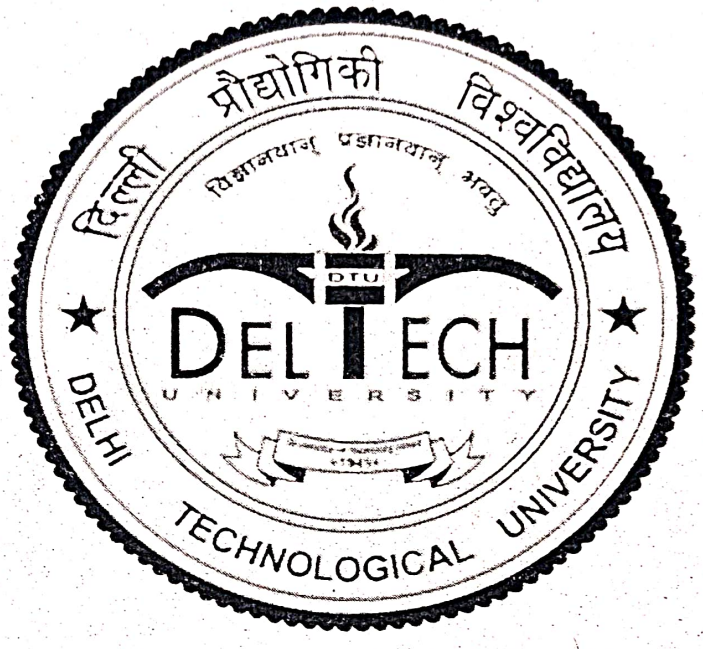
QUESTION PAPERS FOR END TERM THEORY EXAMINATIONS

November/ December-2022



B.Tech, B.Tech (Evening), B.Design,
1st, 3rd, 5th & 7th SEMESTER

End Term Examination
November- December, 2022

B.Tech. / B.Tech. (Continuing Education)/ Design/ USME/DSM – All Semesters

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THIRD SEMESTER **B. Tech. (AE)**

END SEMESTER EXAMINATION **November 2022**

AE-201 **Engineering Mechanics**

Time: 3.0 Hour **Max. Marks: 40**

Note: 1. Attempt Any five questions.
2. Assume missing data, if any

Q-1 (a) Explain different type of forces and their characteristics with example. [4]

(b) A 600 N cylinder is supported on frame BCD (Fig.-1) that is hinged at D point. Determine reactions at A, B, C, and D. [4]

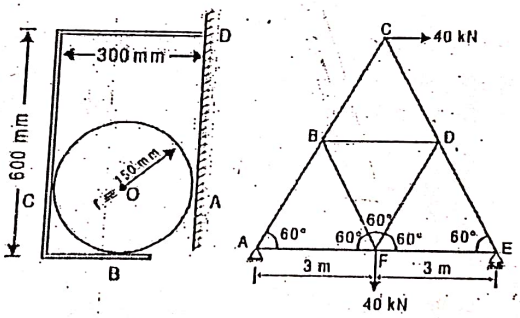


Fig.-1

Fig.-2

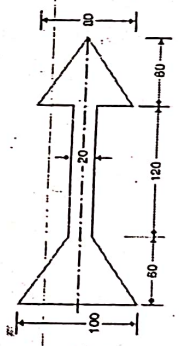


Fig.-3

Q-2 (a) Determine the moment of Inertia of the section in Fig.-3 about horizontal centroidal axis. All dimension are in mm [8]

Q-3 (a) Find value of force P for impending motion of block C upward as shown in Fig.-4. The coefficient of friction at all the

contact surfaces is 0.25. The self-weight of the wedges A and B is neglected. [4]



Fig.-4

(b) Derive the expression of tight and slack side tensions in belt drives with neat diagram. [4]

Q-4 Draw SFD and BMD of the beam in Fig.-5. [8]

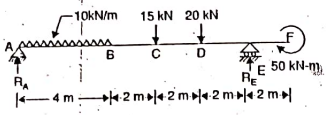


Fig.-5

Q-5 (a) Gravel is thrown into a bin from the top of a conveyor, as shown in Fig.-6, with a velocity of 5 m/sec. Determine the time taken by the gravel to hit the bottom of the bin and velocity. [4]

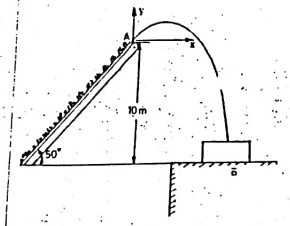


Fig.-6

(b) A flywheel weighing 50 kN and having radius of gyration 1 meter loses speed from 400 rpm to 280 rpm in 2 minutes. Determine the retardation torque, change in kinetic energy and change in angular momentum. [4]

Q-6 (a) Explain D' Alembert's principle. [2]

(b) Two weights 800 N and 200 N are connected by a thread and they move along a rough horizontal plane under the action of a force of 400 N applied to the 800 N weight as shown in Fig.-7. The coefficient of friction is 0.3. Using D' Alembert's principle determines the acceleration of the weight and tension in thread. [8]

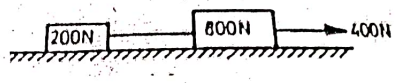


Fig.-7

Total no. of Pages 02

Roll no.....

Third SEMESTER

B.Tech

END TERM EXAMINATION Nov/Dec-2022

AE203 Thermodynamics

Time: 3 Hours Max. Marks: 40

Note : All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1(a): Derived the expression of rate of heat transfer and entropy change during polytropic process [M: 4][CO#1]

(b) Explain (i)equivalent evaporation and evaporative capacity of boiler and boiler efficiency. Explain various losses in boiler in detail. [M: 4][CO#3]

Q.2 (a) Define entropy . Why entropy of unverse is increasing. A mass m of fluid at temperature T_1 is mixed with an equal mass of the same fluid at temperature T_2 Derive the expression of resultant changes of entropy of universe and also prove that it is always positive [M-4][CO#2]

(b) Define following terms with physical significance

(i)Sensible Heat of Water (ii)Latent Heat of Water

(iii) Dryness Fraction (iv) Super Heated Steam

(v) external work (vi) internal energy of steam

(vii) internal latent heat (viii) entropy of superheated steam

[M-4][CO#4]

Q.3(a) Explain primary and secondary fuels in detail (i)What are the advantages of liquid fuels over solid fluid and (ii) gaseous fuels over liquid fuels [M-4][CO#5]

(b)Determine the air fuel ratio on both a molar and mass basis for the complete combustion of octane(C_8H_{18}) with (i) the theoretical amount of air (ii) 150% theoretical air [M-4][CO#5]

Q.4(a) Define first law(energy) efficiency and second law (exergy) efficiency of the cycle. How you can calculate exergy destruction ratio and exergy destruction in each component in the vapour compression cycle. [M-4][CO#2]

(b) Describe the different thermodynamic processes involved in the ideal Rankine cycle.(i) Also advantages of Rankine cycle over Carnot vapour cycle . (ii)Derive the expression for its thermal efficiency and specific work output. (iii) State the methods for increasing thermal efficiency of Rankine cycle [M-4][CO#4]

Q.5 (a) Define boiler. How they are classified. Draw neat sketch of Lancashire / locomotive boiler and explain the working principle. Also discuss boiler mountings and accessories of any boiler [M-4][CO#3]

(b)A cylindrical tank containing 4.0 kg of carbon mono oxide gas at -50°C has an inner diameter of 0.2 m and length of 1m. Determine the pressure in bar exerted by the gas using (i) the generalized compressibility chart (take for CO: Critical temperature=133K, Critical pressure=35 bar and compressibility number=0.9 (ii) the ideal gas equation of state (iii) the Vander Waals equation of state (Take a=1.474 bar$(m^3/kmol)^2$ and b=0.0395 $(m^3/kmol)$ (iv)Redlich Kwong equation of state.(Take a=17.22 bar$(m^6)(K)^{1/2}/(kmol)^2$ and b=0.02737 $(m^3/kmol)$ Compared the results obtained [M-4][CO#6]

or

(b) A refrigerator operating between two identical bodies cools one of the bodies to a temperature T_2. Initially both the bodies are at temperature T_c. Derive the expression for minimum specific work required by the refrigerator [M-4][CO#2]

5

Roll No. .....

THIRD SEMESTER

B. Tech [AE]

END SEMESTER EXAMINATION *NOV/DEC- 2022*

AE-205 MANUFACTURING MACHINES

Time: 3.00 Hrs *Max. Marks:40*

Note: Answer any *FOUR* questions.
Assume suitable missing data, if any.

1[a] With a neat sketch discuss the thread cutting operation to cut a left hand BSW thread on a centre lathe. Also calculate the change gears required to cut a RH screw having 8 mm pitch on a lathe having lead screw of 4 TPI. 5 [CO2]

[b] Sketch various views of a standard RH twist drill and explain its various elements and angles. 5 [CO3]

2[a] A Steel plate 800 mm×400 mm×30 mm is to be shaped along the longer side with cutting speed of 28 m/minute for roughing and 34 m/minute for finishing. The ratio of return time to cutting time is 2:3. The feed per stroke is 1.2 mm for roughing and 0.5 mm for finishing. The maximum depth of cut may be taken as 2 mm for roughing and 0.5 mm for the finishing. Tool over-travel and approach are 15 mm each. Calculate the machining time and metal removal rate for the given plate having final thickness 25 mm. 5 [CO3]

[b] With a neat sketch explain the working of a crank and slotted link mechanism of a shaper. How stroke length, cutting speed and position of stroke can be adjusted on this shaper? 5 [CO3]

3[a] With a neat sketch explain the construction and the working of a column and knee type horizontal milling machine. 5 [CO4]

PTO

[b] With the help of neat sketches differentiate the following milling operations.
(a) Up milling and down milling
(b) Plain milling and face milling
5 [CO4]

4[a] Explain the following terms with reference to grinding.
(i) Loading (ii) Glazing (iii) Dressing (iv) Trueing (v) Centre less grinding
5 [CO5]

[b] What do you mean by the term specification of a grinding wheel? Explain the individual elements which are used to specify a grinding wheel, along with their importance
5 [CO5]

[5] Write short notes on the following [*Any Four*]
(i) Cutting tool materials
(ii) Drilling and related operations
(iii) Universal indexing head
(iv) Difference in shaper and planer
(v) Lapping and honing
10 [CO1,3,4,6]

END

Total No. of Pages 1 *Roll No.----------*

III SEMESTER B TECH AE
END SEMESTER EXAMINATION Nov. 2022
AE-207 ENGINEERING ANALYSIS AND DESIGN

Time: 3 Hours **Max. Marks: 40**

Note: 1. Answer ANY FIVE questions.
2. Answer to each question (or its part) must start on a fresh page.
3. All questions carry equal marks.

1 A. Explain the biomimicry giving suitable examples. [4] [CO1]

1 B. What are the common nature inspired innovations? Explain in brief. [4] [CO1]

2. A. What is the procedure for SWOC analysis? Give its applications. [4] [CO2]

2. B. Explain the concept of Participatory Ergonomics with a typical example. [4] [CO5]

3 A. Explain the principles of innovations given by Da Vinci. [4] [CO2]

3 B. Briefly discuss the development of TRIZ in innovations. Describe any three key principles of TRIZ. [4] [CO4]

4. A. Discuss the ergonomic factors affecting the health and safety of industrial workers. [4] [CO5]

4 B. What are the various types of properties commonly possessed by a person? Discuss various types of Intellectual Property Rights? [4] [CO6]

5 A. Differentiate between Need, Comfort and Luxury giving suitable examples. [4] [CO1]

5 B. Explain the contribution of JUGAD in innovations with a typical example. [4] [CO4]

6. Write short note on the following: (ANY FOUR) [8] [CO1-6]

a) Provocation and Movement
b) Bullet Train
c) Conditions of patentability
d) Contradiction matrix
e) GI tag with examples
f) Sectional Assembly Drawing

Total no. of Pages: 8

Roll no.....

THIRD SEMESTER

B.Tech. (A/E)

END TERM EXAMINATION *Nov/Dec-2022*

AE 317 **POWER UNITS AND TRANSMISSION**

Time: 03:00 Hours *Max. Marks: 50*

Note: All questions carry marks as shown against each. Assume suitable missing data, if any.

Q.1 What are different types of transmission systems? Name the different units of transmission system. Explain any one transmission system. [8 Marks][CO1]

Q.2 With the help of a neat sketch, describe the construction and working principle of the single plate clutch. [8 Marks][CO2]

Q.3 With the help of a neat sketch, describe the construction and working principle of the planet gear box. Explain how the different gears are obtained in it, explain. [8.5Marks][CO3]

Q.4 With the help of neat sketch of torque converter, write construction, principle of operation, advantages and disadvantages. [8.5 Marks][CO4]

Q.5 What is overdrive? Draw its neat sketch. Write its working principle. Write the gear box in which fluid coupling is used and explain its working in that gear box. [8.5 Marks][CO5]

Q.6 What is the Need and Requirements of Differential? Draw a neat sketch of differential gear box and explain its functions. [8.5 Marks][CO6]

Total No. of Pages 2 *Roll No. ...*

FIFTH SEMESTER **B.Tech [AE]**

END SEM EXAMINATION [NOV. 2022]

AE-301 MANUFACTURING TECHNOLOGY

Time: 3 Hours *Max. Marks: 40*

Note: Answer *ANY FOUR* questions. Assume suitable missing data, if any.

1[a] As per Indian standards system of marking grinding wheels [IS: 551-1989], a grinding wheel has the following specification.

54 C 36 T 5 V 12. 5 [CO1]

Explain the individual elements of the specification from the standpoint of the functioning of the wheel.

[b] With reference to USM, briefly discuss the following.

(i) Working principle with schematic diagram (ii) Abrasive Grains (iii) Applications and limitations. 5 [CO2]

2[a] With reference to EDM, briefly discuss the following.

(i) Working principle with neat sketch (ii) Die electric fluids and their desirable properties (iii) Selection of tool materials (iv) Applications and limitations 5 [CO2]

[b] The following data were recorded while machining a workpiece on a standard shaper.

Cutting speed: 24 m/min
Depth of cut: 1.5 mm
Feed: 0.20 mm/rev
Tool life: 90 minutes.

The tool life equation is given for this operation: $VT^{0.15}f^{0.75}d^{0.3}=C$

If cutting speed, feed and depth of cut are all increased by 30% each individually and also collectively, what will be their effect on the tool life? 5 [CO3]

3[a] Draw a Merchant's circle diagram and derive expressions to find out friction force and shear force acting on the single point cutting tool during orthogonal cutting. 5 [CO3]

[b] A mild steel pipe of 50 mm outside diameter is turn on a lathe with a cutting speed of 20 mts/min with a cutting tool having rake angle of 25^0. The length of continuous chip in one revolution is measured 80 mm and cutting force and thrust forces are found 2500 N and 1000 N respectively. Find out the chip thickness ratio, shear plane angle, chip flow velocity and coefficient of friction. 5 [CO3]

4[a] With neat sketches briefly discuss the principle of six points location and principle of extreme positions. 5 [CO4]

[b] With neat sketches explain the construction and working of the following. 5 [CO4]

(i) Leaf jig (ii) Wedge type Jack pin

5[a] What are slip and angle gauges? Select the sizes of the gauges required to build the following. 5 [CO5]

[i] $23^o 49' 15"$ (Use 13 pieces angle gauge set)

[ii] 69.361mm (Use 88 pieces slip gauge set)

[b] Write short notes on the following *[ANY TWO]* 5[CO 2,3,5]

(i) Mechanism of laser operation (ii) Mechanisms of tool wear (iii) Line standards and end standards

END

Q.6b) A Francis turbine with an overall efficiency of 75% is required to produce 148.25kW power. It is working under a head(H) of 7.62m. The peripheral velocity at inlet is $0.26\sqrt{2gH}$ and radial velocity of flow at inlet $0.96\sqrt{2gH}$. The wheel runs at 150rpm and the hydraulic loss in turbine is 22% of the available energy. Assuming radial discharge, determine: Guide blade angle, Wheel vane angle at inlet, Diameter of wheel at inlet, Width of wheel at inlet. [4][CO6]

Q.7a) The internal and external diameter of the impeller of a centrifugal pump is 200mm and 400mm respectively. The pump is running at 1200 rpm. The vane angle of impeller at inlet and outlet are 20° and 30° respectively. Water enters the impeller radially and the velocity of flow is constant. What will be the work done by the impeller per unit weight of the water? [4][CO6]

Q.7b) Draw and discuss the following characteristic curves of centrifugal pumps: Main characteristic curves, Operating characteristic curves, and constant efficiency curves. [4][CO6]

Total No. Pages 04

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Vth SEMESTER

(B.Tech.)

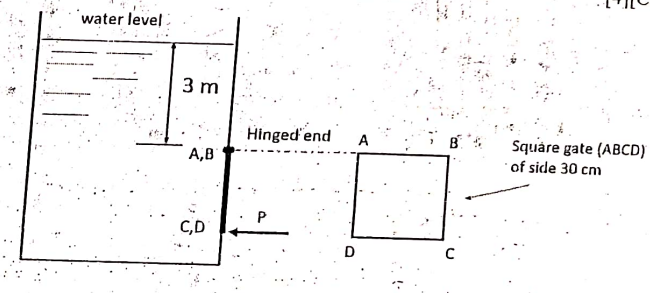
END TERM EXAMINATION ***NOV-2022***

AE303 FLUID MECHANICS AND HYDRAULIC MACHINES

Time: 3:00 Hours ***Max. Marks: 40***

Note : Attempt any five questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1a) A square door (ABCD) of side 30 cm is provided in the vertical wall of a tank which is filled with water having a specific weight of 9790 N/m³ as shown in the figure. What horizontal force (P) must be applied at the lower end of the gate so as to hold the hinged door closed. The hinged end (AB) of the door lies at a depth of 3 m from the free surface. [4][CO1]



Q.1b) A flat plate of 0.3m² area moves edgewise through oil between large fixed parallel planes 10 cm apart. If the velocity of the plate is 0.6 m/s and the oil has a kinematic viscosity of 0.45×10^{-4} m²/s, and specific gravity of 0.8, what will be the drag force required to maintain this velocity when, i) the plate is at 2.5 cm from one plane, ii) plate is equidistant from both planes. [4][CO1]

Q.2 a) Explain the following with neat sketches:

i) Streamlines, Pathlines, Streaklines,

ii) Laminar flow, turbulent flow, uniform flow, non-uniform flow

[2+2][CO2]

Q.2 b) A one-dimensional steady flow through a converging nozzle having linear velocity distribution, $u = u(x)$, with velocity $u=V_0$ at nozzle base and $u=3V_0$ at nozzle tip. What will be the acceleration of the fluid at the base and at the tip of the nozzle if the length of the nozzle is 500 mm and $V_0 = 5$ m/s. [4][CO2]

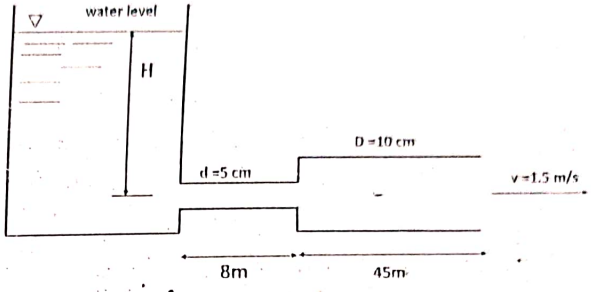
Q.3 a) Explain the physical significance of the following dimensionless numbers: Reynolds number, Froude number, Weber number, Euler Number [4][CO3]

Q.3 b) A 2.5 m ship model was tested in freshwater (density= 1000 m^3/kg) and measurement indicates that there was a resistance of 45N when the model was moving at 2 m/s. What will be the velocity of 40 m prototype and also the force required to drive the prototype at this velocity in sea water (density= 1025 m^3/kg). [4][CO3]

Q.4 a) Two fixed parallel plates kept 8 cm apart have a laminar flow of oil between them with a maximum velocity of 1.5 m/s. Find : discharge per meter width, shear stress at the plate, pressure difference between two points 25 m apart, velocity at 2 cm from the plate, velocity gradient at the plate. The dynamic viscosity of the oil is 2 N.s/m^2. [4][CO4]

Q.4 b) Crude oil (viscosity = 1.5 Poise, specific gravity = 0.9) flows through a 20 mm diameter vertical pipe. Two pressure gauges have been fixed at 20 m apart. The pressure gauges fixed at the higher level reads 200 kPa and that at lower level read 600kPa. What will be the flow rate through pipe and direction of flow. Specific weight of water = 10kN/m^3. [4][CO4]

Q.5 a) A 5cm diameter pipe takes off abruptly from a large tank and runs 8 m, then expands abruptly to 10 cm diameter and runs 45m and then discharges directly into open air with a velocity of 1.5 m/s as shown in figure . What will be the required height (H) of the water surface above the point of discharge? Take the coefficient of friction as 0.0065. [4][CO5]



Q.5 b) A venturimeter with 200mm diameter at the inlet and 100mm diameter at throat is laid with axis horizontal and is used for measuring the flow of oil of specific gravity 0.8. The difference of level in U-tube differential manometer reads 180mm of Hg while 11520kg of oil is collected in 4 minutes. What will be the discharge coefficient for the venturimeter? [4][CO5]

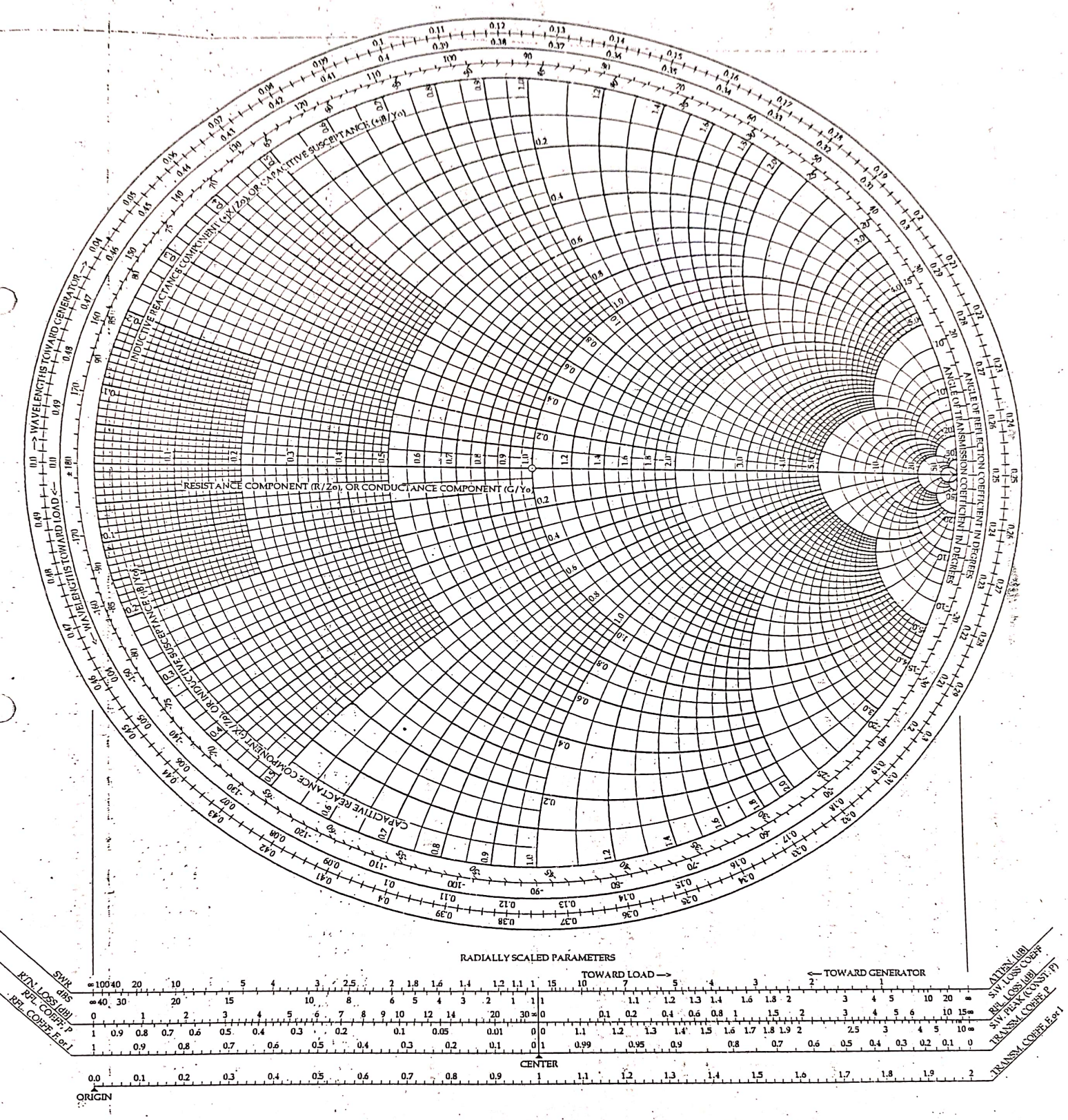
Q.6a) A 137mm diameter jet of water issuing from a nozzle impinges on the bucket of a Pelton wheel and the jet is deflected through an angle of 165^O by the bucket. The head available at the nozzle is 400m. Assuming coefficient of velocity as 0.97, speed ratio as 0.46 and reduction in relative velocity while passing through bucket is 15%. Find the power developed by wheel. [4][CO6]

Student's Name :
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The Complete Smith Chart

Black Magic Design



Total no. of Pages: 3 Roll no.....

VIth SEMESTER **B.Tech.**

END TERM EXAMINATION ***Nov/Dec-2022***

COURSE CODE AE309 **COURSE TITLE Operations Research**

Time: 03:00 Hours *Max. Marks: 50*

Note: Assume suitable missing data, if any.
Attempt any 5 questions

Q.1 (a) Define Operations Research and explain its significance and application.

(b) Use penalty (or Big 'M') method to Minimize $z = 4x_1 + 3x_2$ subject to the constraints: $2x_1 + x_2 \geq 10$, $-3x_1 + 2x_2 \leq 6$ $x_1 + x_2 \geq 6$, $x_1 \geq 0$ and $x_2 \geq 0$. [4+6][CO1]

Q.2 (a) Four new computers C1 C2 C3 C4 are to be installed in computer table. There are 5 places A, B, C, D & E available. Because of limited space or some restriction C2 cannot be placed at C and C3 cannot be placed at A. The assignment cost of the computer is placed in table below. Find the optimal assignment schedule.

	A	B	C	D	E
C1	4	6	10	5	6
C2	7	4	-	5	4
C3	-	6	9	6	2
C4	9	3	7	2	3

(b)

Machine	Job				
	A	B	C	D	E
M1	11	13	9	16	17
M2	4	3	5	2	6
M3	6	7	5	8	4
M4	15	8	13	9	11

Solve the following sequencing problem, giving an optimal solution when passing is not allowed. Its processing time (in hours) is given above. Also find the total elapsed time and idle time of every machine. [5+5][CO2]

Q.3 (a) What is Kendall's Notation? Give the classification of queuing system based on Kendall notation.

(b) In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the interarrival time follows an exponential distribution and the service time (the time taken to hump a train) distribution is also exponential with an average of 36 minutes. Calculate:(i) expected queue size (line length) (ii) probability that the queue size exceeds 10. If the input of trains increases to an average of 33 per day, what will be the change in (i) and (ii)? [4+6][CO3]

Q.4 (a) Explain pay off matrix and types of strategy in game theory?

(b) Define Dominance rule, Saddle point and Fair game? Use dominance rule to reduce the matrix size. Solve the following game theory problem by graphical method? [3+7][CO4]

	Player B			
Player A	I	II	III	IV
I	19	6	7	5
II	7	3	14	6
III	12	8	18	4
IV	8	7	13	1

Q.5 (a) State and explain group replacement policy? [4+6][CO5]

(b) Let the value of the money be assumed to be 10 percent per year and suppose that machine A is replaced after every three years, whereas machine B is replaced every six years. The yearly costs (in Rs) of both the machines are given below (Assume time value of money is constant). Determine which machine should be purchased.

Year	1	2	3	4	5	6
Machine A	1000	200	400	1000	200	400
Machine B	1700	100	200	300	400	500

Q.6 (a) Define term PERT, CPM, Dummy activity, Total float, free float and independent float?

(b) Total cost of project is 10,000 and overhead cost Rs 200/day. If the project duration has to be crashed down to 9 days. Calculate the total cost of project? [4+6][CO6]

Activity	Normal Duration	Predecessor	Cost slope Rs/day
P	3	-	500
Q	7	P	100
R	4	P	400
S	5	R	200

Total No. of Pages _3 Roll No. .....

7TH SEMESTER **B.Tech (Automobile Engg.)**

END SEMESTER EXAMINATION Nov-2022

AE405 & Design of Automobile Components

Time: 3:00 Hours *Max. Marks : 40*

Note : Answer any five questions.
All questions carry equal marks. Assume suitable missing data, if any. Design Data H/Book is not allowed.

Q.1 (a). Explain bearing modulus with the help a characteristic curve for sliding contact bearing. (3) CO-3

(b). Consider a full hydrodynamic journal bearing with a radial load of 22kN at journal speed of 960rpm. If the length of the bearing is equal to journal diameter and ratio of minimum oil thickness to radial clearance is 0.2; then determine (i) dimension of the bearing (ii) minimum film thickness, (iii) requirement of oil flow. Assume viscosity of the lubricant as 20centipoise. (5) CO-3

Q2. A pair of helical gears with minimum teeth on the pinion and 80 teeth on the gear is used to transmit power of 5kW at 1660 rpm of driving pinion. The gear tooth is 20° full depth involute with a helix angle of 15°. Both the gears are made of hardened steel with UTS of 660MPa and a design stress of 220MPa. Gears are machined with an accuracy of grade 8, with a service factor of 1.5. Design the gear pair on the basis of strength and wear. (8)CO-2

Q3. A pair of straight bevel gears with 24 teeth and 36 teeth is mounted on shafts at right angle to each other. An electric motor supplies 12kW of power at 1400rpm to the pinion shaft. Both the gears are made of same steel with UTS of 660MPa. Determine the module on the basis of

strength only. Draw the line diagram of the bevels in mesh with complete nomenclature. (8)CO-2

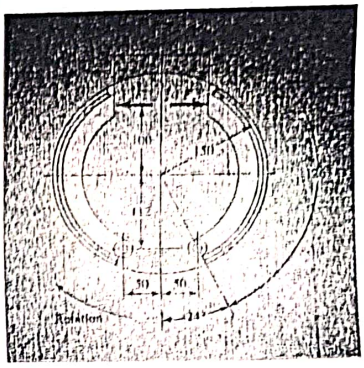
Q4. (a). Show that the maximum bending moment in a connecting rod occurs at a distance of $l/\sqrt{3}$ from piston pin and is equal to $[0.128F_n.L]$. where F_n is resultant normal force and L is the length of connecting rod. (3)CO-5

(b). Design a connecting rod (I-section) with a non split big end for a single cylinder petrol engine with following data: piston diameter=100mm, stroke=140mm, length of CR=300mm, weight of reciprocating parts=1.8kg, rpm=1600 with an overspeed of 2500rpm. Compression ratio=7:1, maximum explosion pressure=2.75MPa. assume that the CR is made of SAE1045 steel with UCS of 660MPa and UTS of 580MPa. (5) CO-5

Q5. Design a cast iron piston made of FG200 for the petrol engine data given in Q4(b) for a fuel consumption of 0.227kg/kW/hr at overspeed of 2500rpm and Basic mean effective pressure of 0.65MPa. HCV of the fuel is 41870kJ/kg. Assume a wall pressure of 0.035MPa for two compression rings and one oil ring. Bearing pressure at skirt and cylinder interface is 0.45MPa. Design the piston pin assuming that it is made of the same material as that of connecting rod. (8)CO-5

Q6. Design an overhang crankshaft for a single cylinder petrol engine data given in Q4(b) made of SAE 1040 with permissible stresses in bending and compression as 60MPa and 75MPa respectively. Allowable bearing pressure in main bearing is 7MPa. Side crank carries a flywheel of mass 200kg between two journal bearings of crankshaft. Assume that the bearings are 200mm apart. (8)CO-4

Q7. Explain a leading shoe and a trailing shoe with help of a free body diagram. The internal expanding brake is actuated by a cam mechanism exerting the same force F on each shoe having a face width of 40mm. The lining is moulded asbestos with a friction coefficient of 0.38 and a pressure limited to 1MPa. Determine the actuating force and total braking torque capacity (Refer figure given below). (8)CO-1



(all dimensions in mm)

Total No. of Pages 1 | 8 Roll No._____

VII SEMESTER B TECH ELECTIVE
END SEMESTER EXAMINATION Nov. 2022
AE-409 COMPUTER AIDED VEHICLE SAFETY AND DESIGN

Time: 3 Hours **Max. Marks: 40**

Note: 1. Answer ANY FIVE questions.
2. Answer to each question (or its part) must start on a fresh page.
3. All questions carry equal marks.

1 *A.* Explain in brief the development of the safety features of an automobile with time scale. [4] [CO1]

1 B. Discuss the power and torque characteristics of an IC engine used for automobiles. [4] [CO4]

2 A. What are the various tests required for a vehicle certification? Explain in brief. [4] [CO2]

2 B. What are the various aerodynamic resistances to a vehicle motion? Explain how these can be minimized? [4] [CO2]

3 A. What are the parameters for the visibility test of a vehicle? Describe in brief the visibility regulations. [4] [CO2]

3 B. Explain the requirement of a gear box in a vehicle. How it helps in the acceleration and gradeability? [4] [CO3]

4 A. Explain the Monocoque vs body-on-frame for a vehicle. [4] [CO3]

4 B. Explain the forces acting on an IC engine piston and connecting rod. [4][CO4]

5 *A.* Explain the various methods for the crash testing of an automobile with relevant standards. [4] [CO5]

5 B. Discuss the evolution of the emission testing standards of IC engines. [4] [CO6]

6. Write short notes on the following: **(ANY FOUR)** [8] [CO1-5]

a) OBD
b) NVH Design
c) TAP-15
d) Self driven Car
e) Monocoque Body
f) Seat belt certification

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VII SEMESTER

B.Tech (Automotive/Other Branches)

END TERM EXAMINATION *NOV-2022*

AE-411 **Vehicle Maintenance & Tribology**

Time: 3:00 Hours *Max. Marks: 50*

Note: Attempt any five questions (out of eight questions).
All questions carry equal marks.
Start the new question or part thereof on a new page.
Attempt all parts of a question at one place
Assume suitably missing data, if any.

Q.1	(a) Analyse various types of lubricants additives along with their needs. (b) Analyse the concept of friction describing its various types.	10 marks (5+5)	CO-1
Q.2	(a) Classify the different tools used for servicing. Also describe three of them using neat sketches. (b) Classify various types of maintenance and describe them briefly	10 marks (5+5)	CO-2
Q.3	(a) Illustrate the process of crankshaft grinding. Also draw a neat sketch for the same. (b) Illustrate the procedure of spark plug servicing.	10 marks (5+5)	CO-3
Q.4	(a) Analyse the process of servicing the brake of vehicle. Draw a neat sketch for the same. (b) Analyse the steps for servicing and maintaining a manually operated gearbox of 4-wheel manually operated vehicle.	10 marks (5+5)	CO-4

Please Turn Over for remaining four questions

Q.5	(a) Illustrate the evolution of battery in automotive sector. Also Illustrate in detail the procedure of battery servicing. (b) Illustrate the various steps involved in diagnosing ignition system faults.	10 marks (5+5)	CO-5
Q.6	(a) Classify the various cooling system tests. Also explain them in detail. (b) Classify the various flushing processes and explain them using neat sketches	10 marks (5+5)	CO-6
Q.7	(a)Write a comprehensive note on Adhesive wear and its mechanism (b) Discuss the concept of boundary lubrication in detail.	10 marks (5+5)	CO-1
Q.8	Write short notes on any two of the following: a. Greasing of motor vehicles b. Preventive maintenance c. Road test report, Trip sheet and Log book	10 marks (5+5)	CO-2

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Total no. of Pages: 01 Roll no.....

SEVEN SEMESTER B.Tech. (A/E)

END TERM EXAMINATION Nov/Dec-2022

AE 413. VEHICLE TRANSPORT MANAGEMENT

Time: 03:00 Hours Max. Marks: 50

Note : All questions carry marks as shown against each.
Assume suitable missing data, if any.

Q.1 What do you mean by Personality problems? Discuss personality disorder in details. [8 Marks][CO1]

Q.2 What are the major activities of the administrative department? Also enlist its responsibilities. [8 Marks][CO2]

Q.3 What do you mean by vehicle cost? What are the factors which affect its cost and operating cost, explain them. [8.5 Marks][CO3]

Q.4 What are the parameters on which the fitness of vehicle depends? Explain any 10 parameters. [8.5 Marks][CO4]

Q.5 What is the preventive maintenance? What are steps for better tire life? What are causes of uneven tyre wear? [8.5 Marks][CO5]

Q.6 What is the necessity of registration of Vehicle? What are the occasions that registration is refused, issue of registration certificate and how to apply for registration of a vehicle? [8.5 Marks][CO6]

Total No. of Pages: 03 Roll No. .....

THIRD SEMESTER B.Tech.[EE]

END SEMESTER EXAMINATION (Nov.-2022)

MA-261 NUMERICAL AND ENGINEERING OPTIMIZATION METHOD

Time: 3 Hours *Max. Marks:40*

Note: Answer *ALL* questions. All questions carry equal marks. Assume suitable missing data, if any and clearly mention the assumptions.

Q.1 Answer all the following questions:

[a] Find the input output relationship of the circuit given in Figure.1 in terms of a linear differential equation. Using **Runge-Kutte fourth order** method write a MATLAB program and obtain a solution for the differential equation for t= 0 sec to t=0.6 seconds with step size 0.2. Assume initial condition y(0)=2, R1= 30kΩ, R2=20kΩ, C=100μF, Vin =20volts. [4] CO1

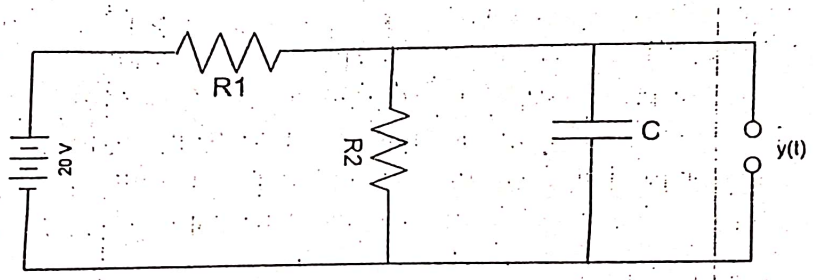


Figure.1

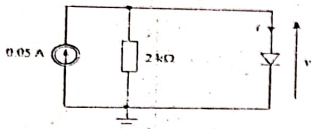
[b] What are the necessary and sufficient conditions for unconstrained one-dimensional optimization techniques? [2] CO3

[c] Explain the concept of random search method for unconstrained optimization methods. [2] CO3

Q.2 Attempt any TWO questions out of the following:

[a] Find a positive root of equation $\log x = 3x + \sin x$ by bisection method. [4] CO1

[b] Given the circuit shown, where the diode is described by the equation $i = 10^{-15}(e^{38v} - 1)$



Assuming v_0=0, apply Newton Raphson Method to calculate the value of voltage v. [4] CO1

[c] Maximize the function f(x,y) = 50x + 100y using graphical method under the constraints $10x + 5y \leq 2500$, $4x + 10y \leq 2000$, $x + 1.5y \leq 450$, $x \geq 0$, $y \geq 0$. [4] CO2

Q.3 Attempt any TWO questions out of the following:

[a] Write MATLAB program to find the minimum value of $f(x) = x^2 + 2x$ within the interval [-3,4] using Fibonacci method. Obtain the optimal value within 5% of exact value. [4] CO3

[b] Minimize following function

$$f(x) = 0.65 - \left[\frac{0.75}{1+x^2}\right] - 0.65x \tan^{-1} x^{-1}$$

Apply golden section search method in the interval [0 3] with 6 iterations. [4] CO3

[c] Find the minimum of the function f = (λ/log λ) by using quadratic interpolation method (take the initial trial step length as 0.1). [4] CO3

Q.4 Attempt any TWO questions out of the following:

[a] Minimize $f(x_1, x_2) = 6x_1^2 - 6x_1x_2 + 2x_2^2 - x_1 - 2x_2$ using steepest descent method starting from the point $X_1 = \begin{Bmatrix}0\\0\end{Bmatrix}$. [4] CO3

[b] Find the value of [x,y] using Newton-Raphson technique to solve F1(x,y)=x^2+ xy+ y^2- 7 and F2(x,y)=x^3- y^3- 9 with initial condition [x,y]=[1.5,0.5]. [4] CO3

[c] Explain pattern search method for unconstrained n dimensional optimization. [4] CO3

Q.5 Attempt any TWO questions out of the following:

[a] Find the optimum values of x_1 and x_2 using the Kuhn-Tucker conditions to minimize the given function.

$f(x_1, x_2) = x_1^2 + x_2^2 - 2x_1 - 4x_2$

subject to $g_1(x_1, x_2) = x_1 + 4x_2 - 5 \leq 0$,

$g_2(x_1, x_2) = 2x_1 + 3x_2 - 6 \leq 0$,

$g_3(x_1, x_2) = -x_1 \leq 0$,

$g_4(x_1, x_2) = -x_2 \leq 0$

starting from the point $X_1 = \begin{Bmatrix}1.0\\1.0\end{Bmatrix}$. [4] CO3

[b] Apply Penalty function method to minimize

$$f(x_1, x_2) = \frac{1}{3}(x_1 + 1)^3 + x_2$$

subject to $g_1(x_1, x_2) = -x_1 + 1 \leq 0$

$g_2(x_1, x_2) = -x_2 \leq 0$ [4]

[c] Apply unidirectional search method and maximize $f(x, y, z) = x + 2y + z$ subject to $2x + y - z \leq 2$, $-2x + y - 5z \geq -6$, $4x + y + z \leq 6$, $x \geq 0$, $y \geq 0$, $z \geq 0$ [4]

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THIRD SEMESTER

B.Tech.

END TERM EXAMINATION ***Nov/Dec-2022***

BT 201 Introduction to Biotechnology

Time: 03:00 Hours *Max. Marks: 50*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 [A] Attempt any TWO of the following [2½+2½ marks] [CO1]

(i) Give an elaborative account of any three applications of Biotechnology in Agriculture

(ii) How is Biotechnology helpful in Medical / Health sector? Enumerate five applications in the field and discuss any two in detail

(iii) Analyze the role of Biotechnology in the following - Designer milk; DNA fingerprinting; Leavening of bread

[B] Answer the following [2½+2½ marks] [CO1]

(i) Name any five scientists who won Nobel Prize in Physiology & Medicine or Chemistry in the past 15 years. Indicate the contribution of each

(ii) Compare and contrast the following terms, mentioning 2 points for each - Reproductive cloning and Therapeutic cloning; Organogenesis and Somatic embryogenesis

Q.2 [A] Attempt any TWO of the following [2½+2½] [CO4, CO5]

(i) DNA is genetic information carrier. Explain the statement with the help of Hershey and Chase experiment

(ii) Give a descriptive account of the following - 'Prokaryotic standard promoter and its recognition by RNA polymerase' and 'Advantages of supporting medium used in gel electrophoresis'

(iii) Assign roles to the following enzymes / proteins in the process of gene expression and explain the functioning of each in about 50 words - DnaG primase, DNA gyrase, DNA ligase, Sigma subunit of RNA polymerase; Rho protein

P.T.O.

[B] Attempt any TWO of the following [2½+2½] [CO2]

(i) Extrachromosomal nuclear material (Plasmids) confers phenotypic traits on bacteria in which they are present. Explain this statement with examples of various types

(ii) Give reasons for the following - 'Lysosomal enzymes do not hydrolyze cytoplasmic contents' and 'Two eukaryotic cell organelles are semiautonomous'

(iii) Analyze the structures of the following to explain their functions - 'Centriole' and 'Mitochondria'

Q.3 [A] Answer the following [2½+2½] [CO3]

(i) Evaluate the structure and nutrition of fungi and determine the similarities and differences from algae

(ii) Write two points of differences between each of the following - Glycoprotein and Glycolipid; Gram-positive and Gram-negative bacteria; Integral membrane protein and Peripheral membrane protein

[B] Attempt any TWO of the following [2½+2½] [CO3]

(i) Give the salient points of induced fit hypothesis explaining the enzyme active site in enzyme-substrate complex

(ii) Explain the class and functions of oxidoreductase enzymes. What is the basis of their systematic nomenclature and Enzyme Commission numbers?

(iii) Enzymes are very selective for their substrates. What are the various types of specificities of enzymes? Explain with examples

Q.4 [A] Attempt any TWO of the following [2½+2½] [CO4]

(i) What is meant by sticky end restriction enzyme? What are its various types, explain with examples. Explain any one strategy for the selection of recombinants from non-recombinants based on color reaction

(ii) Give two points of differences between any three of the following - Monocistronic and Polycistronic; Introns and Exons; 30S initiation complex and 70S initiation complex; EF-Tu and EF-Ts; Eukaryotic mRNA and Prokaryotic mRNA

P.T.O.

(iii) Give a descriptive account of the structure of secondary and tertiary structures of tRNA. Also clearly explain the positions of anticodon, variable loop, terminal base pair and CCA sequence

[B] Give details of the following steps with respect to Central Dogma of Molecular Biology - 'DNA polymerase III catalyzed DNA chain extension with high processivity' and 'Hairpin termination of prokaryotic transcription' [5] [CO4]

Q.5 [A] Attempt any TWO of the following [2½+2½] [CO5]

(i) Describe the principle and working of agarose gel electrophoresis. Also clearly discuss the roles of following in gel electrophoresis - Ethidium bromide, Bromophenol blue, Glycerol, TAE buffer

(ii) Explain the principle of differential centrifugation and how is it used for the separation of various cell organelles

(iii) Give a flowsheet representation indicating the preparation and working principle of silica-based thin layer chromatography

[B] Give a descriptive account of the principle of ion exchange chromatography. Clearly explain the stationary phase, mobile phase, matrix, washing conditions, and elution conditions. Also compare and contrast anion exchanger and cation exchanger [5] [CO5]

END

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Third Semester
B.Tech.

END TERM EXAMINATION November- 2022

BT 203 Biochemistry

Time: 3:00 Hours Max Marks: 40

Note: All questions are compulsory

Q 1. Write short note on any four of the following: 4X2=8 [CO

a. Buffers Solutions
b. Ionic bonds
c. Noncovalent interactions
d. pH of solutions
e. Free energy

Q 2. A researcher is analysing a compound. He finds that it has the same structure as glucose, but has an altered configuration at one of the stereogenic centers. What can the researcher conclude about the compound? [2] [CO

Q 3. Attempt any *four* of the following: [4X2= 8] [CO

a. Electron transport chain
b. Phosphorylation
c. Metabolism
d. ATP
e. Metabolic pathways
f. Fermentation

Q 4. Describe and discuss any *four* pathways with labelled diagram of intermediates and enzymes.

a. Glycolytic Pathway
b. Citric acid cycle
c. Calvin cycle
d. Pentose Phosphate pathway
e. Gluconeogenesis
f. Glycogen breakdown

[4X2.5=10] [CO 4]

Q. 5 What is lipid digestion, absorption, and transportation. How cholesterol is metabolised in a cell.

[3] [CO 5]

Q. 6 Answer any two of the following:

[2X2.5=5] [CO

a. What are carbohydrates? Give the classification with structure.
b. Describe DNA structure.
c. Explain protein. How are the monomeric units are attached.

Q. 7 Write short note on any *two* of the following:

[2X4=4] [CO

a. Urea cycle
b. Amino acid synthesis
c. Polar amino acids
d. Peptide bond

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Total no. of Pages: 1 28 Roll no.....

IIIrd SEMESTER **B.Tech. Biotechnology**

ENDTERM EXAMINATION *Nov/Dec-2022*

COURSE CODE BT-205 **COURSE TITLE** **GENETICS**

Time: 03:00Hours *Max.Marks:40*

Note : All questions are compulsary
Assume suitable missing data, if any.

1. What is epistasis? Explain the phenomenon of dominant - epistasis giving suitable example. 5[CO 2]
2. What are chromosomal aberrations? Explain chromosomal structural changes with the help of diagram. 5[CO 3]
3. What are transposable elements? Give a brief account on salient features of transposable elements. 5[CO 3]
4. a.Explain the cytoplasmic factors of extranuclear inheritance.

   b. Using any two characters explain Mendels dihybrid ratio 2 x 2.5 [CO 4]

5. What are nucleosomes? Explain its structure with the help of diagram 5[CO 4]
6. Explain the Hardy- Weinberg principle. In a population of 1000 individuals, 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. Based on this data, the frequency of allele A in the population is? 5[CO 1]

OR

What are nucleosomes? Explain its structure with the help of diagram 5[CO 2]

7. Differentiate between biochemical and genetic markers. Explain different types of DNA markers in brief. 6 [CO5]

OR

Explain the mechanism involved in DNA repair system. 6[CO4]

8. Explain cris-cross inheritance of colour blindness and haemophilia in humans, with the help of crosses 4 [CO5]

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III SEMESTER

B.Tech. (Biotechnology)

END TERM EXAMINATION *Nov/Dec-2022*

BT-207 Fundamentals of Computational Biology

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Answer any two of the following. [2x4=8][CO#BT207.2]

a) Define genome. What is the size of human genome? What are the differences between mutations and polymorphisms in Human genome?

b) Discuss the applications of computational biology in the field of medicine.

c) What role does good and bad mutation plays in survival of the fittest principle?

Q.2 Answer any two of the following. [2x4=8] [CO# BT207.5]

a) Demonstrate the algorithm behind progressive method of multiple sequence alignment with a diagram.

b) What are the applications of multiple sequence alignment?

c) Differentiate between dynamic, progressive and iterative methods of multiple sequence alignment.

Q.3 Answer any two of the following. [2x4=8] [CO# BT207.4]

a) The Pribnow box is the sequence TATAAT of six nucleotides that is an essential part of a promoter site on DNA for transcription to occur in bacteria. Develop a python program to locate this sequence in a given DNA sequence in order to identify the site of initiation of transcription.

b) What is string datatype in python? Discuss any 4 inbuilt methods of string datatypes in python programming language.

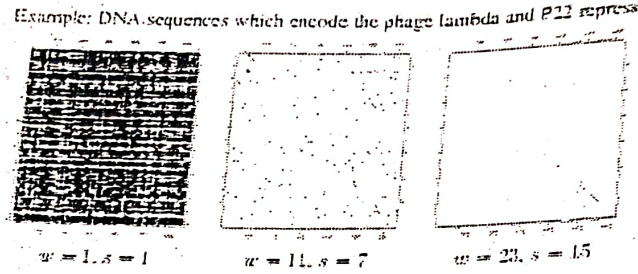
c) Write a python script to concatenate the DNA sequences 'AGTTCAGT' and 'CATGATCGAG' and count the length of the resulting sequence.

Q.4 Answer any two of the following. [2x4=8] [CO# BT207.2]

a) Align the following sequences using Needleman-Wunsch algorithm:
GAATTC and GATC
using identity score of +2, similarity score of +1, mismatch score of -1 and gap penalty of 0.

b) Illustrate with examples, the advantages of dot matrix algorithm over dynamic programming algorithm. Also state the disadvantages of the dot matrix algorithm.

c) Given below are the results of dot plot of two sequences. What can you interpret from these results? Explain the significance of "w" and "s".



Q.5 Answer any two of the following. [2x4=8] [CO# BT207.1]

a) Describe GenBank flat file data format of nucleotide sequences. What information is located in the header part of the format?

b) Differentiate between:
   i) Flat file and Relational databases.
   ii) Primary, Secondary and Composite Databases

c) What is BLAST? Compare BLAST and Smith-Waterman methods in terms of searching a database.

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Roll No:

5th_ SEMESTER

B.Tech. (Biotechnology)

END SEMESTER EXAMINATION Nov2022

BT 301 : Immunology and Immunotechnology

Time: 3:00 Hours Max. Marks : 40

Note : Answer all questions. Assume suitable missing data, if any.

1. Give suitable reasons for the following answers. Attempt any 2 questions of the following: [4x2] (CO# 1, 2)

(a) Clonal selection of a particular B cell clone with 'A' antigen specificity in secondary lymphoid organ leads to production of IgM and re-exposure to the same antigen results in predominantly Ig G response. Explain the above process by schematic representation at the stage of recombination. Graphically show how memory response can be demonstrated for immune response against any antigen. What are the factors that influence immunogenicity of an immunogen?

(b) A suckling infant and his elder brother were both exposed to a chicken pox patient. Both of them showed mild symptoms. The following year both the kids were again exposed to chicken pox patient, but this time the younger brother showed severe symptoms while the elder brother was protected. Explain the observation in detail. How does an adjuvant increase the potential of a vaccine formulation?

(c) Complement fixation by alternative pathway is a process that involves amplification, explain. In case we block C3 breakdown into C3a and C3b, will it affect both Classical and Alternative Complement Fixation pathways and what stage will it be affected, if any? Explain using detailed schematic diagrams. What is ADCC?

2. Attempt any 2 questions of the following: [4x2] (CO #2)

(a) Distinguish between antigen presentation by MHC class I and class II pathways. What is the significance of recycling of empty MHC class I molecules in cross presentation of exogenous antigens?

(b) Explain how cytokines can modulate the type of immune reaction against the same pathogen and thus determine the outcome of the disease. Enumerate any 4 properties of cytokines and explain with suitable examples.

(c) Explain how T cell activation is regulated by inducible expression of CTLA4. What are Treg cells? What do we understand by T dependent and T independent antigens?

3. Attempt any 2 questions of the following: [4x2] (CO# 3)
   (a) Mechanism of killing by immune cells involved in killing tumor cells
   (b) Mechanism of killing by macrophages and dendritic cells
   (c) Molecular basis of TCR and BCR signalling

4. Attempt any 2 questions of the following: [4x2] (CO# 4)
   (a) What are the probable causes of autoimmunity? How are haemolytic and pernicious anaemia different? How is SLE autoimmune disorder caused?
   (b) Inflammation is not always a detrimental response; explain. What is Type IV hypersensitivity? Adoptive transfer is a mechanism of tumor therapy. Explain the mechanism of adoptive transfer.
   (c) Corneal transplant does not usually result in graft rejection. Explain why. What is graft vs host rejection?

5. Write short notes on the following: (Answer any 4 the questions) (CO#5)
   (a) Flowcytometry [2]
   (b) Type I hypersensitivity [2]
   (c) Significance of HAT medium in hybridoma production [2]
   (d) Sandwich ELISA [2]
   (e) Comparative account of live-attenuated and subunit Polio vaccines [2]

Total no. of Pages: 1 Roll no.....

VthSEMESTER **B.Tech. Biotechnology**

END TERM EXAMINATION *Nov/Dec-2022*

COURSE CODE BT-303 TITLE GENETIC ENGINEERING

Time: 03:00Hours *Max.Marks:40*

Note:All questions arecompulsory.

Q.1 Briefly answer the following: [2 x 4][CO1 and 2]

a) What is the importance of reporter gene in expression vector?
b) Explain the role of the *Lac* Z sequence in PUC 19 vectors?
c) Explain why YACs behave as chromosomes.
d) Why is *Agrobacterium* called a natural genetic engineer?

Q.2 Illustrate different methods for the identification of recombinant phages.

OR

Describe the preparation of competent E.coli cells.Explain DNA purification from cell extract using ion exchange chromatography. [4][CO3]

Q.3 a) Evaluate the use of hybrid plasmid-M13 vectors to produce single-stranded versions of cloned genes.

b) Draw the construct of Yeast integrative plasmids and Yeast Replicative Plasmids. State the advantage of using YIp in cloning experiments.

[2 x3][CO4 and 5]

Q.4 a) Write a short note on the function of restriction endonuclease.

b) How is Footprinting used to identify protein binding sites on the DNA molecule [2 x4][CO2 and 5]

Q.5 a) Explain the major problems encountered when foreign genes are expressed in *E.coli*. What are the ethical concerns raised in process of pharming?

b) Describe HRT & HART methods to identify proteins encoded by a specific cloned gene. [2 x4][CO4 and 5]

Q.6 a) Describe binary and co-integrated vector strategies.

b) Discuss the mechanism of T DNA transfer in Agrobacterium mediated transformation [2 x 3][CO5]

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FIFTH SEMESTER

B.Tech [BT]

END SEMESTER EXAMINATION NOV-2022

BT 317: Enzymology and Enzyme Technology

Time: 3:00 Hours *Max. Marks: 50*

Note: Answer ALL questions.
Assume suitable missing data if any.

Q.1(a)Write the differences between catalytic antibodies and Ribozyme. Discuss the application of enzymes in Food processing industry. [3+3=6] CO 1

(b) An enzyme has a Km of 4.7×10^{-5}. If the Vmax of the preparation is 22 micromoles X $liter^{-1}$ X min^{-1}, what velocity would be observed in the presence of 2×10^{-4} M substrate and 5×10^{-4} M of (a) a competitive inhibitor, (b) a noncompetitive inhibitor, (c) an uncompetitive inhibitor, Ki in all three cases is 3×10^{-4} M. [4] CO 2

Q.2 (a)What do you mean by immobilization? Derive the rate equation assuming first order kinetics for immobilized reactor system along with their assumptions. [5] CO 3

(b) How Entrapment is different from Encapsulation. What is the relative activity and the degree of inhibition caused by a competitive inhibitor when [S] = Km and [I] = Ki? [3+2=5] CO 3

Q. 3 (a) Microorganism having $\mu_m = 0.8\ h^{-1}$, Ks = 80 mg/L cultivated in a 10 L chemostat operated with 50 ml/min sterile feed containing 50 g/L of substrate with overall yield coefficient of 0.3g/g substrate. Calculate outlet biomass and substrate concentration.

OR

CSTR volume 750 L contains 8g/L glucose as a feed flowing with flow rate of 150 L/h. Microbial system follows Monod model with μ_m= 0.4 h^{-1}, Ks = 1.5 g/L, Yx/s= 0.5 g cell mass/g substrate. Determine cell produced at steady state condition. [5] CO 4

(b) Elaborate the differences between airlift and bubble column reactor along with diagrams. [5] CO 4

Q.4 (a) Discuss the physical factors which affect the fermentation process in a bioreactor. [5] CO 5

(b) Explain the design and working of any one bioreactor containing immobilized cells or catalyst. [5] CO 5

Q.5 (a)Elaborate the case study based on enzymatic industrial bioprocess. [5] CO 6

(b) Write the advantages of enzyme based industrial processes over chemical processes. Discuss the role of organic solvent in enzymatic catalysis. [3+2= 5] CO 6

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Total No. of Pages: 02

Roll No. .....

FIFTH SEMESTER
B. Tech

END SEMESTER EXAMINATION

Nov/Dec- 2022

BT319 Drug Design and Delivery

Time: 3 Hours

Maximum Marks: 50

Note: Answer ALL questions. All questions carry equal marks. Assume suitable missing data, if any.

1. A. Answer any two of the followings:- [CO 1]

i. Define high throughput screening (HTS). What is the major advantage of HTS? [2.5 Marks]

ii. Define virtual screening. How has it eased the process of drug optimization? [2.5 Marks]

iii. What is traditional drug design? How do you consider discovery of penicillin as? [2.5 Marks]

iv. Leaves of *Azadirachta indica* are used as having anti-bacterial and anti-inflammatory properties Under which method, you would use them as a treatment agent? [2.5 Marks]

B. A cytoplasm-based receptor has specific ligands. Exemplify such a ligand and the receptor. Mention their functioning. [5 Marks]

2. A. Answer any two of the followings:- [CO 2]

i. Define bench to bedside translation of drugs. Enumerate the steps undergone in such a translation process. [2.5 Marks]

ii. Mention two very important objectives of pre-clinical drug discovery. [2.5 Marks]

iii. Diagrammatically explain the steps involved in testing the candidate drugs in cultured cells. [2.5 Marks]

iv. What is ADME? How is this study carried out? Describe briefly and draw diagrams where necessary. [2.5 Marks]

B. Differentiate between reproductive toxicity and genotoxicity. Which one is more important and why? [5 Marks]

3. A. Answer any two of the followings:- [CO 3]

i. How are IPR rules applicable in drug development? [2.5 Marks]

ii. What are biosimilars and generic drugs? What are their importance in drug discovery? [2.5 Marks]

iii. What is enzyme kinetics? How are these important in drug discovery? [2.5 Marks]

iv. Differentiate between orthosteric and active sites. Illustrate your answer with suitable examples. [2.5 Marks]

B. Define agonist and antagonist. How do they work on the given targets? Give examples. [5 Marks]

4. A. Answer any two of the followings:- [CO 4]

i. Write the principles of synthetic vaccine design? Briefly describe with the help of suitable diagrams only. [2.5 Marks]

ii. Define peptidomimetics. Mention two of its importance. [2.5 Marks]

iii. Describe very briefly the concept of lead identification. [2.5 Marks]

iv. What is the importance of epitope mapping? [2.5 Marks]

B. Describe briefly the process of rational drug design. [5 Marks]

5. A. Answer any two of the followings:- [CO 5]

i. How CADD is useful over traditional methods in drug design? [2.5 Marks]

ii. What is pharmacophore and how is it modelled in the process of drug design? [2.5 Marks]

iii. Define QSAR. Mention its merits. [2.5 Marks]

iv. What is MDS and mention its importance. [2.5 Marks]

B. Narrate three recent advances in drug development. [5 Marks]

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Total no. of Pages: 02 Roll no.....

5th and 7th SEMESTER

B.Tech.

END TERM EXAMINATION Nov/Dec-2022

BT323 Population Genetics

Time: 03:00 Hours Max. Marks: 50

Q.1. What do u mean by polymorphism? Write different types of polymorphism. [1+4=5] [CO1]

Q.2. Write short notes on any two [2.5x2=5] [CO2]

a. Linkage Disequilibrium

b. What is effective population size.

c. Molecular clock hypothesis

d. Heterosis

Q,3 (a) What is Genome -wide association study (GWAS)? Write the steps of GWAS. What are the Benefits of GWAS? [1+2+2= 5]

(b) What are the basic modes of inheritance for single -gene diseases? What do u mean by penetrance ? [4+1 =5] [CO3]

Q.4. (a) What do u mean by Quantitative Trait Loci (QTL)? Write down the types of quantitative traits? Write some quantitative phenotypic traits that evolved along the human lineage. [1 +2+2 =5]

(b) What is QTLs mapping? What are the protocols of QTL mapping? Write down the advantages of QTL mapping? [1+2 +2 = 5] [CO4]

Q,5. (a) Write the different modes of selection with examples. What do u mean by identity by descent (IBD)? [3 +2 =5]

(b) Write in detail about Darwin sexual selection theory. What is frequency dependent selection? [3 +2 =5] [CO5]

Q.6. (a) Write an introduction on genetic variability in natural population. What is gene diversity within populations? What is transient polymorphism? [1+1+3 =5]

(b) What is gene diversity in blood groups and other loci ? [5] [CO6]

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Total no. of Pages: 02

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7_SEMESTER

B.Tech

END TERM EXAMINATION Nov/Dec-2022

BT405 Fundamentals of Computational Biology

Time: 03:00 Hours Max. Marks: 40

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Answer any two of the following. [2x4=8] [CO# BT405.2]

a) Explain the effect of variants in coding regions?
b) Describe the VCF format for storing variation data?
c) How to formulate a Genome wide association study?

Q.2 Answer any two of the following. [2x4=8] [CO# BT405.5]

a) Compare various MSA methods in terms of precision and speed.
b) How to calculate score of multiple sequence alignment? Demonstrate with an example.
c) Summarise the steps of progressive alignment method using a diagram.

Q.3 Answer any two of the following. [2x4=8] [CO# BT405.4

a) Construct a python program to print a complimentary sequence string stored in a variable named "coding_strand".
b) What are datatypes? Discuss any 5 datatypes of python programmi language.
c) Python is an interpreted, high-level, dynamically typed programmi language. Justify the statement.

Q.4 Answer any two of the following. [2x4=8] [CO# BT405.3]

a) Use Smith-Waterman algorithm to align "GCTA" with "TGC" using "+1" for match, "-1" for mismatch and "0" for gad penalty. Write all the possible local alignments.

b) Differentiate between local and global alignment.

c) What are substitution matrices? Explain the two types of substitution matrices that are used for protein sequence alignment.

Q.5 Answer any two of the following. [2x4=8] [CO# BT405.1]

a) Describe any 5 resources available at NCBI.

b) How computational biology can aid in drug designing?

c) Differentiate between:

i) dbSNP and ClinVar.

ii) PubMed and PubMed Central.

iii) NCBI and EMBL

iv) blastp and tblastn

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Total No. of Pages: 02

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SEVENTH SEMESTER

B.Tech[BT]

END SEMESTER EXAMINATION NOV-2022

BT407: Bioprocess Tech & Downstream Processing

Time: 3:00 Hours *Max. Marks: 40*

Note: Answer ALL questions.
Assume suitable missing data if any.

Q.1 [a] How the rate at which the C source is metabolized can influence the formation of biomass and production of primary or secondary metabolites. [4] CO 1

[b] Define the term Idiophase. Explain the synthesis of metabolite produced from animal cell culturing. [4] CO 2

Q.2 [a] Discuss the application of enzymes in starch processing and textile industry. [4] CO 3

[b] What is biofertilizer? Classify different types of biofertilizers. [4] CO 3

Q.3 [a] In a fermentation process producing baker's yeast, the biomass is separated using a continuous centrifuge, operating at 4000 rpm, with a feed rate of 80 l/min. The solid particles may be assumed to have an average diameter of 0.05 mm. The density of the biomass is 1010 kg/m^3. The fluid may be assumed to have properties of water. Find the sigma factor for the centrifuge.

OR

Discuss the factors which affects the rate of filtration. Explain the working of Continuous rotary vacuum filter press. [4] CO 4

[b] Derive and explain the significance of terminal velocity in Sedimentation process. [4] CO 4

Q.4 [a] How precipitation affects the DSP. Describe the different types of membrane used in separation process. [2+2=4] CO 5

[b] Explain the theoretical principles and steps involved in aqueous two-phase extraction. [4] CO 5

Q.5 [a] How do you separate particles based on adsorption and affinity Chromatography. [4] CO 6

[b] What are the processes involved in heat and mass transfer operations of drying. [4] CO 6

Total No. of pages-3 *Roll No.....*

SEVENTH SEMESTER B.TECH. (BIOTECHNOLOGY)

END SEMESTER EXAMINATION DECEMBER-2022

BT-413 NANOBIOTECHNOLOGY

Time: 3.00 Hours **Max. Marks: 50**

Note: **Answer *Five* questions.**
Assume suitable missing data, if any.

Q.1 All questions are **Compulsory** **[(2 x 8) CO- 2, 3, 4, 5]**

a. What is LD_{50} and LC_{50} explain. Arsenic has an LD50 of 15mg/kg. How many gram of arsenic is toxic to an individual who weighs 100 kg?

b. List 2 advantages and 2 disadvantages of positive vs. negative photoresist. What are the common applications of each?

c. What is Pharmacokinetics and Pharmacodynamics? describe dose response curve.

d. What are immuno-sensors? Discuss about SPR based immuno-sensing technology.

e. Explain the working principle behind electrochemical etch stop method. Why it is better than "time dependent and boron doping" etch stop methods.

f. You are using KOH etching to define a 100 mm thru-hole in a <100> wafer. What should the dimensions on your mask be if you are using a: a) 200 mm thick wafer b) 300 mm wafer. (tan 54.7^{o}=1.412)

g. What is Numerical aperture of optical microscope?

I. What is the theoretical resolving power (resolution) of your 40X lens when used with blue light? Blue light has a wavelength of 0.45 μm.

II. Ultraviolet light has a wavelength of about 0.25 μm. If the same lens could be used and the UV light could be detected (by photographic film, for example) what would be the theoretical resolution? (N.A. of 40X = 0.65)

h. Describe what a molecular beacon is and how this can be used for biosensing.

Q 2. Attempt any four of the following questions. **[(4 x 4)CO-2, 3, 4]**

a. How does the following techniques influence the Photolithography process
   1. Oxidation
   2. Soft baking
   3. UV exposure
   4. Developing Solution

b. Describe lab-on-a-chip, discuss about its fabrication process and explain its application in medical diagnostics.

c. Describe the principles behind the Czochralski method for silicon manufacturing.

d. Describe the structure and working principle of MEMS micro-accelerometers.

e. Describe the working principle of glucose biosensor.

f. Schematically illustrate the steps involved in fabrication of bulk micromachined pressure sensor, what are its applications.

g. Outline the principle and applications of ***any two*** of the following

i. Optical Coherence Tomography (OCT)
ii. Coherent Anti-Stokes Raman Scattering Microscopy
iii. Fluorescence Lifetime Imaging Microscopy (FLIM)

Q3. Answer **any one** **[(6) CO- 3]**

a. What is biosensor, briefly describe the different components and types of biosensors and explain their applications with suitable examples of target analytes.

OR

b. What are the different modes of detection in biosensors, what are electrochemical transducers and explain their applications in different types of biosensors with suitable examples of target analytes.

Q4. Answer **any one** **[(6) CO- 5]**

a. What is nanotoxicology? How does nanomaterial affect the vital organs of the body, briefly explain the toxicological mechanism of nanomaterials. How to estimate the potential hazard related to nanoparticles.

OR

b. Explain in detail the environmental applications of nanoparticles, explain in brief the ecotoxicological studies of nanoparticles, explain the importance of development in test protocols for nanomaterials and the regulation of engineered nanomaterials.

Q5. Answer **any one** **[(6) CO- 3,4]**

a. Describe the principle and advantages of optical bioimaging; briefly explain the working principle and types of transmission microscopy.

OR

b. How does fluorescent microscope work, briefly describe the function of confocal microscope and its advantages.

OR

c. Discuss about the properties and applications of PDMS, briefly describe the methods for fabricating microgrooves patterns using of soft lithography.

-END-

Total no. of Pages: 02 46 Roll no.....

VII SEMESTER

B.Tech.

ENDTERM EXAMINATION Nov/Dec-2022

BT421 Pharmacogenomics and Personalized Medicine

Time: 3:00 Hours *Max. Marks: 50*

Note : All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

		Marks	[CO#]
Q. 1	Write short notes on *any four* of the following: -	2.5x4=10	
	a) Restriction fragment length polymorphism (RFLP)	2.5	[3]
	b) Expressed Sequence Tags (ESTs)	2.5	[3]
	c) Types of Amino Acids and their properties	2.5	[4]
	d) Intracellular receptors as drug targets	2.5	[4]
	e) *De novo* method of drug designing	2.5	[4]
Q.2	What are genetic markers? Describe the role of Single Nucleotide Polymorphisms (SNPs) as biomarkers in pharmacogenomics.	10	[3]
Q. 3	Briefly describe the main targets for drug design. Describe the role of G-protein coupled receptors as drug targets and their significance in pharmacogenomics.	10	[4]
Q.4	What are Epidermal Growth Factor Receptors (EGFR)? How inhibitors of EGFR kinase used as drug targets. Also depict the testing procedures for these drug targets.	10	[5]
	Or		
	Describe the ligand and structure based methods of drug designing. Explain the significance of each method in detail with examples.		

Q. 5 Answer *any two* of the following: - 5x2=10

a. Outcome of the Mutations in drug targets and ligand binding pockets

b. Write a brief note on genotyping techniques. Describe Taqman Genotyping in detail.

c. Please read the below given para and answer the questions:-

A healthy 30-year old female and her husband consulted a physician for genetic counseling. They would like to become pregnant in the near future, but have concern that their offspring may develop cystic fibrosis. The wife's sister has cystic fibrosis, an autosomal recessive disorder with an incidence of approximately 1/116000 in this particular population. The husband history is non-contributory.

Please answer the following questions:-

1) What is the probability of this couple having a child affected with cystic fibrosis?
2) What is the probability of husband being a carrier?

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Total no. of pages:02

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III SEMESTER
B.TECH
CE 201 CIVIL ENGINEERING BASICS AND APPLICATIONS
TIME: 3.00 HOURS MAX. MARKS: 40

NOTE: ALL QUESTIONS ARE COMPULSORY
ALL QUESTIONS CARRY EQUAL MARKS
ASSUME SUITABLE MISSING DATA, IF ANY

1. Attempt any two parts.

a. Discuss the significance of following properties of lime-

- Slaking of lime
- Hardening of lime

(4) CO-1

b. With a neat sketch explain types of defects found in timber. Describe the classification and uses of plywood. (4) CO-1

c. What are the factors controlling composition and quality of steel. Differentiate between mild steel and HYSD bars. (4) CO-1

2. Attempt any two parts.

a. What are the essential requirements of a good foundation? With a neat sketch explain types of foundations. (4) CO-2

b. Explain the following terms used for masonry-

King closer, Queen closer, Beveled bat, Corbel, Cornice, Coping, Gable and Parapet (4) CO-2

c. Differentiate English bond with Flemish bond with their essential features. (4) CO-2

3. Attempt any two parts

a. Define gel space ratio. Estimate the gel space ratio and theoretical strength of concrete made with 500 gm of cement with water cement ratio 0.52 on complete hydration of cement. (4) CO-3

b. With the help of flow diagram explain the dry process of manufacturing of cement. (4) CO-3

c. Explain specific gravity and soundness tests on cement. (4) CO-3

4. Attempt any two parts.

a. What are the steps involved in the mix design of concrete as per IS code. (4) CO-4

b. How the optimal dose of super plasticizer is decides. Explain the effect of it on the strength and durability of concrete. (4) CO-4

c. What are the factors affecting workability of concrete. (4) CO-4

5. Attempt any two parts.

a. Enumerate the chief characteristics of rocks used as building stones. Describe the various weathering agencies responsible for deterioration of rocks. (4) CO-5

b. Discuss the following properties of minerals with a suitable example-

- Hardness
- Cleavage
- Fracture
- Specific gravity

(4) CO-5

c. What are the different groups of rock forming minerals? With nea sketch explain any two minerals in details. (4) CO-5

(b) Determine the moment of inertia of the triangle shown in figure 4(b) below about its centroidal x'-axis parallel to the triangle's base.

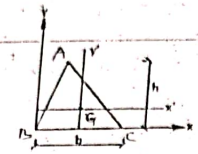


Figure 4(b)

(c) Explain the parallel axis theorem.

Q 05: Attempt any two parts: (CO5)

(a) The two blocks are joined together by an in-extensible cable, as shown in figure 5(a). The system is released from rest. Determine the velocity of block A after it moves 3m. Assume the coefficient of kinetic friction between block A and the plane as $\mu_k = 0.25$ and consider the pulley as weightless and frictionless. Analyze the problem using the work-energy method.

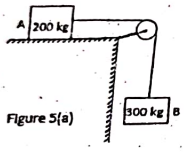


Figure 5(a)

(b) The maximum range of a field gun is 2000 m. If a target at 1300 m is to be hit, what should be the projection angle?

(c) Two bodies, one of which is 40 kg with a velocity of 8 m/sec and the other of mass 25 kg with a velocity of 12 m/sec, move towards each other along a straight line and impinge centrally. Find the velocity of each body after impact if the coefficient of restitution is 0.9.

Total No. of pages 04 Roll No.

III SEMESTER B.Tech. [Civil Engg.]

Branch/ Group code

END SEMESTER EXAMINATION Nov. 2022

CE203 Engineering Mechanics

Time: 03 Hours Max. Marks: 40

Note: Question No. 01 is compulsory. Attempt remaining 4 questions selecting any two parts from each question. All questions carry equal marks. Take $g = 9.81$ m/sec^2 if required. Assume suitable missing data if any.

Q 01: Attempt all parts: (CO1, CO2, CO3, CO4 & CO5)

(a) Determine the mechanical advantage of the ramp shown in figure 1(a) below.

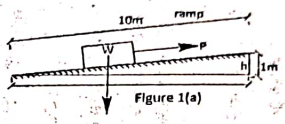


Figure 1(a)

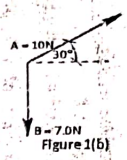


Figure 1(b)

(b) Determine $(\vec{A} - \vec{B})$ for the vectors shown in figure 1(b) above.

(c) Determine the unit vector/direction vector of the vector $\vec{V}$ Whose magnitude and the end coordinates are shown in figure 1(c) below.

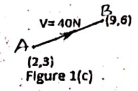


Figure 1(c)

(d) Determine the mechanical advantage of the pulley system shown in figure 1(d) below.

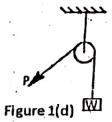


Figure 1(d)

(e) Explain the Pappus and Guldinus theorem of moments.

(f) Define reversible and irreversible machines.

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(g) Explain the principle of conservation of angular momentum.

(h) Determine the centroid of a triangular geometry using the geometry approach.

Q 02: Attempt any two parts.

(a) For the jointed roof truss apparatus shown in figure 2(a) below, determine all the three-member forces analytically. (CO3)

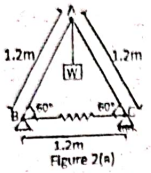


Figure 2(a)

(b) Verify the principle of moments for the Bell Crank lever laboratory apparatus shown in figure 2(b) below. (CO2)

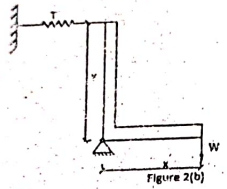


Figure 2(b)

(c) Analyze the simple truss shown in figure 2(c) below and find member forces in all members of the truss using the method of section. Take advantage of symmetry and report symmetric member forces. (CO3)

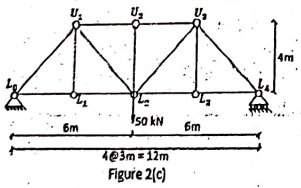


Figure 2(c)

Q 03: Attempt any two parts: (CO4)

(a) Explain the friction mechanism and Coulomb's law of dry friction.

(b) Determine the mechanical advantage and velocity ratio for the compound pulley system shown in figure 3(b) below.

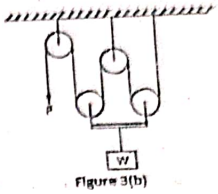


Figure 3(b)

(c) The block shown in figure 3(c) below is moved by force P in a uniform motion on the flat floor surface. Determine the point of application of 'P' above the floor, so that the block slides without tipping over. The coefficient of kinetic friction between the block and the floor surface is μ_k.

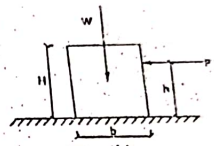


Figure 3(c)

Q 04: Attempt any two parts: (CO5)

(a) Determine the centroidal coordinates of the body from the origin. The body is at a distance 'a' from the origin along the axis of symmetry. Figure 4(a) below shows a hemi-spherical solid of revolution with radius R.

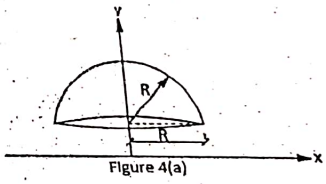


Figure 4(a)

Total no. of pages: 03 Roll No.....

III SEMESTER

B. Tech. (Civil Engineering)

B.Tech

END TERM EXAMINATION Nov/Dec-2022

CE 205 Fluid Mechanics

Time: 3 Hours Max. Marks: 40

Note: Attempt any FIVE questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1(a) What do you understand by "Kinematics of Fluid Flow"? [2][CO3]

(b) Define (i) Steady flow; (ii) Uniform flow. [2][CO3]

(c) What are the characteristics of (i) Laminar flow; (ii) Turbulent Flow. [2][CO3]

(d) Explain the concept of "Stream Tube". [2][CO3]

Q.2 (a) Draw a detailed neat sketch showing the development of boundary layer on flat stationary surface. [3][CO7]

(b) What is laminar sublayer? How is the concept of laminar sublayer useful? [3][CO7]

(c) Explain the terms: (i) Displacement thickness; (ii) Momentum thickness, used in boundary layer. [2][CO7]

Q.3(a) A pipe having a 20 cm diameter branches into two pipes, one of the branch pipes has a diameter of 10 cm whereas the other has 5 cm, the flow in the larger branch pipe is two-third of the main pipe and the remaining is discharged through the smaller diameter branch pipe. If the average velocity of flow in any of the pipes, main or branch does not exceed 3 m/s, find the rate of flow in the main pipe. [4][CO3]

(b) Derive a rational equation using dimensional analysis, for a pipe flow, having given the following quantities affecting the flow phenomenon:

F = the unit boundary friction against which the fluid flows
μ = the viscosity
ρ = the mass density
V = the velocity of flow
D = the pipe diameter
ε = the pipe surface roughness **[4][CO6, 8]**

Q.4(a) What is model analysis? What are the advantages of model testing? Describe various modes of model distortion. **[4][CO6]**

(b) Describe various forms of energies present in fluid flow. Also write and explain the "General Energy Equation" for steady flow. **[4][CO4]**

Q.5(a) Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of the plate is 3 m below the surface of water. Find the position of centre of pressure also. **[4][CO2]**

(b) A plate 0.025 mm distant from a fixed plate, moves at 60 cm/s on a fluid layer between the plates, and requires a force of 2 N per square metre surface in contact with fluid to maintain this speed. Determine the fluid viscosity between the plates. **[4][CO1]**

Q.6(a) The water is flowing through a pipe having diameters 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through pipe is 35 litres/s. The section 1 is 6 m above datum and section 2 is 4 m above datum. If the pressure at section 1 is 39.24 N/cm^2, find the intensity of pressure at section 2. **[4][CO3]**

(b) A crude oil of viscosity 0.97 poise and of specific gravity 0.9 is flowing through a horizontal circular pipe of diameter 100 mm and of length 10 m. Calculate the difference of pressure between the two ends of the pipe, if 100 kg of the oil is collected in a tank in 30 seconds. **[4][CO5]**

Q.7(a) Explain the Darcy – Weisbach equation for head loss in laminar flow through pipe. Whether this equation can be used for turbulent flow also? If yes, explain how. **[4][CO5]**

(b) Prove that for a steady laminar flow through a circular pipe, the velocity distribution across the section is parabolic and the average velocity is half of the maximum local velocity. **[4][CO5]**

B.TECH. (CIVIL) III SEMESTER

END TERM EXAMINATION Nov/Dec-2022

CE207: ENGINEERING ANALYSIS AND DESIGN

Duration: 3:00 Hr *Max. Marks: 50*

Note: Attempt ANY FIVE questions.
Draw neat sketches wherever required.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Compare the concepts of design of following along with their typical sketches:
(a) Flexible pavement and rigid pavement [CO4:5]
(b) Under reinforced section and over reinforced section [CO4:5]

Q.2(a) Explain consistency limits of soil. [CO1:5]
(b) Calculate coefficient of permeability of a soil sample, 6 cm height and 40 cm^2 in cross sectional area, if a quantity of water equal to 400 ml passed down in 10 minutes, under a head of water of 50 cm. [CO3:5]

Q.3(a) What are the factors that control geometric design of highway? Discuss in brief. [CO2:5]
(b) On a highway free mean speed is observed as 100 km/h. Under fully jam condition the average spacing between vehicles is found as 6.8 m. Calculate maximum traffic flow. [CO3:5]

P.T.O.

Q.4(a) On a typical diagram show important components of a railway track. [CO2:5]

(b) Estimate the size of supply pipe with flow velocity 1.2 m/sec, to service reservoir, serving a town of 20,000 population with average water demand of 120 litres/capita/day. [CO3:5]

Q.5(a) Describe hydraulic depth and hydraulic radius. [CO1:5]

(b) Calculate both for a pipe of radius of 50 cm which is flowing half full under action of gravity. [CO4:5]

Q.6(a) Discuss applications of any two important equipment that are generally used in field surveying. [CO1:5]

(b) The length and bearing of a traverse PQRS are given below. [CO4:5]

Segment	Length	Bearing
PQ	40	80°
QR	50	10°
RS	30	210°

Compute length of line segment SP (round off to two places of decimal).

5 6

Total no. of Pages: 02

Roll no.....

Third SEMESTER

B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

CE251 Building Material & Construction

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q1 TRUE OR FALSE: (CO1,2,3,4,5) (8 marks)

(a) PLYWOODS are boards which are prepared from thin layers of wood called Veneers

(b) REFRACTORY brics are burnts in kiln at temperature of ranging from 1333degree Celsius to1999 degree Celsius

(c) NONDESTRUCTIVE tests now considered as powerful method to evaluate of high rise buildings

(d) COIR class are fibre reinforced concretes

(e) AIR permeability test suitable for finess of concretes

(f) IN CONCRETE dam for no tension at base equal to 2/3 base

(g) SOUNDNESS of test more suitable for LE-Chatelier apparatus

(h) DELHI drinking water have total hardness is called carbonate hardness +non carbanote hardness

Q2 MATCH THE FOLLOWING (CO 1,2,3,4,5) (8 marks)

(a) PVC PIPE	-house plumbing
(b) Galvanized iron pipe	-hot water plumbing
(c) CASTIRON PIPE	-main pumping station
(d) STEEL PIPE	-main distribution
(e) 80/100 BITUMEN	-building roof
(f) M70 CUTBACK	-building grouting
(g) RF5 ROAD TAR	-mastic asphat
(h) IS 1343	-prestressed concrete

Q3 a) DIFFERENTIATE between shear-strain curve for steel and concrete? Discuss merits and demerits (CO3) (8 marks)

b) EXPLAIN concrete mix design IS10262 -2019? Discuss advantages and dis advantages

Q4 a) DIFFERENTIATE between raftfoundations and under-reamed pile building Constructions? (CO 4,5) (8 marks)

b) EXPLAIN kota stone and marble stone for multistorey buildings floor constructions? Discuss merits and demerits.

Q5 WRITE research paper on any one topics (500words). (CO1,2,3,4,5) (8 marks)

Case study of computer waste, electronics waste, civil waste, electrical waste, mechanical waste and medical waste.

V[th] Semester

B.Tech. (Civil Engineering) Max. Marks: 40

END TERM EXAMINATION Nov. 2022

Course Code: CE 301 Course Title: Analysis of Determinate Structures

Note: All questions are compulsory.
Assume Suitable missing data, if any
Exchange of calculators is not allowed

		Marks	CO
Q 1	(i) A three hinged parabolic arch has a span of 50m and a rise of 15m. It carries a point load of 10kN at quarter span from left end. Calculate the direction and magnitude of reactions. Also, calculate the normal thrust and radial shear at quarter span.	6	CO 5
	(ii) Differentiate between a beam and arch. Discuss classification of arches.	2	
Q 2	Draw the influence lines for moment and shear at a section10m from the left hand support of a simply supported beam of span 25m. Also, determine the maximum bending moment and shear force for the beam shown in Fig 1.	5	CO 4

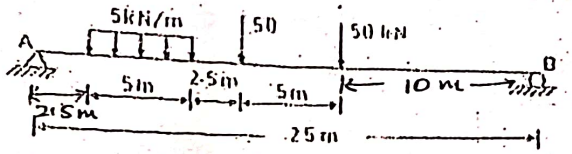


Fig 1

Q 3	A cantilever beam of span 2.8m carries a gradually varying load from zero at free end to 20kN/m at the fixed end. Find the value of slope and deflection at the free end by Moment area method. EI = 8 X 10^{12} N-	4	CO 3

mm^2.

Q 4 For the beam shown in Fig 2, determine slope at A, B, C and deflection at D by Conjugate Beam Method. 5 CO 3

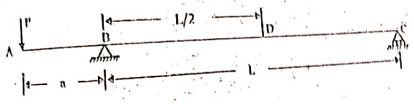


Fig 2

Q 5 (i) Differentiate between a plane truss and compound truss. 1 CO 6

(ii) Identify the type of truss for the figures shown below Fig 3 (a) to (c). 3

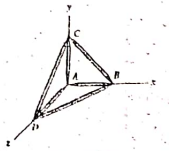
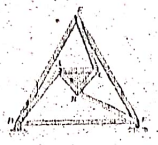


Fig 3(a)



3 (b)



3(c)

Q 6 Determine the vertical displacement of joint B of truss as shown in Fig 4. The area of cross section of each member is $300mm^2$. Take E = $200kN/mm^2$. Solve by Unit Load Method. 5 CO3/ CO6

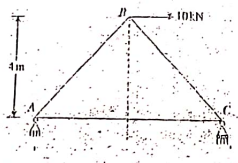


Fig 4

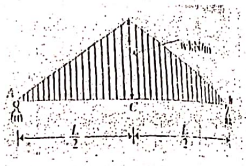


Fig 5

Q7 Calculate the deflection at the centre of a simple beam subjected to varying load as shown in Fig 5 by Strain Energy Method. 4 CO 1

Q 8 Draw SFD and BMD for the beam as shown in Fig 6. 5 CO 2

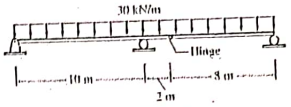


Fig 6

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END TERM EXAMINATION NOV. 2022

V SEM B.Tech. Civil Engineering

COURSE CODE: CE303 COURSE TITLE: Design of RCC Structures

TIME: 3 Hours Max. Marks: 40

Note: Attempt any Five questions. All questions carry equal marks. Use of IS code is permitted.

1(a) Describe stress strain relationship of Mild steel used in concrete as reinforcement with the help of a labelled sketch. M4/CO1

(b) Discuss the features of Working Stress design methodology in detail. M4/CO1

2(a) A singly reinforced rectangular beam section 250 mm x 550 mm. (total depth) is reinforced with 1256 sq. mm Fe 415 steel with effective cover of 50 mm. Determine the uniformly distributed load (inclusive of its self weight) it can carry if the span of the beam is 5.5 m. Use M25 concrete. M4/CO2

(b) Write details of any one test conducted on cement. M4/CO2

3(a) Find the moment of resistance of a singly reinforced rectangular beam of RC 300 mm wide and 417 mm deep upto the center of tensile reinforcement. The total depth of the beam is 450 mm. The reinforcement of the beam consists of 3 bars of 16 mm diameter. Use M20 concrete and Fe415 steel grades for calculations. M4/CO3

(b) What do you understand by workability of concrete? Describe a method to measure workability of a very stiff concrete mix. M4/CO3

4(a) A rectangular RC beam has a width of 250 mm and effective depth of 500 mm. The tension and compression reinforcement in the beam are respectively 5 bars of 28 mm and 2 bars of 25 mm. The effective cover to the compressive steel is 50 mm. Calculate the moment capacity of the section. Take M20 grade concrete and Fe 250 grade steel. Stress in compression steel may be taken as 87 percent of yield stress of steel used. M4/CO4

(b) Discuss why a minimum value of strain in tensile reinforcement is specified for the design of RC beams? M4/CO4

5(a) Discuss the concept of T beams. Provide examples where T beam action may be recognized. M4/CO5

(b) Describe various detailing considerations for shear steel reinforcement in RC beams with neat sketches. M4/CO5

6 Write short notes on any two of the following topics.

(a) Design of beams for torsion

(b) Concrete mix design

(c) Manufacture of cement M8/CO6

Total No. of Pages:03

Roll No.....

VSEMESTER

Nov./Dec.-2022

B.Tech. END SEMESTER EXAMINATION

CE-305 Mechanics of Materials

Time: 3.00 Hours *Max. Marks:40*

Note: Attempt Five questions. Question number ONE is compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Answer all the following questions (Any four) [2x4=8]

(a) What is stress? In what way does the shear stress differ from direct stress? Explain. [CO1]

(b) What do you mean by point of contraflexure? Is the point of contraflexure and point of inflexion different? [CO2]

(c) Define the term: Torsion, torsional rigidity and polar moment of inertia. [CO3]

(d) What is Macaulays' method of beam deflection analysis? What are the its advantages over the direct integration method? [CO4]

(e)Define the terms: Principal planes and principal stresses [CO5]

Q.2 (a) If a tension test bar is found to taper from (D+a) diameter to (D-a) diameter, prove that the error involved in using the mean diameter to calculate the Young's modulus is $\left[\frac{10a}{D}\right]^2$ %. [CO1][4]

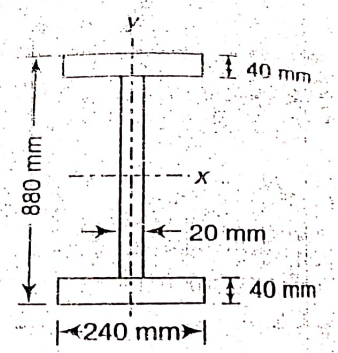
(b)The cross section of a beam is a T section 150mm x 100 mm x13mm with 150mm side horizontal. Find the maximum intensity of shear stress and sketch the distribution of stress across the section if it has to resist a sheer force of 80 kN. [CO2] [4]

Q.3(a) The compression flange of a cast iron girder is 120mm wide and 20mm deep, the tension flange 240mm wide and 40mm deep and the web 300mmx20mm. Find (i) the moment of inertia about N.A. (ii) the load per meter run which may carried over a 4m span by a beam simply supported at the ends, if the maximum permissible stresses are 90 N/mm^2 in compression and 30 N/mm^2 in tension. [CO2][4]

(b) A solid steel shaft transmits 100kW at 150 rpm. Determine the suitable diameter of the shaft if the maximum torque transmitted exceeds the mean by 20% in each revolution. The shear stress is not to exceed 60MPa. Also find the maximum angle of twist in a length of 4m of the shaft. G=80 Gpa. [CO3][4]

Q. 4 (a) What is Rankine empirical relation for columns? [C04][2]

(b) A simply supported beam of I-section as shown in Figure deflects 12mm when subjected to a uniformly distributed load of 50kN/m length. Determine the safe load if the beam is used as a column with both ends fixed. Use Euler's formula with a factor of safety 5. E=205GPa. [CO4][6]



Q.5. (a) What is Mohr's stress circle? How it is useful in the solution of stress analysis problem? [CO5][3]

(b) A rectangular block of material is subjected to a tensile stress of 110N/mm^2 on one plane and a tensile stress of 47N/mm^2 on the plane at right angles to the former. Each of the above stresses is accompanied by a shear stress of 63N/mm^2 and that associated with the former tensile stress tends to rotate the block anticlockwise. Find

(i) the direction and magnitude of each of the principal stress and

(ii) magnitude of the greatest shear stress. [CO5][5]

Q.6 (a) State the assumption made in theory of Torsion. [CO3] [3]

(b) Compare the weight of a solid shaft with that of a hollow one having same length to transmit a given power at a given speed, if the material used for the shafts is the same. Take the inside diameter of the hollow shaft as 0.6 times the outer diameter. [CO3][5]

6 5

Total No. of Pages 2 Roll No. .....

FIFTH SEMESTER **B.Tech. (Civil)**

END SEMESTER EXAMINATION

November -2022

CE-309 Environmental Engineering Design

Time: 3hours *Max. Marks: 40*

Answer any four questions

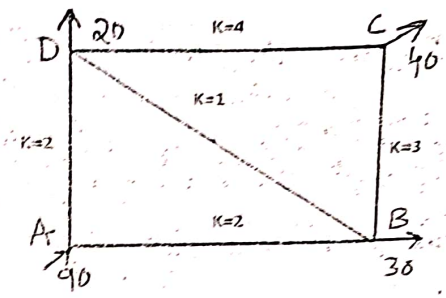
1. An aeration tank on the diffused air system is to treat 6.8×10^6 litres/day of settled sewage having BOD of 200 mg/l. Find the
   (i) Volume of the aeration tank, if the design criterion is 1 cubic metre for 535 gram of BOD in the effluent sewage to the tank
   (ii) Volume of the aeration tank if the suspended solids content of the mixed liquor is 2500 mg/l and the BOD is to be 40 gram of suspended solids.
   (iii) Period of aeration of the sludge which occupies 25% of the aeration tank. (10 Marks) (CO4)
2. (a) Write short note on trickling filters with the help of neat sketch (4 Marks) (CO4)

   (b) Calculate the size of a tricking filter for the following data
   (i) Sewage flow= 5×10^6 l/d
   (ii) Recirculation Ratio = 1.5
   (iii) BOD of raw sewage= 280 mg/l
   (iv) BOD removed in Primary Units = 35%
   (v) BOD of final effluent= 50 mg/l (6 Marks) (CO4)
3. (a) Design a circular sewage sedimentation tank for a town having population of 40,000. The average water demand is 140 litres/capita/day. Assume that 70% water reaches at the treatment plant and the max. Demand is 2.7 times the average demand. (6 Marks) (CO2)

   (b) Why it is necessary to provide Grit Chamber in sewage treatment plants for combined sewage system (2 Marks) (CO3)

(c) Write a short note on fundamental mechanism of anaerobic digestion (2 Marks) (CO4).

4. Determine the distribution of flow in the pipe network shown in figure. The head Loss h_L may be assumed as KQ^2. The flow is turbulent and pipes are rough. The value of K for each pipe is indicated in the figure. Use Hardy-Cross method. (10 Marks) (CO5)



5(a) Find out graphically or otherwise the balancing storage required in a distribution reservoir with the following data

Population to be served = 60,000

Average per capita demand = 180 litres per day

Pumping into reservoir is done for 15 hours a day (i.e from 5 AM to 12.30 PM and from 1.30 PM to 9.00 PM). Hourly variation factors between different hours are as under

0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12
0.25	0.25	0.25	0.25	0.35	0.45	1.0	1.5	1.9	2.5	2.1	1.5
12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
1.2	0.9	1.0	1.2	1.5	1.6	1.3	1.0	0.8	0.5	0.4	0.3

(6 Marks) (CO5)

(b) Prove that the area and overflow rates rather than the detention period govern the design of settling tank. (4 marks) (CO2)

Total No. of Pages: 02

Roll No.....

Vth-SEMESTER

B. Tech.[Civil Engineering]

End Term Examination (Nov/Dec-2022)

Course Code CE-315 Course Title: Rock Engineering

Time: 3.00 Hours Max. Marks: 40

NOTE: All questions are compulsory
All questions carry equal marks
Assume suitable missing data, if any

1. The following table shows data obtained from a single – stage traixial compression test on a cylindrical rock sample, conducted with closed loop servo- control, at a confining stress of 10 MPa, and at zero pressure.

Total axial load (kN)	Sample height (mm)	Sample diameter (mm)
0	100.84	50.2
19.89	100.8	50.2
39.6	100.77	50.2
63.4	100.74	50.2
88.67	100.71	50.21
116.18	100.68	50.21
144.68	100.65	50.22
185.23	100.58	50.24
190.62	100.56	50.25
180.22	100.52	50.26
115.79	100.46	50.27
97.97	100.4	50.28
96.98	100.37	50.28

Draw the stress strain curve and estimate the values for the following:

(i) yield strength (ii) peak strength (iii) residual strength (iv) tangent Young's modulus at 50% peak axial stress and (v) tangent Poisson's ratio at 50% peak axial stress. [10] [CO2]

2. (a) Explain with suitable sketches the effects of orientation of joint in deciding the drection of tunnels, dams, slopes and foundation on rock. [5] [CO3]

(b) With the help of suitable sketches justify, how you will decide the positioning/ placing of the foundation at site, for the following conditions encountered at site:

(i) General concreting for foundation

(ii) Foundation on rock mass of two different compressiblities

(iii) Foundation adjacent to sloping grounds

(iv) Foundation at different levels

(v) Foundation for mulyistoried building in rock slope [5] [CO4]

3. (a) Enumerate with illustrative examples steps for Stability Analysis and Design Procedure to be followed for designing a slopes. [5] [CO4]

(b) What are the different method of construction of Tunnel ? With suitable sketches enumerate the procedure of construction by any one method. [5] [CO3]

4. A vertical shaft is to be sunk through a rock mass in which the magnitudes of the two horizontal principal stresses have a ratio of 3: 1. A clear space of 5 m x 5 m must be maintained within the shaft for equipment installation. The three excavation cross-sections (a) Circular Shaft (b) Elipical Shaft (c) Square Shaft are under consideration for the shaft design. Discuss the relative design merits of each cross-section in terms of rock mechanics principles, and hence provide recommendations for the optimal shape for the excavation. [10] [CO5]

Total No. of Pages 2

Roll No. .....

FIFTH SEMESTER

B.Tech. (Civil)

END SEMESTER EXAMINATION

November -2022

CE-317 Solid Waste Management & Air Pollution Control

Time: 3hours

Max. Marks: 40

Answer any five questions

1. Explain the following (any Four) (8 Marks)
   (a) Photo chemical smog (CO6)
   (b) Source control of air Pollution (CO7)
   (c) Sampling of Particulate Matter (CO8)
   (d) Catalytic Convertor (CO9)

2. (a) Briefly present the typical composition of MSW of Indian City ? (4 Marks) (CO1)
   (b) Explain various handling methods of solid waste ? (4 Marks) (CO2)

3. (a) Explain the various processing done at source before MSW treatment? (4 Marks) (CO2)
   (b) Write a detailed note on segregation of solid waste? (4Marks) (CO 2)

4. (a) Explain Bio-medical Waste treatment using
   (i) Incineration (ii) Auto claving (4Marks) (CO 3)
   (b) How Biomedical wastes are classified ? Mention briefly (4Marks) (CO 3)

5. (a) What is e-waste? What are its classifications? Explain the steps involved in e-waste management (4Marks) (CO 4)
(b) Explain the process of pyrolysis and what are its by products? What way is it different from Incineration? (4Marks) (CO 5)

6. Write short notes on (8 Marks)

(i) Principle & operation of ESP (CO6)

(ii) Relation between Air pollution & Metrology (CO7)

(iii) Health effects of CO and SPM (CO8)

(iv) Treatment of Lechate (CO3)

6 1

Total No. of Pages : 01 FIFTH Roll No.....

~~THIRD~~ SEMESTER
B.TECH (CIVIL ENGINEERING)

END TERM EXAMINATION NOV-2022

CE 319 : Application of Geoinformatics & Remote Sensing

Time: 3 Hours Max. Marks : 40

Note: All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (a) What is remote sensing, an EMR and tabulate the EMR spectrum [4]

(b) Differential between actual and an ideal remote sensing system [4]

Q.2 (a) Discuss energy interactions in atmosphere and on earth's surface [4]

(b) What are different types of, platforms, resolutions and the implications [4]

Q.3 (a) What are the major feature of a remote sensing satellite systems [4]

(b) What is registration and different types of errors and their corrections [4]

Q.4 (a) Explain full pixel, sub-pixel, and mixed pixels targets using a diagram [4]

(b) Explain with example how to find proportions of classes in a mixed pixel [4]

Q.5 (a) What is Reflectance, spectra and spectral reflectance curve and applications [4]

(b) Define PAN, Multispectral, Thermal, Hyperspectral and ultraspectral ? [4]

Roll no.....

Total no. of Pages: 01

5th SEMESTER
B.Tech.

Nov/Dec-2022

END TERM EXAMINATION
CE321 Disaster Preparedness and Management

Max. Marks: 50

Time: 3:00 Hours

Note : Answer any FIVE.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a) Disaster preparedness is the first step in any disaster management process. Explain how hazard zonation mapping will help disaster mitigation in the case of landslides [5][CO1]

b) How important is vulnerability and risk assessment for pre-disaster management? If you are an administrator, what are key areas that you would focus on in a Disaster Management System? [5][CO2]

Q.2 a) List the differences between mitigation and adaptation strategies. [5][CO2]

b) What is Standard Operating Procedure (SOP)? List the SOP considered by different authorities during a disaster. [5][CO3]

Q.3 a) What is disaster resilient infrastructure? Discuss about the basic infrastructure considerations to be applied based on Flood, Earthquake and Landslide. [5][CO3]

b) What is the importance of Building Codes? How are Building codes reinforced? [5][CO4]

Q.4 a) What is the role of social media in Disaster Risk Management?

b) Discuss the concept of community based disaster management and highlight its principles and challenges. [5+5][CO4+CO5]

Q.5 a) Drought and floods occur in the same region but at different times. Explain? [5][CO5]

b) What is Disaster Management Act, 2005? Explain the features and significance of the disaster management act, 2005. [5][CO6]

Q.6 Write note (any two): [2x5][CO1, CO6]

a) Nuclear hazards

b) Biological disasters considering COVID-19

c) Climate change

d) Machine learning for disaster management

TOTAL NUMBER OF PAGES: 1 71

Roll No:-.....

FIFTH SEMISTER
B. TECH

END TERM EXAMINATION
Dec-2022
COURSE CODE: - CE 325
COURSE TITLE: - HUMAN VALUES AND ETHICS IN DISASTER MANAGEMENT
TIME ALLOWED: - 3:00 Hours Maximum marks: 50

NOTE:- 1. Attempt any five.
2.All questions carry equal marks.
3. Assume suitable data, if missing.

1. Differentiate between a Professional and an Amateur. [10][CO1]
2. What are the ethics in disaster management? Explain briefly with suitable example. [10][CO3]
3. What are the Ethical Principles in Disaster Risk reduction? Mention them and explain in detail. [10][CO2]
4. What are the most important ethical attributes in managing a disaster? [10][CO1]
5. Discuss an issue arising out of one such instance
(a) There is a corruption in public office that provides illegal dwellers with documentation such as ration card/aadhar card and electricity connection. [10][CO3]

6. Explain in detail an issue out of one such instance

(a) How do you make officer performing public duties accountable for allowing illegal structure and dwellings to stay for years together without taking any action? [10][CO2]

7. Define the roles of ethics and human values in contest with engineering. [10][CO2]

Total no. of Pages: 02

Roll no.....

VII SEMESTER

B.Tech.

END SEMESTER EXAMINATION *Nov/Dec-2022*

CE407-WATER RESOURCES ENGINEERING

Time: 3:00 Hours *Max. Marks: 40*

Note: Answer any Five questions.
Assume suitable missing data, if any.

Q.1 (a) Define duty and delta of a crop. Derive a relationship between duty and delta for a given base period. [4][CO1]

(b) The depths of penetrations along the length of a border strip at points 30 metres apart were probed. Their observed values are 2.0, 1.9, 1.8, 1.6 and 1.5 metres. Compute the water distribution efficiency. [4][CO1]

Q.2 (a) How flow irrigation is different from lift irrigation? Explain in detail. [4][CO2]

(b) Determine the time required to irrigate a strip of land of 0.06 hectares in area from a tube-well with a discharge of 0.04 cumec. The infiltration capacity of the soil may be taken as 6cm/hr, and the average depth of flow on the field as 15 cm. [4][CO2]

Q.3 (a) Briefly describe the difference between a barrage and a dam [4][CO3]

(b) The head regulator of a canal has three openings each 3m wide. The water is flowing between the upper and lower gates. The vertical opening of the gate is 1.0m. The head on the regulator is 0.45m. If the upstream water level rises by 0.20m, find how much the upper gates must be lowered to maintain the canal discharge unaltered. [4][CO3]

Q.4 (a) What are the remedies which are to be taken, to prevent failures of weir? Explain briefly. [4][CO3]

(b) Derive an expression for expressing energy dissipation obtained by a jump, in terms of initial depth (y1) and sequent depth (y2). [4][CO4]

Q.5 (a) What is meant by cross-drainage works? Briefly explain with the help of a neat diagram. [4][CO4]

(b) What are the factors to be considered in the selection of dams? [4][CO5]

Q.6 (a) Discuss briefly the assumptions made in designing of a gravity dam. [3][CO5]

(b) Design a concrete gravity dam for the following data: [5][CO5]
Maximum allowable compressive stress in concrete= 3000 kN/m^2
Maximum reservoir level= 250m
R.L of bottom of dam= 110m
Specific gravity of concrete= 2.4
Unit wt. of water= 10kN/ m^3

Q.7 (a) Enumerate the different type of spillways with the help of neat sketches. [3][CO5]

(b) Design a suitable section for the overflow portion of a concrete gravity dam having the downstream face sloping at a slope of 0.7H: 1V. The design discharge for the spillway is 8000 cumecs. The height of the spillway crest us kept at RL 204.0m. The average river bed level at the site is 100.0m. The spillway length consists of 6 spans having a clear width of 10m each. Thickness of each pier may be taken to be 2.5m [5][CO5]

(c) What is a Standard operating policy (SOP) for reservoir operation? Fill the missing data in the following table operation by SOP of a reservoir having 350 units capacity. Here S_t, Q_t, D_t, E_t, R_t, , Q_t denote the storage, inflow, demand, evaporation, release and spill respectively during time period t and S_{t+1} is the storage in the subsequent time period t+1

(3)(CO5)

T	S_t	Q_t	D_t	E_t	R_t	S_t	Q_t
1	201.00	70.61	51.68	10	---	---	0.00
2	208.93	348.40	127.85	8	127.85	---	---
3	350.00	42.29	203.99	8	---	---	0.00
4	180.30	23.78	203.99	6	---	---	0.00
5	0.00	15.00	0.00	6	---	9.00	0.00

Total No. of Pages 4 *Roll No. .....*

SEVENTH SEMESTER

B. Tech.

End Term Examination **Nov/Dec-2022**

CE- 413 WATER RESOURCES MANAGEMENT

Time: 3:00 Hours *Max. Marks : 40*

Note : All questions are compulsory.
Assume suitable missing data, if any.

1(a) Answer the following

[i] Write a brief note on different aspects of water harvesting.

[ii] How can you calculate maintainable demand by a reservoir?

[iii]How can optimization techniques be useful in fixing reservoir capacity? Explain with the help of suitable example.

[iv]Explain the role of hydrological and flood routing aspects in calculating spillway capacity for a reservoir? (2)(CO1)

(b) Answer four parts of the following:

[i] Write a short note on utility of sediment transport knowledge in flood control works.

[ii] Enlist various factors which affect erosion by water. Explain various forms of soil erosion in a catchment due to runoff.

[iii] Compare various structural methods of soil and water management.

[iv] Write a brief note on land capability based on land slope.

[v]Give brief notes on following aspects of gully control: Planning gully control, vegetation and gully control structures. (2)(CO2)

(c) Answer four parts of the following:

[i] Derive Muskinghum equation used for the development of IUH.

[ii] State the method of flow routing used as short term method of forecasting for the Yamuna water level in Delhi.

[iii] What do you mean by PMF? How do you obtain it?

[iv] Write a brief note on problems of flood prone areas. How can you address them under non structural measures?

[v] Write a brief note on application of flow duration data of a river in analysis and control of floods. (4)(CO3)

(d) Write brief notes on the following:

[i] Applications of optimization techniques for water resources systems analysis.

[ii] Applications of simulation techniques for water resources systems analysis..

[iii] Software applications in water resources management.

[iv] ANN application in water resources systems. (4)(CO5)

2(a) Design a 140 m long bench terrace for a land having an average slope of 18%. The soil is clay loam. The terrace channel has uniform grade 0.5%. Maximum intensity rainfall expected during the 10 years recurrence interval 10 cm//hr. The values of K, x, a and n may be taken as 6.0, 0.22, 0.5 and 0.8 respectively. (3.5)(CO2)

(b) A drainage basin has 160 km^2 area, 7 hours time of concentration and 9 hours as storage constant with the following information about inter-isochrones area distribution, determine 2 hour unit hydrograph and the equilibrium discharge corresponding to the information. (3.5)(CO3)

Time (h)	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Inter isochrones Area (km^2)	10	36	43	35	22	10	4

3(a) A rectangular parking lot is 140 m x 280 m long. The time of overland flow across the pavement to the longitudinal gutter along the centre is 18 minutes and the estimated total time of concentration to the down stream end of the gutter is 24 minutes. The runoff coefficient is 0.9. If rainfall of intensity 6 cm /hr falls on the lot for 1 minute and stops abruptly, determine the hydrograph upto its peak magnitude. (3.5)(CO3)

(b) A basin has 415 km^2 of area L=35 km, LCA=10km. Assuming C_t = 1.5 and C_p = 0.7, develop a 4 hour synthetic unit hydrograph. (3.5)(CO3)

4(a) Using the benefit cost analysis, determine the optimal scale of development for the following alternatives for a small water resources project. Cost and benefits for different alternatives are given in million Rs.

Alternative	1	2	3	4	5	6	7	8
Cost	7	16	35	69	95	127	154	184
Benefits	7	21	48	94	140	180	197	207

(3.5)(CO4)

(b) A water resources project has benefits that equal Rs 20 million at the end of first year and increase on a uniform gradient series to Rs 100 million at the of fifth year. The benefits remain constant at Rs 100 million each year until the end of the year 30, after which they decrease to zero on a uniform gradient series at the end of year 40. Calculate the present worth of these benefits using 10 percent interest rate.

(3.5)(CO4)

OR

Minimize $Z = 3x_1+4x_2$ *using dual simplex method or matrix method*

Subject to

$$x_1+3x_2 \geq 15$$
$$3x_1+5x_2 \leq 72$$
$$2x_1+x_2 = 24$$
$$x_1, x_2 \geq 0$$

(3.5)(CO4)

5(a) Work out benefit cost ratio for the data available in the table below and suggest the peak stage corresponding which you would like to provide protection against the flood level. *(2)(CO4)*

Peak stage (m)	Total damage below Indicated stage (Rs in millions)	Return period (years)	Annual cost of project (Rs in millions)
9	0	7	0.8
10	8	10	1.2
11	20	15	1.6
12	40	22	2.0
13	64	30	2.6
14	90	70	3.2
15	120	150	3.6
16	160	300	4.0

(b) A sequence of inflows (in thousand cumec) for 30 time periods is given below. Prepare a 3x3 inflow transition probability matrix by calculating transition probabilities by discretising the inflows into three intervals 0-2,2-4,4-6 (2)(CO5)

T	Q_t	T	Q_t	T	Q_t
1	2.4	11	4.8	21	2.6
2	2.3	12	4.1	22	1.3
3	1.5	13	5.5	23	2.4
4	1.1	14	5.9	24	1.6
5	2.1	15	3.2	25	3.4
6	2.4	16	4.3	26	2.6
7	4.2	17	5.3	27	3.5
8	2.6	18	3.2	28	4.6
9	5.1	19	1.2	29	1.4
10	3.2	20	4.6	30	4.5

Roll Number .....

B.TECH. (CIVIL) VII SEMESTER
END TERM EXAMINATION Nov/Dec-2022

CE415: TRANSPORTATION SAFETY AND ENVIRONMENT

Duration: 3:00 Hr *Max. Marks: 40*

Note: Attempt all questions.
All questions carry equal marks.
Assume suitable missing data, if required.

Q.1(a) Distinguish between condition diagram and collision diagram. [CO2:4]

(b) Discuss pollutants from vehicular traffic. [CO1:4]

Q.2 Describe the benefits of Road Safety Audit. Discuss different stages of road safety audit. [CO4:8]

Q.3 Describe the role of Environmental Impact Assessment in highway projects. Explain the salient features of the EIA process in brief. [CO1:8]

Q.4 Determine the ground level concentration of pollution from highway traffic at a distance of 2 km downwind along its centre line. Wind is blowing at an average speed of 36 km/h. Diffusion coefficients in vertical dispersion and horizontal dispersion are given as 53 m and 88 m respectively. [CO3:8]

Q.5 Write brief notes on any two of the following: [CO2:8]

a. Noise level parameters
b. 4E's in transportation safety
c. AQI

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Total No.of page: 2 Roll No.....

SEVENTH SEMESTER
B.Tech
END SEMESTER EXAMINATION NOV/DEC-2022

CE- 423 ADVANCED TRANSPORTATION ENGINEERING

Time: 3 Hour Max. Marks: 40

Note: Answer any five questions.
All questions carry equal marks.
Assume suitable missing data, if any

Q.1 Explain any four the following terms:
(a) Ownership cost (b) Motor Vehicles running cost (c) Capital cost
(d) Annual cost (e) Highway operating cost. [4x2=8] [CO-1]

Q.2 A 50 Km length of single lane road is proposed to be converted into double lane road at a cost of 8.5 lakhs per Km length of the road. The rate of interest is 10% and annual maintenance cost of single lane and double lane road is estimated as Rs. 7500 and Rs. 9500 per Km. The average operation cost on the existing road of the vehicle is estimated as Rs 1.80 per vehicle per Km and that on improved roads Rs 1.5 per Km. The present traffic on the single lane road is 2500 motor vehicles per day and by the end of 15 years design period, the traffic is expected to be doubled. Determine the economic feasibility of the proposal [8][CO-4]

Q.3 Answer any four of the following terms. (a)Thirtieth highest hourly traffic volume (b) Desire lines (c) Traffic signal system (d) Level of service (e) IRC method of signal design. [4X2=8] [CO-1]

Q.4 The average normal flow of traffic on cross roads A and B during design period are 400 and 250 PCU per hour. The saturation flow values on these roads are estimated as 1250 and 1000 PCU per hour respectively. The all red time required for pedestrian crossing is 12 sec. Design two phase traffic signal Webster's method. [8] [CO-2]

Q.5 (a) What are the various types of traffic islands used. Explain the uses of each. (b) What are the various types of parking facilities designed for traffic needs. [4x2=8] [CO-3]

Q.6 Using the data given below, calculate the wheel load stresses at (a) interior, (b) edge and (c) Corner regions of a cement concrete pavement using Westergaard's stress equations. Also determine the probable location where the crack is likely to develop due to corner loading. Wheel load P = 5100 Kg, modulus of elasticity of cement, E = $3.0*10^5$ Kg/cm^2, pavement thickness, h=18 cm. Poisson's ratio of concrete, μ = 0.15 Modulus of subgrade reaction, K= 6.0Kg/cm^3 Radius of contact area, a = 15cm.

[8] [CO-4]

Q.7 (a) Determine the total thickness of flexible pavement assuming single layer elastic theory and using the following data:

Design wheel load = 5100 Kg, Tyre pressure = 7.0 Kg/cm^2 Elastic modulus = 180 Kg/cm2, permissible deflection = 0.25cm.

(b) Explain briefly CBR method of flexible pavement design as per IRC guidances. [2X4=8] [CO-5]

TOTAL NUMBER OF PAGES : 01

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Roll No.....

SEVENTH SEMISTER
B.TECH

END TERM EXAMINATION Dec-2022
COURSE CODE:_ CE 429 COURSE TITLE:- DISASTER INDUCED RISK
TIME ALLOWED:- 3:00 Hours Maximum marks: 50

NOTE:- 1. Attempt any five.
2.All questions carry equal marks.
3. Assume suitable data, if missing.

1. What are the early warnings and methods of flood protection? [10][CO1]
2. Explain complete cycle of disaster management system? [10][CO2]
3. What are the various methods of mass causality mitigation management? [10][CO3]
4. How the engineers would be benefited through learning and practicing community perceptive on disaster risk reduction? [10][CO2]
5. Describe in details the do's and don'ts for various types of disasters. [10][CO3]
6. What are the several methods of landslide risk reduction awareness, response and capacity development? [10][CO1]

Total No. of Pages 2

IIIRD SEMESTER

END SEM. EXAMINATION

Roll No......

B.Tech.(Computer Engg.)

(Nov. – 2022)

Paper Code: CO-201 Title of the subject: Data Structures

Time: 3:00 Hours Max. Marks: 40

Note: Answer any five questions. Write pseudo code/C code for all algorithms asked. Use C code for question 7(b). Assume suitable missing data, if any.

1. Two Max-Heaps stored in array A[0..(n_1-1)] and B[0..(n_2-1)] are given. It is required to merge them into single Max-Heap C[0..(n_1+n_2-1)] without destroying/modifying given heaps. Explain at least two methods for this and write down algorithm for most efficient method to perform desired task. [8][CO01]

2. (a) Write an algorithm to check if given tree is a binary search tree or not. [4][CO04]

   (b) Write an algorithm to check if all nodes in this tree satisfy heap property or not. Return true/1 if all nodes satisfy heap property, and return false/0 otherwise. [4][CO01]

3. (a) The following binary tree has the following in-order and pre-order traversal. Draw the tree and give the post-order traversal. Also, write the algorithm for the same.

   In-order ABCEDFJGIH

   Pre-order JCBADEFIGH

   [4][CO04]

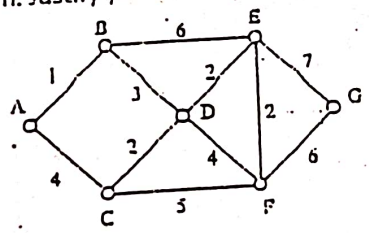
   (b) Write an algorithm to print binary tree nodes in level order traversal (print level wise starting from root node then level 1, level 2 and so on). [4][CO04]

4. (a) Write an algorithm to evaluate a postfix expression containing only four operators (+,-,*,/) where division is floating point division. [5][CO02]

   (b) Convert following infix expression to prefix expression: (a-b)/c+d*e-f/(g*h). [3][CO02]

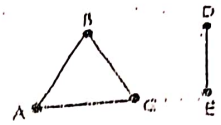
5. (a) Describe concept of bucket and chaining in Hash tables. Compare the performance of two for search operations. [4][CO05]

   (b) For given graph give adjacency matrix and adjacency list representation. Does adjacency list representation of a graph always saves space compared to adjacency matrix representation. Justify your answer.



[4][CO06]

6. A not connected graph may contain several connected components (Example shown in figure: a not connected graph with two connected components). Write an algorithm (using concept of DFS/BFS) to print all (i) number of connected components and (ii) nodes of each connected component in a parenthesis like (A, B, C) (D,E) for given graph.



[8][CO06]

7. (a) Draw a B-Tree of order 6 (max six children for each node, min 2 keys and max 5 keys in a node) by performing insertions in an empty B-Tree in following order: 12, 45, 65, 44, 19, 23, 18, 90, 76, 46, 32, 57, 93, 20, 29, 63. Draw intermediate B-Trees before and after every node split operation. [6][CO06]

(b) Write a recursive function in C to create a copy of a given linked list. [2][CO03]

Total no. of Pages: 02 Roll no.....

THIRD SEMESTER B.Tech [CSE]

END TERM EXAMINATION Nov/Dec-2022

CO-203 OBJECT ORIENTED PROGRAMMING

Time: 03:00 Hours Max. Marks: 40

Note : Attempt any five
Assume suitable missing data, if any.
Give suitable code/example wherever applicable

Q.1 (a) Describe the features that differentiate object oriented programming languages from structured programming languages which do not support objects. Name a few OOP languages. [3][CO2]

(b) What is exception, and type of exceptions in c++? Give a code to handle different exceptions. Analyse the mechanism of handling the exception. How it is different from if-else or switch statements. [5][CO5]

Q.2 (a) Write a function template for finding the minimum value contained in an array. Distinguish between overloaded functions and function templates [4][CO8]

(b) A class template is known as a parameterized class comment. Distinguish between the term class template and template class. [4][CO8]

Q.3 (a) Write a program to find square and cube of a number using late/dynamic binding using base pointer. Write functions for getdata, show data, show result. [4][CO5]

(b) Differentiate between [4]

(i) Overloading and overriding [CO4]

(ii) class variable and object variable [CO3]

Q.4 (a) Differentiate between compile time polymorphism and run time polymorphism. Write a code to implement overloading new operator. [4][CO4,8]

(b) Compare normal function, inline function, macros in c++. Discuss memory usage, advantages, disadvantages, purpose, conditions of these mechanism. Give suitable examples. [4][CO5,7]

Q.5 (a) How the multipath inheritance are handled. Give suiable example with code. [4][CO4]

(b) Define a class "string" with members to initialize and determine the length of the string. Overload the operators '+' and '+=' for the class "string". [4][CO3,4]

Q.6 (a) Analyze how the stack is used to implement function calls, and parameter passing options. [4][CO6]

(b) C++ also provides us a few operators through we could access the data members and member functions of a class by using pointers. Explain these operators with code. [4][CO7]

Q.7 Discuss any two in details and suitable examples [8]

(a) Working with data files [CO9]

(b) Friend function vs member function [CO3]

(c) Features of Java [CO2]

Total no. of Pages:03 *Roll no.....*

III-SEMESTER *B.Tech.(CO)*

END SEMESTER EXAMINATION Nov– 2022

CO205 Discrete Structures

Time: 3:00 Hours **Max. Marks: 50**

Note: Answer all questions by selecting any two parts from each question. Assume suitable missing data, if any.

Q.No. 1 **[5x2=10]**

A. ***Test the validity of following argument:*** [CO#1]

Babies are illogical
Nobody is despised who can manage crocodile
Illogical persons are despised
Therefore, babies cannot manage crocodiles.

B. Show that the argument form with premises $(p \wedge t) \rightarrow (r \vee s)$, $q \rightarrow (u \wedge t)$, $u \rightarrow p$, and $\sim s$ lead to the conclusion $q \rightarrow r$. [CO#1]

C. Prove that the equation a= (P =>(Q=>R)) =>((P =>Q)=>(P=>R)) is a tautology and also Convert the statement α= (¬P V ¬Q)=> (¬P Λ R) into PDNF form. [CO#1]

Q.No. 2 **[5x2=10]**

A. Prove that $7^{2n}+2^{3n-3}.3^{n-1}$ is divisible by 25 for n € N using mathematical induction. [CO#2]

B. Solve recurrence relation $a_n+2a_{n-1}+4a_{n-2}=0$(when roots are complex numbers). [CO#2]

C. What is pigeon hole principle? If seven colors are used to paint 60 cars, then show that at least 8 cars will be of same color and also find in how many ways can 7 women and 6 children stand in a line such that no two children are next to each other. [CO#2]

Q.No. 3 **[5x2=10]**

A. Let $A = \{2, 3, 6, 12\}$ and let *R and S* be relations on A defined by *aRb if and only if* 2 *divides* $(a - b)$ *aSb if and only if* 3 *divides* $(a - b)$ [CO#5]

i. Determine $\bar{S}$, $R \cap S$ *and* R^{-1}.

ii. Write a program to compute symmetric closure of a relation

B. What are the necessary condition for Permutation of functions? Given following permutation functions F and G. [CO#3]

$$F=\begin{bmatrix}15 & 10 & 20 & 6 & 4\\ 10 & 6 & 4 & 15 & 20\end{bmatrix} \quad G=\begin{bmatrix}15 & 10 & 20 & 6 & 4\\ 6 & 15 & 10 & 20 & 4\end{bmatrix}$$

Find FoG and GoF.

C. What is Warshalls's Algorithm? Consider the relation R={(1,3),(2,1),(2,4),(4,3)}. Find the transitive closure of R using Warshalls's Algorithm. [CO#6]

Q.No. 4 **[5x2=10]**

A. Is the poset $A = \{1, 2, 3, 6, 12, 24, 36, 72\}$ under the relation of divisibility a lattice? Find the complement of each element of the poset A, if it exists. [CO#3]

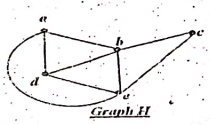
B. Write a program to find the minimum and maximum of a sequence using divide and conquer algorithm. [CO#5]

C. Let D_{40}={1,2,4,5,10,20,40} with relation x<=y if and only if x divides y Find: [CO#3]

i. All Lower and Upper Bound of 10 and 20.
ii. GLB and LB of 10 and 20.
iii. Draw Hasse Diagram of D_{40}.

Q.No. 5 **[5x2=10]**

A. For the graph H shown in figure below, find the chromatic polynomial, P_H; and use P_H to find the chromatic number of the graph, $X(H)$. [CO#4]

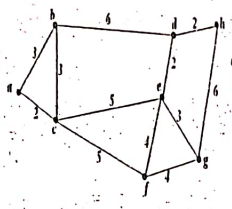


Graph H

B. Draw the digraphs of the possible spanning trees for the symmetric relation whose graph is given below. How many spanning trees are there? [CO#4]



C. The representative weighted-graph of the footpath connectivity between the important departments, laboratories and other facilities of a University is shown in figure below. The weights mentioned against the edges represent the distance in multiples of 100 meters. The administrative authority of the University plans to upgrade these footpaths to cycling-tracks by creating concrete paths along the route. In Phase-I of this project, it is intended to connect all important departments, laboratories and other facilities using at-least one cycling-track, such that it is feasible to travel from the headquarter to any location using a bicycle. Find a minimal spanning tree whose vertices are the important departments, laboratories and other facilities of the University. What is the total distance for the tree? [CO#6]



Total no. of Pages:02 Roll no.....

THIRD SEMESTER

B.Tech

END TERM EXAMINATION *Nov/Dec-2022*

CO207 Engineering Analysis & Design

Time: 03:00 Hours *Max. Marks: 50*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Explain Time Advance Mechanism with its types in detail.
[Max. Marks:5][CO-4]

Q.2 Illustrate Linear Congruential Generator. Contrast its different forms.
[Max. Marks:5][CO-4]

Q.3 Discuss Hypothesis. Illustrate with example Null and Alternative Hypothesis.
[Max. Marks:5][CO-4]

Q.4 Write short note on any two of the following
a. Static vs. Dynamic
b. Deterministic vs. Stochastic
c. Discrete vs. Continuous
[Max. Marks:5][CO-1]

Q.5 Illustrate modelling of any complex system with the simulation language (GPSS/ SIMSCRIPT/SLAM/GASP/SIMULA).

or

Summarize any one of the following simulation languages used for modelling of a system
a. GPSS
b. SIMSCRIPT
c. SLAM
d. GASP
e. SIMULA
[Max. Marks:5][CO-3]

P.T.O

Q.6 Assume that we have a LCG for generating random numbers where X_0(seed value) is 25, a(multiplier) = 15 and m = 100. Will there be the stage at which the random numbers start to repeat?

[Max. Marks:5][CO-4]

Q.7 Find the Single Server Queue statistics (Time in minutes) for the following data.

Inter Arrival Time	-	7	4	2	4	6
Service Time	5	3	5	3	2	3

a. Average waiting time for customers
b. Probability customer has to wait in queue
c. Average time between arrivals
d. Average waiting time for customer those who wait
e. Average time customer spends in the system

[Max. Marks:5][CO-2]

Q.8 Discuss Confidence Interval. Describe the effect of sample variation and sample size in confidence Interval

[Max. Marks:5][CO-5]

Q.9 Define random variable. What are the different types of random variables? Which are the two tests for random numbers?

[Max. Marks:5][CO-4]

Q.10 Describe Goodness of Fit. Explain any one of the following

a. Chi-Squared Test
b. Kolmogorov-Smirnov Test

[Max. Marks:5][CO-5]

All the Best

Total No. of Pages 2 Roll No.....

V-SEMESTER B.Tech.(CO)

END SEMESTER EXAMINATION Nov- 2022

CO303 THEORY OF COMPUTATION

Time: 3:00 Hours Max. Marks: 50

Note: Attempt any five questions. Assume suitable missing data, if any

Q.No. 1 [5x2=10]

A. Construct a Nondeterministic Finite Automata(NDFA) accepting the set of strings over Σ= {a, b} ending in "aba" use it to construct a DFA accepting same set of string. [CO#1]

B. What is myhill-Nerode theorem? Explain equivalence of two finite automata(FA) with suitable example. [CO#1]

Q.No. 2 [5x2=10]

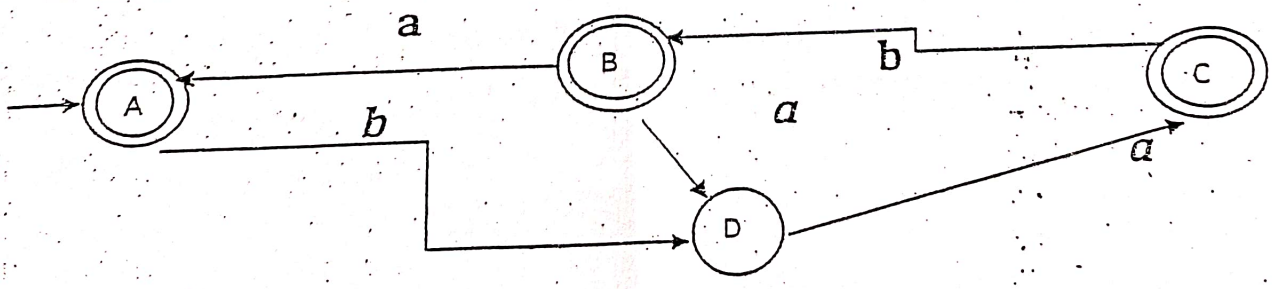
A. Design Moore and Mealy machine that will read sequence made up of letters a, e, i, o, u and will give as output same characters except when an 'i' is followed by 'e' it will be changed to 'u'. [CO#3]

B. Explain decision properties of regular languages and Construct Moore machine equivalent to given mealy as below [CO#3]

Present state	Next state	O/P	Next state	O/P
	Input=a		Input=b	
→A	C	X	B	X
B	A	Y	D	X
C	B	Y	A	Y
D	D	Y	C	X

Q.No. 3 [5x2=10]

A. What is Arden's theorem? Find a regular expression(RE) corresponding to the following FA using Arden's theorem. [CO#6]



B. Explain CNF and GNF forms of context free grammar and [CO#2]

i. Convert the following CFG to CNF
S=>abSb| a|aAb, A=>bS|aAAb

ii. Convert the following CFG to GNF
S=>ab, S=>aS , S=>aaS

Q.No. 4 *[5x2=10]*

A. Explain pumping lemma for context free language(CFL) and Design a Context Free Grammar (CFG) for the language L= { x| x ∈ {a, b}* ,the number of a's in x is a multiple of 3}. [CO#2]

B.

C. Explain pumping lemma for regular expression and Prove that the language $L= \{a^n b^n c^n | n \geq 1\}$ is not regular. [CO#3]

Q.No. 5 *[5x2=10]*

A. Design a Push down automata(PDA) for the following. [CO#4]

i. Language $L=\{a^n b^{n+2} | n \geq 1\}$

ii. Grammar (G): S=>aS|bA, A=>a|aS|bAA, B=>aBB|bS|b, where S is the start symbol of G.

B. Design a Turing Machine(TM) to recognize the language $L= \{0^n 1^n 2^n | n \geq 1\}$. [CO#5]

Q.No. 6 *[5x2=10]*

A. Explain following with suitable example [CO#6]

i. Recursive and recursively enumerable languages

ii. Post correspondence Problem(PCP) and Church's thesis

B. What is Universal Turing Machine(UTM)? Design a Turing Machine(TM) that will recognize the language $L= \{a^n b^n | n \geq 1\}$. [CO#5]

Total No. of Pages 02
5TH SEMESTER
END SEMESTER EXAMINATION

Roll No. .....
B.Tech. (CO)
NOV-2022

CO-305 INFORMATION THEORY & CODING

Time: 3:00 Hours

Max. Marks: 50

Note: Answer Any FIVE questions. All questions carry equal marks.
Assume suitable missing data, if any.

1[a] A die is rolled and a coin is tossed, find the probability that the die shows an odd number and the coin shows a head. [5] [CO-1]

[b] What is discrete random variables? Suppose a random variable X has the following probability function.

χ:	2	4	6	8
f(χ):	0.1	0.2	0.3	0.4

(i) Compute the mean μ and standard deviation σ of x.
(ii) Find the probability distribution of the standardized random variable z = (x-μ)/σ and show that =0 and =1. [5] [CO-1]

2[a] A discrete source emits one of five symbols once every milliseconds with probabilities 1/2,, 1/4, 1/8, 1/16 and 1/16. Find the source entropy and information rate. [5] [CO-2]

[b] A binary source is emitting an independent sequence of 0's and 1's with the probabilities P and (1-P) respectively. Plot the entropy of the source versus probability [0 < P < 1]. Write the conclusion. [5] [CO-2]

3 [a] Determine the Huffman code for the following message with their probabilities given

0.05	0.15	0.2	0.05	0.15	0.3	0.1

Find the average length and the efficiency of the code. [5] [CO-2]

[b] Describe the prefix coding using suitable examples. [5] [CO-2]

P.T.O.

4 [a] What are the properties of linear block code. How would you generate a linear block code? Also Prove that GH^T=0. [5] [CO-3]

[b] What is property of generator? Describe with a suitable Example. [5] [CO-3]

5 [a] Prove that the maximum differential entropy for specified variance is h(X) = ½ log2(2 e σ^2) [5] [CO-2]

[b] Prove that the channel capacity of a channel width "B"Hz, with additive Gaussian noise of power spectral density No/B and limited in bound limited to B is C=B(1+P/NoB). [5] [CO-2]

6[a] Show that and α, α^2, α^4 and α^8 are roots of g(x)= x^4+x^3+x^2+x^1+1 , the generator polynomials of the (15,7) double error correcting binary BCH codes, Where α is a primitive field element of GH(2^4) [5] [CO-5]

[b] What are cyclic codes? Assume the (7,4) cyclic code with generator polynomial g(x)=+1. Let data d= (1110). Find the corresponding systematic code word. [5] [CO-4]

7 Write short notes:- [5] [CO-6]

[a] Convulation coding. [5] [CO-4]

[b] Non Systematic Code.

*****END*****

Total no. of pages: 01 *Roll No.....*

V SEMESTER
B.Tech
END TERM EXAMINATION Nov/Dec-2022
CO313 Computer Graphics
Time: 3:00 Hours Max.Marks: 40

Note: All questions are compulsory
Assume suitable missing data, if any

Q.1 Explain the difference between the following:
a). Random and raster scan display [2][CO#1]
b). RGB and HSV color model [2][CO#1]
c). Boundary fill and flood fill algorithm [2][CO#2]
d). Parallel projection and perspective projection [2][CO#7]

Q.2 Consider a point in 3D whose coordinates are (2,10,5) in x,y and z axis respectively. Point is translated by (6,2,8) and then rotated about y axis. What will be the final coordinates of the point.. [4][CO#4]

Q.3
a). Describe Wailer Atherton Polygon Clipping Algorithm. [4][CO#5]

b). Show how Cohen-Sutherland-Hodgeman line clipping algorithm will clip a line whose end coordinates are (1,6) and (5,16), against a window whose lower left corners are at (2,5) and upper right corner is (7,15). [4][CO#5]

c). Explain the various techniques of text clipping. [2][CO#5]

Q.4
a). What are Bezier curves ? [2][CO#6]
b). What are B-spline curves ? [2][CO#6]
c). What is the difference between Bezier and B-spline curves ? [2][CO#6]

d). Give a mathematical formulation for Bezier curve with four control points given as A(2,3), B(4,5), C(6,9), D(10,4). [4][CO#6]

Q.5 Write short notes : (any 2) [4*2][CO#7]
i). Vanishing point
ii). Depth buffer method
iii). Scan line method

[c] A dataset shown in Table V, contains four samples $\{S_1, S_2, S_3, S_4\}$ having two features $\{X_1, X_2\}$. Compute the principal components of dataset. Justify that first principal 'component is the direction of maximum variance (in Maximum one page of answer sheet). [4] [CO2]

Table V

Feature	S_1	S_2	S_3	S_4
X_1	4	8	13	7
X_2	11	4	5	14

5[a] What is the role of exploration and exploitation in reinforcement learning. Write one step for exploration and exploitation for the following cases: [4] [CO1, CO3]

(i) Restaurant Selection
(ii) Online Advertisements
(iii) Oil Drilling
(iv) Chess Playing

[b] Table VI shows a dataset and response of a probabilistic classifier F. Classifier F is binary classifier with class levels 0 and 1. F gives the probability of a sample x belonging a class 1 i.e. $p(C=1|x)$. Draw the ROC curve with four points corresponding to thresholds = 0.1, 0.5, 0.7, 0.8. [4] [CO2]

Table VI

S. No.	1	2	3	4	5	6	7	8	9	10
Class C (Actual)	0	1	1	0	1	0	0	0	1	0
$p(C=1\|x)$	0.98	0.67	0.58	0.18	0.55	0.86	0.39	0.89	0.82	0.26

----Best of Luck----

Total No. of Pages = 1 *Roll No. .....*

FIFTH SEMESTER
B.Tech.(CSE)

END SEMESTER EXAMINATION *November-2022*

CO327 MACHINE LEARNING

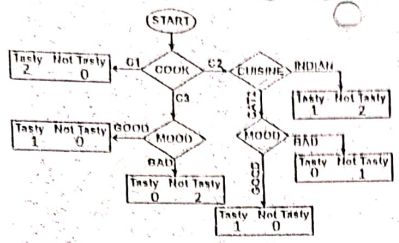
Time: 3:00 Hours *Max. Marks: 40*

Note: Answer *ALL* questions.
Assume suitable missing data, if any.
CO# is course outcome(s) related to the question.

1[a] Determine whether the following tasks belong to supervised learning, unsupervised learning, or reinforcement learning. [0.5x8=4] [CO1]

(i) You want to predict whether or not it will be raining at 5pm tomorrow based on previous weather-related database.
(ii) Take a collection of notes written on multiple topics of a subject, and find a way to automatically group these topics into a small number of groups of topics that are somehow "similar".
(iii) You have given a large database of student records which contains students' performance in different subjects, try to learn whether there might be different clusters of such students which needs a separate teaching strategy.
(iv) In stock market, given data on stock prices over the last 25 years, determining the future stock price of a company.
(v) Grouping of pixels in an image with similar colors.
(vi) To train a robot to find a path in a given scenario.
(vii) Inspect a large database of emails that are known to be spam, to discover if there are sub-types of spam.
(viii) Observe the past record and current statistics of two cricket teams, and predicting which team will win in the next match.

[b] The data is collected from a restaurant for food (cuisine type: Indian or continental) made by various cooks (C_1, C_2, C_3). Feedback of customers is taken as tasty or non-tasty along with customers' mood (good or bad). The data is used to build a decision tree, shown in Fig. below. Decision trees are prone to overfitting (explain why? In maximum 2 sentences). Pruning is one way to deal with overfitting. Let the classification error for the given decision tree is 0.31. If we decide to build a decision tree up to level 2 only (consider root node as level 0), the classification error is 0.37. Let the value of the tuning parameter $\lambda = 0.03$. Explore, whether pruning at deepest node is advisable or not? Also, discuss the effect of tuning parameter *i.e.* $\lambda = 0$ and $\lambda = \infty$. [Hint: Cost function is a combination of classification error and complexity of the decision.]
[1+2+1] [CO2]



2. Answer *any TWO* of the followings

[a] In a sports competition of a university, the management want to design a machine learning based model to select team members. The data for the previous selection of athletes is given in Table I.

[4] [CO1, CO2]

Table I

S. No.	1	2	3	4	5	6	7	8	9	10
Speed	2.50	3.75	7.00	4.25	7.25	4.50	5.25	7.50	5.50	4.25
Agility	6.00	8.00	4.25	3.75	5.75	5.00	9.50	8.00	6.75	3.75
Draft	No	No	Yes	No	Yes	No	Yes	Yes	Yes	No

Use k-nearest neighbors (KNN) with k = 3, and 5 to predict whether the player with speed 6.75 and agility 3.0 will be selected or not. Use Euclidean distance.

[b] Support vector machines (SVM) consider a margin between the classes to improve the classification. If a hyper plane $\mathbf{w}^T\mathbf{x} + w_0 = 0$ is decision boundary between two classes, suggest (with proper justification) an objective function with suitable constraints for SVM to get the desired margin. Also, explain how the logistic regression is different from SVM (use maximum 5 sentences/expressions). **[3+1] [CO2]**

[c] An agency collected the data for crop health across the country as given in Table II. It has three attributes: Season = summer (S) or winter (W), Region = plane (P) or hilly (H), Seed type = traditional (T) or gene-modified (GM). Predict the heath of crop (Y = heathy, N = not healthy) of hilly region in summer season with tradition seed using naïve Bayes classifier. Show all the steps. **[4] [CO2, CO3]**

Table-II

S. No.	1	2	3	4	5	6	7	8	9	10
Season	S	S	S	W	W	W	W	W	S	S
Region	P	P	P	P	P	H	H	H	H	P
Seed Type	T	T	T	T	GM	GM	GM	T	GM	GM
Healthy	Y	N	Y	N	Y	N	Y	N	N	S

3. Answer *any TWO* of the followings

[a] Find the cluster using single link technique for data shown in Table III. Use Euclidean distance, and draw dendogram. **[4] [CO2]**

Table III

Label	A	B	C	D	E
X	0.22	0.27	0.18	0.35	0.25
Y	0.38	0.19	0.41	0.12	0.35

[b] Find the clusters with the help of k-means clustering algorithm for the data shown in Table IV. Consider A and B as the initial centroids, and use Euclidean distance. Solve for maximum three iterations. **[4] [CO2]**

Table IV

Label	A	B	C	D	E
X	168	179	182	187	170
Y	60	68	76	77	59

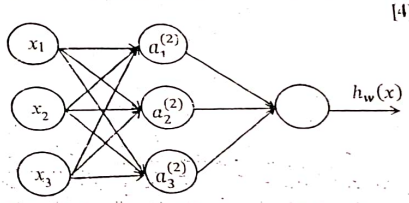
[c] Explain the concept of soft assignment in clustering. Discuss the limitations of *k*-means clustering algorithm and how they are addressed in expectation maximization (EM) approach of clustering. **[1+1+2] [CO2]**

4. Answer *any TWO* of the followings

[a] Use perceptron learning rule to train the network. The input training vectors are as follows: $X_1 = [1 \ -2 \ 0 \ 1]^T$, $X_2 = [0 \ 1.5 \ -0.5 \ -1]^T$ and $X_3 = [-1 \ 1 \ 0.5 \ -1]^T$. The initial weight vector is $[1 \ -1 \ 0 \ 0.5]^T$, The learning rate is 0.1 and the desired outputs are $d_1 = -1$, $d_2 = -1$ and $d_3 = 1$. Calculate the weight after one complete cycle. The activation function is given by: **[4] [CO2]**

$$s(t) = \begin{cases} 1, & t \geq 0 \\ -1, & otherwise \end{cases}$$

[b] The Fig. below shows a neural network. Compute the output at $a_2^{(2)}$ and $h_w(x)$ by using feed-forward approach. Further, obtain the expression of gradients using backpropagation at $a_2^{(2)}$. Assume the sigmoid activation function. **[4] [CO2]**



Total No. of Pages 3 Roll No. .....

FIFTH SEMESTER

B.Tech. (CSE)

END SEMESTER EXAMINATION NOVEMBER-2022

CO325 Probability and Statistics

Time: 3 Hours *Max. Marks: 50*

Note: Answer *ALL* questions.
Assume suitable missing data, if any.
CO# is course outcome related to question

1. Attempt any two of the following:

[a] A random variable has the following probability function

X	1	2	3	4	5	6	7
P(X)	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Determine the value of the following:

i. k
ii. mean
iii. $P(0<X<5)$ [5] [CO1]

[b] i. Prove that $Var(ax+b)= a^2Var(x)$ where a and b are non-zero constants. [2.5] [CO1]

ii. What is central limit theorem and what is the significance of it? [2.5] [CO1]

[c] Define central moment. Write and proof the relationship among second central moment and other n^{th} moments. [5] [CO1]

2. Attempt any two of the following:

[a] If joint probability distribution of x, y are following:

$$F(x,y) = \begin{cases} 4xy & 0<x<1, 0<y<1 \\ 0 & otherwise \end{cases}$$

i. Marginal properties [2.5][CO2]

ii. Proof the independent properties of joint and marginal probability distribution. [2.5] [CO2]

[b] Write Chebychev's inequality and proof it. [5] [CO2]

[c] Explain following by taking proper example [5] [CO2]

i. Estimator
ii. Estimate
iii. Point estimation
iv. Criteria for a good estimator

3. Attempt any two of the following:

[a] If X is normally distributed with mean = 12 & S.D. = 4. Find x' such that $P(X > x') = 0.24$ [5] [CO3]

[b] What is memorylessness property and which distribution contains this property. Prove it for any of two. [5] [CO3]

[c] Assume that the joint sample space S_j has only three possible elements: (1,1), (2,1), and (3,3) with probabilities of 0.2, 0.3, and 0.5 respectively. find [5] [CO3]

i. $F_{X,Y}(x, y)$
ii. Draw graph for joint distribution function
iii. Corresponding marginal distributions

4. Attempt any two of the following:

[a] A manufacturer claimed that at least 98% of the steel pipes which he supplied to a factory conformed to the specifications. An examination of a sample of 500 pieces of pipes revealed that 30 were defective. Test this claim at a significance level of (i) 0·05, (ii) 0·01. [5] [CO4]

[b] Explain t-test and Chi-squared test with proper example. [5] [CO4]

[c] The U.N. Bureau of census wishes to estimate the birth rate per 1, 00,000 people in the nation's largest cities. It is known that the standard deviation in the birth rates for these 100 urban centers is 12 births per 1, 00,000 people. Then (a) Calculate the variance and standard error of the sampling distribution of (i) n=8 cities (ii) n=15 cities. [5] [CO4]

5. Attempt any two of the following:

[a] The means of two single large samples of 1000 & 2000 members are 67.5 and 68.0 inches respectively. Can the sample be regarded as drawn from the same population of s.d. 2.5 inches, test at α=.05? [5] [CO5]

[b] A random sample of 50 items gives the mean 6.2 and variance 10.24. Can it be regarded as drawn from population with mean 5.4 at 5% of level of significance? Show your answer by using curve with proper notations of symbols. [5] [CO5]

[c] Explain different types of error in hypothesis testing with proper notations by taking a short example. [5] [CO5]

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188	.53586
0.1	.53983	.54380	.54776	.55172	.55567	.55962	.56356	.56749	.57142	.57535
0.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026	.61409
0.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803	.65173
0.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439	.68793
0.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904	.72240
0.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175	.75490
0.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230	.78524
0.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057	.81327
0.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646	.83891
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993	.86214
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100	.88298
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973	.90147
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91309	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295	.94408
1.6	.94520	.94630	.94738	.94845	.94950	.95053	.95154	.95254	.95352	.95449
1.7	.95543	.95637	.95728	.95818	.95907	.95994	.96080	.96164	.96246	.96327
1.8	.96407	.96485	.96562	.96638	.96712	.96784	.96856	.96926	.96995	.97062
1.9	.97128	.97193	.97257	.97320	.97381	.97441	.97500	.97558	.97615	.97670
2.0	.97725	.97778	.97831	.97882	.97932	.97982	.98030	.98077	.98124	.98169
2.1	.98214	.98257	.98300	.98341	.98382	.98422	.98461	.98500	.98537	.98574
2.2	.98610	.98645	.98679	.98713	.98745	.98778	.98809	.98840	.98870	.98899
2.3	.98928	.98956	.98983	.99010	.99036	.99061	.99086	.99111	.99134	.99158
2.4	.99180	.99202	.99224	.99245	.99266	.99286	.99305	.99324	.99343	.99361
2.5	.99379	.99396	.99413	.99430	.99446	.99461	.99477	.99492	.99506	.99520
2.6	.99534	.99547	.99560	.99573	.99585	.99598	.99609	.99621	.99632	.99643
2.7	.99653	.99664	.99674	.99683	.99693	.99702	.99711	.99720	.99728	.99736
2.8	.99744	.99752	.99760	.99767	.99774	.99781	.99788	.99795	.99801	.99807
2.9	.99813	.99819	.99825	.99831	.99836	.99841	.99846	.99851	.99856	.99861
3.0	.99865	.99869	.99874	.99878	.99882	.99886	.99889	.99893	.99896	.99900
3.1	.99903	.99906	.99910	.99913	.99916	.99918	.99921	.99924	.99926	.99929
3.2	.99931	.99934	.99936	.99938	.99940	.99942	.99944	.99946	.99948	.99950
3.3	.99952	.99953	.99955	.99957	.99958	.99960	.99961	.99962	.99964	.99965
3.4	.99966	.99968	.99969	.99970	.99971	.99972	.99973	.99974	.99975	.99976
3.5	.99977	.99978	.99978	.99979	.99980	.99981	.99981	.99982	.99983	.99983
3.6	.99984	.99985	.99985	.99986	.99986	.99987	.99987	.99988	.99988	.99989
3.7	.99989	.99990	.99990	.99990	.99991	.99991	.99992	.99992	.99992	.99992
3.8	.99993	.99993	.99993	.99994	.99994	.99994	.99994	.99995	.99995	.99995
3.9	.99995	.99995	.99996	.99996	.99996	.99996	.99996	.99996	.99997	.99997

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003
-3.8	.00007	.00007	.00007	.00006	.00006	.00006	.00006	.00005	.00005	.00005
-3.7	.00011	.00010	.00010	.00010	.00009	.00009	.00008	.00008	.00008	.00008
-3.6	.00016	.00015	.00015	.00014	.00014	.00013	.00013	.00012	.00012	.00011
-3.5	.00023	.00022	.00022	.00021	.00020	.00019	.00019	.00018	.00017	.00017
-3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
-3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
-3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
-3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
-3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100
-2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
-2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
-2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
-2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
-2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
-2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
-2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
-2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
-2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
-2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
-1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
-1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
-1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
-1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
-1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
-1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
-1.2	.11507	.11314	.11122	.10935	.10749	.10565	.10383	.10204	.10027	.09853
-1.1	.13567	.13350	.13136	.12924	.12714	.12507	.12302	.12100	.11900	.11702
-1.0	.15866	.15625	.15386	.15151	.14917	.14686	.14457	.14231	.14007	.13786
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760
-0.4	.34458	.34090	.33724	.33360	.32997	.32636	.32276	.31918	.31561	.31207
-0.3	.38209	.37828	.37448	.37070	.36693	.36317	.35942	.35569	.35197	.34827
-0.2	.42074	.41683	.41294	.40905	.40517	.40129	.39743	.39358	.38974	.38591
-0.1	.46017	.45620	.45224	.44828	.44433	.44038	.43644	.43251	.42858	.42465
-0.0	.50000	.49601	.49202	.48803	.48405	.48006	.47608	.47210	.46813	.46414

Total no. of Pages: Roll no.....

B.Tech. _____ SEMESTER

END TERM EXAMINATION Nov/Dec-2022

COURSE CODE (CO407/CO433) COURSE TITLE Distributed System

Time: 03:00 Hours Max. Marks: 40

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Attempt Any two parts. 5 X 2 = 10

a) Describe architectural models in distributed systems and explain how the design of the peer-to-peer model is different from the client server with a neat diagram [05] [CO1]

b) What is concurrency control in distributed transactions? Explain various methods of concurrency control with suitable examples. [05] [CO1]

c) What is meant by marshalling in Remote Procedure Call (RPC)? Briefly describe the limitation of distributed system. Mention any five of them. [05] [CO1]

Q.2 Explain message oriented and stream-oriented communication. Also Compare and contrast Persistent communication with Transient communication [10] [CO2, 3]

Or

Describe the interaction model in Distributed System. Explain how event ordering is done in asynchronous distributed system along with necessary diagram. [10] [CO2, 3]

Q.3 Discuss and analyze the working of Centralized, Distributed and Token Ring Algorithm in detail with diagram and perform the comparative analysis among them with example. [10] [CO 3, 4]

Q.4 Analyze, enlist and explain the resources provided by infrastrucure as a service? Differentiate between public, private and hybrid cloud. Give examples. [10] [CO 2, 3.4]

$$P=\begin{bmatrix} 5 & -14 & 2 & 17 \\ -10 & -5 & -10 & 50 \\ 10 & 2 & -11 & 19 \end{bmatrix}$$

I. What are the Cartesian coordinates of the point X in 3D?

II. What are the Cartesian image coordinates, (u, v), of the projection of X?

[b] An ideal pinhole camera has focal length 5mm. Each pixel is 0.02 mm x 0.02 mm and the image principal point is at pixel (500, 500). Pixel coordinates start at (0, 0) in the upper-left corner of the image. What is the 3 x 3 camera calibration matrix, K, for this camera configuration? **[6] [CO2]**

6[a] The SIFT descriptor is a popular method for describing selected feature points based on local neighborhood properties so that they can be matched reliably across images. Assuming feature points have been previously detected using the SIFT feature detector, **[4+4] [CO1, CO4]**

I. briefly describe the main steps of creating the SIFT feature descriptor at a given feature point, and

II. name three (3) scene or image changes that the SIFT descriptor is invariant to (i.e., relatively insensitive to).

[b] Briefly describe a situation where the aliasing problem can occur and how this problem can be overcome. **[2] [CO3]**

7[a] Apply the 3x3 Sobel filter in both horizontal and vertical direction to the given grey scale image Fig. 5. Then calculate the magnitude M(x,y) at each point using the obtained horizontal H(x,y) and vertical V(x, y)components (output of horizontal and vertical kernels). The image is already zero-padded. **[6] [CO5]**

$$M(x,y)=\sqrt{H(x,y)^2+V(x,y)^2}$$

Replace the three cell "RO LL NO" with your actual six-digit Roll No. E.g 00 00 53

0	0	0	0	0
0	50	40	50	0
0	RO	LL	NO	0
0	40	50	40	0
0	0	0	0	0

Fig. 5 Gray Scale Image

[b] Describe the Canny edge detector. What are the steps involved in edge detection using this detector. Use diagrams where necessary in your explanation. **[4] [CO1]**

Total No. of Pages : 4 *Roll No. .....*

FIFTH SEMESTER

B.TECH

END SEMESTER EXAMINATION ***November-2022***

CO411 COMPUTER VISION

Time: 3:00 Hours ***Max. Marks: 50***

Note: Answer *Any FIVE* questions.
Assume suitable missing data, if any.
[CO#] is a course outcome related to question

1[a] Briefly describe the two types of photo receptors in the retina and what these receptors encode. **[2] [CO2]**

[b] Given below is a binary image where dark pixels denote object pixels.

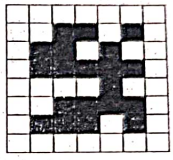


Fig. 1 Binary Image

[2+3+3] [CO1]

I. Use 4-connectedness and 8-connectedness to sketch the distinct objects in the binary image.

II. Write down the expression for the first-order moments of a binary image. Use these expressions to compute the centroid of the object in the binary image given above. You may assume that the top left pixel has coordinates (0, 0).

III. Write down the expressions for the second-order moments of a binary image and calculate them.

2[a] Describe the difference between diffuse reflection and specular reflection using diagram. **[2] [CO2]**

[b] A greyscale transformation can be applied directly onto a greyscale image Fig. 2 to manipulate its pixel values (assuming the range is [0,255]). Draw the histograms for the following greyscale transformations: [1+3] [CO]

5	20	20	120	100
250	100	5	5	255
230	220	150	155	158
156	157	236	120	130
5	136	150	200	140
100	140	180	190	190

Fig. 2 Gray Scale Image

(i) thresholding the image at pixel value 100.

(ii) linearly stretch the intensity in the interval [100,200] to [0,255].

[c] Suppose that a 3-bit image (L=8) of size 64x64 pixels (MN=4096) has the intensity distribution shown in the following table (on the left). Get the histogram transformation function and make the output image with the specified histogram, listed in the table on the right. [4] [CO3]

Table 1: 3-Bit Image Intensity Distribution

r_k	n_k	$P_r(r_k)=n_k/MN$
$r_0=0$	790	0.19
$r_1=1$	1023	0.25
$r_2=2$	850	0.21
$r_3=3$	656	0.16
$r_4=4$	329	0.08
$r_5=5$	245	0.06
$r_6=6$	122	0.03
$r_7=7$	81	0.02

Table2: Specified Histogram

z_q	$P_z(z_q)$
$z_0=0$	0.00
$z_1=1$	0.00
$z_2=2$	0.00
$z_3=3$	0.15
$z_4=4$	0.20
$z_5=5$	0.30
$z_6=6$	0.20
$z_7=7$	0.15

3[a] Explain how the Fourier Transform is used for image enhancement by applying frequency-domain filters, such as high-pass filtering, high-boost filtering, and homomorphic filtering. What is (are) the main task(s) for the above 3 filters as far as image processing is concerned? [5][CO1]

[b] Describe when it would be suitable to use the Prewitt masks. Use a diagram to illustrate these masks. Sketch the result when one of these masks is applied to the greyscale image figure 3. You only need to compute the values for the central region of the image that is fully covered by the mask. [5][CO2]

6	7	7	8	8	9
6	7	8	34	38	39
7	8	9	36	38	39
7	6	36	35	37	40
6	6	8	36	18	39
3	7	8	35	20	39

Fig. 3 Gray Scale Image

4[a] Given a set of 3 images as shown Fig. 4, finding and labeling the image in the center as "containing cat" is considered a detection task in recognition. If you agree or disagree with the statement, give reasons. [3] [CO4]

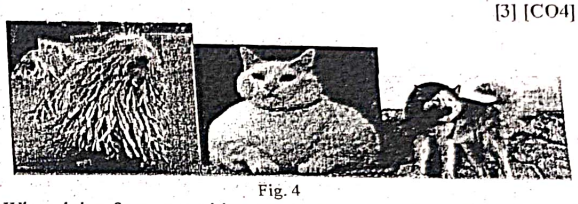


Fig. 4

[b] When doing face recognition, we are given a vector of features (usually pixel values) as the representation for each of the images in our training set. In order to compute the eigenfaces, we concatenate each of these vectors together into a matrix, and then find the eigenvectors of this matrix. If you agree or disagree with the statement, give reasons. [2] [CO4]

[c] Both Eigenfaces and Fisherfaces are unsupervised methods. That is, they are able to operate on data without having to provide labels for the instances. If you agree or disagree with the statement give reasons. [3] [CO4]

[d] If we initialize the k-means clustering algorithm with the same number of clusters but different starting positions for the centers, the algorithm will always converge to the same solution. If you agree or disagree with the statement, give reasons. [2] [CO4]

5[a] Given the 3x4 camera matrix P and a 3D point in homogeneous coordinates $X = [0\ 2\ 2\ 1]^T$ [2+2] [CO1]

Total No. of Pages: 2 Roll No.....

VII -SEMESTER
B.Tech.(All Branches(E1/E3/E7)

END SEMESTER EXAMINATION Nov/Dec- 2022

CO-415 WIRELESS AND MOBILE COMPUTING

Time: 3:00 Hours Max. Marks: 40

Note: Answer all questions by selecting any two parts from each question. Assume suitable missing data, if any.

Q.No. 1 [4x2=8]

A. Show the various subsystems of the Cellular system architecture and explain the working of Mobile call termination and Mobile call origination in a cellular system. [CO#1]

B. Why do we need different MAC frame format for mobile environment in comparison of wired network? explain the MAC frame format of IEEE 802.11. [CO#2]

C. How frequency reuse Distance $D = \sqrt{(3N)} \times R$ is calculated? Explain. Given the minimum distance between two cochannels D=84 meters, and Radius of a cell R =4 meters, find the reuse factor of the network. [CO#3]

Q.No. 2 [4x2=8]

A. A certain city has an area of 2400 square miles and is covered by a cellular system using a seven cell reuse pattern. Each cell has a radius of 8 miles and the city has 48 MHz spectrum with a half- duplex channel bandwidth of 80KHz. Find: [CO#5]
(i) The number of cells in the service area.
(ii) The number of channels per cell.
(iii) Total number of subscribers that can be served

B. What are the various power management and synchronization mechanisms in Ad-hoc and infrastructure wireless networks? Explain [CO#6]

C. What is Mobile IP? Explain Packet flow in mobile IP, if two nodes communicate and both are in foreign networks. What additional routes do packets take if reverse tunnelling is required? [CO#2,3]

103

[4x2=8]

Q.No. 3

A. What is Bluetooth? Describe the general format of packet and packet header in Bluetooth technology. And also Sketch the Protocol stack and describe its various layers briefly. [CO#2]

B. What kind of problems may arise if TCP is implemented over wireless Networks? Explain and also discuss different approaches for TCP improvement. [CO#2]

C. Explain the working of following [CO#1,2]

1. DCF and PCF mode at MAC sublayer
2. CSMA/CA with RTS/CTS
3. Authentication and ciphering in GSM

Q.No. 4 [4x2=8]

A. What is WAP? Discuss the components of the wireless application protocol (WAP) architecture. [CO#2]

B. Explain working of RSA algorithm for encryption and decryption and also find cipher text corresponding to plain text M=9, also generate Public key and Secret key using RSA algorithm by taking two prime numbers p=11 and q=23. [CO#3]

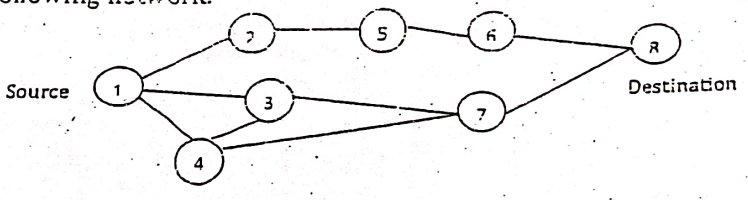
C. Explain the Destination sequenced distance vector (DSDV) routing with suitable example also differentiate it with AODV. [CO#4]

Q.No. 5 [4x2=8]

A. What are the Data management issues in mobile computing? How Data Management is done in Mobile Computing? Explain. [CO#6]

B. Explain the working mechanism of Data Encryption Standard(DES) and RSA algorithms. [CO#3]

C. Explain working of TORA and also discuss route maintenance in in TORA assuming that at time t link fails between node 7 and node 8. For following network. [CO#4]



Total no. of Pages: 01 Roll no.....

END TERM EXAMINATION NOV-2022

Seventh Semester B.Tech. COE

Paper Code: CO423 Swarm and Evolutionary Computing

Duration: 3 Hours Max Marks: 50

Note: All questions are compulsory.
Marks for questions are indicated alongside.
Assume suitable missing data, if any.

Q.1. (a) Differentiate between Steady state model and Generational model of Evolutionary Algorithm. [2] [CO3]

(b) Explain any four parent selection methods of Genetic Algorithm. [8] [CO1]

Q.2. (a) List various types of mutation operators that can be applied on permutation representation of evolutionary algorithm. [3] [CO1]

(b) Explain Real Coded Genetic Algorithm. [7] [CO4]

Q.3. Explain Artificial Bee Colony Algorithm in detail. [10] [CO1]

Q.4. Solve the following Travelling Salesman problem using Ant Colony Algorithm for finding the shortest path between six cities and returning back to source city. The coordinates of the cities in two coordinate system are given as {(1,4) (3,6) (3,7) (5,7) (5,5) (4,2)}. Show the convergence for two iterations. Specify the values assumptions made if any. [10] [CO2]

Q.5. Explain Evolutionary Robotics with respect to the following aspects: (i) Design (ii) Architecture (iii) Future. [3+5+2] [CO4]

END

Total No. of Pages: 2 Roll No.....

SEVENTH SEMESTER B. Tech.

END SEMESTER EXAMINATION November-2022

CO425 WEB TECHNOLOGY

Time: 3 Hours *Max. Marks: 40*

Note: Attempt any Five questions. Assume suitable missing data, if any.

Q.1(a) Explain the structure of HTML. Write HTML code for expanding audio and video. [4] [CO-5]

(b) Discuss the concept of remote login in the Web Server. [2] [CO-6]

(c) How are the concepts of IP addressing and DNS associated? [2] [CO-1]

Q.2(a) Suppose a developer wants to read and write into a file. How will the developer use PHP script for this purpose? [3] [CO-2]

(b) If we need to compare two date objects in different formats, how will JavaScript be used? [3] [CO-2]

(c) Explain the concept of Event handling in JavaScript through a suitable example? [2] [CO-6]

Q.3(a) Enlisted the difference between Data Mining, Web Mining, and Text Mining. [4] [CO-3]

(b) What is a Recommender System? Enlist the classification of the Recommender System. [4] [CO-3]

Q.4 (a) Write a step for configuring the ODBC driver and define its data source. [4] [CO-4]

(b) What are the steps of Web Mining? Explain the type of Web Mining. [4] [CO-3]

Q.5 (a) What is Search Engine Optimization? Discuss its significance in Web Mining. Explain the basic principle in the working of search engine optimization. [5] [CO-3]

(b) How would you conduct a usability test for a Website? [3] [CO-4]

P.T.O →

Q.6 Write a short note on (any four)

(i) Web Analytics [2][CO-1]
(ii) Meta Tags [2][CO-5]
(iii) Frame tag in HTML [2][CO-5]
(iv) Web Crawler [2][CO-3]
(v) JDBC [2][CO-4]

END

Total No. of Pages: 02 Roll No.....

VII SEMESTER

B.Tech.

END TERM EXAMINATION Nov-2022

CO429 Neural Networks

Time: 3:00 Hours Max. Marks: 50

Note: All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1. Define Associative Memory. Explain its various types in detail with suitable examples. [10][CO5]

OR

Explain Storage and Retrieval algorithms for associative memory. [10][CO5]

Q.2. a) Explain any two of the following activation functions: [5][CO3]

i. Tanh
ii. Sigmoid
iii. SELU

b) What is the role of activation function in neural networks? [2][CO3]

c) Write a short note on any one of the following: [3][CO3]

i. Semi-Supervised Learning
ii. Reinforcement Learning

Q.3 Attempt any two questions: [5][CO4]

a) Explain Credit Assignment Problem in detail.

b) Explain why Zero Initialization technique is not considered as a good technique of weights initialization. [5][CO2]

c) Explain the limitations of single-layer feed forward network and what are the improvements that can be possible over single layer feed forward network to multi-layer feed forward network. [5][CO4]

Q.4 Explain Kolmogorov Theorem in multi-layer feed forward network. Further, explain and derive the Backpropagation algorithm for multi-layer feed forward network. [4+6][CO4]

OR

Consider a two-layer network. The initial weights and biases are as follows:

$$w^1 = 1,\ b^1 = 1,\ w^2 = -2,\ b^2 = 1$$

An input/target pair is given to be:

$$((p=1), (t=1))$$

i. Find the squared error (e^2) as an explicit function of all weights and biases.
ii. Using part (i), find $\delta(e^2)$ at the initial weights and biases.
iii. Repeat part (ii) using back propagation and compare results.

[2+4+4][CO4]

Q.5 Explain the various architectures of Hopfield network in detail. How learning process occurs in Hopfield network? Explain.

[6+4][CO6]

OR

Consider a Hopfield network with the following weight and bias:

$$W = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

i. The following input (initial condition) is applied to the network. Find the network response. Show the network output after each iteration until the network converges.

$$P = \begin{bmatrix} 0.9 \\ 1 \end{bmatrix}$$

ii. Draw a sketch indicating what region of the input space will converge to the same final output that you found in part (i). (In other words, for what other p vectors will the network converge to the same final output)? Justify your answer.

iii. What other prototypes will this network converge to, and what regions of the input space correspond to each prototype (sketch the regions). Justify your answer.

[5+2.5+2.5][CO6]

Total No. of Pages: 3

Roll No. .....

SEVENTH SEMESTER

B. Tech. (CSE)

END SEMESTER EXAMINATION *November-2022*

CO431 REINFORCEMENT LEARNING

Time: 3:00 Hours *Max. Marks: 50*

Note: Answer *ALL* questions.
Assume suitable missing data, if any.
CO# is course outcome related to question

1 Attempt all questions.

[a] In MDPs and reinforcement learning, explain why we often discount future rewards. [5] [CO1]

[b] In ϵ-greedy action selection, for the case of two actions and $\epsilon = 0.5$, what is the probability of the greedy action is selected. [5] [CO2]

2. Attempt any two of the following:

[a] Consider the Markov chain with three states, S={1,2,3}, that has the following transition matrix.

$$p = \begin{bmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ \frac{1}{3} & 0 & \frac{2}{3} \\ \frac{1}{2} & \frac{1}{2} & 0 \end{bmatrix}$$

i. Draw the state transition diagram for this chain.

ii. If we know P(X1=1)=P(X1=2)=14, find P(X1=3,X2=2,X3=1).

[5] [CO3]

[b] Why is Q-learning considered an off-policy control method? [5] [CO2]

[c] Consider the problem of driving. You could define the actions in terms of the accelerator, steering wheel, and brake, that is, where your body meets the machine. Or you could define them farther out? say, where the rubber meets the road, considering your actions to be tire torques.

Or you could define them farther in? say, where your brain meets your body, the actions being muscle twitches to control your limbs. Or you could go to a really high level and say that your actions are your choices of where to drive. What is the right level, the right place to draw the line between agent and environment? On what basis is one location of the line to be preferred over another? Is there any fundamental reason for preferring one location over another, or is it a free choice? [5] [CO4]

3. Attempt any two of the following:

[a] What is the Iterative policy evaluation method? [5] [CO1]

[b] Ego-centric representations are based on an agent's current position in the world. In a sense the agent says, I don't care where I am, but I am only worried about the position of the objects in the world relative to me. You could think of the agent as being at the origin always. Comment on the suitability (advantages and disadvantages) of using an ego-centric representation in RL. [5] [CO4]

[c] Consider the task of controlling a system when the control actions are delayed. The control agent takes an action on observing the state at time t. The action is applied to the system at time $t + \tau$. The agent receives a reward at each time step. [2x2.5] [CO3]

i. What is an appropriate notion of return for this task?
ii. Give the Temporal Difference TD(0) backup equation for estimating the value function of a given policy.

4. Attempt any two of the following:

[a] Consider an MDP with a single nonterminal state and a single action that transitions back to the nonterminal state with probability p and transitions to the terminal state with probability 1-p. Let the reward be +1 on all transitions, and let $\gamma = 1$. Suppose you observe one episode that last 10 steps, with a return of 10. What are the first visit and every-visit estimators of the value of the non-terminal state. [5] [CO4]

[b] Suppose you get a job where the boss is interested in localization of a robot with multiple laser sensors in a factory. The boss has heard of variable elimination, rejection sampling, and particle filtering and wants to know which would be most suitable for this task. You must write a report for your boss, explaining which one of these technologies would be most suitable. For the one that is most suitable, explain what information it requires to be used for localization. For the two technologies that are not the most suitable, explain why you rejected them. [5] [CO3]

i. Variable elimination (i.e., exact inference as used in HMMs)
ii. Rejection sampling
iii. Particle filtering

[c] What's the main shortcoming of TD learning that Q-learning resolves? [5] [CO1]

5. Attempt all questions.

[a] Let us consider the effect of approximation on policy search and value function based methods. Suppose that a policy gradient method uses a class of policies that do not contain the optimal policy; and a value function based method uses a function approximator that can represent the values of the policies of this class, but not that of the optimal policy.

i. Why would you consider the policy gradient approach to be better than the value function based approach?
ii. Under what circumstances would the value function based approach be better than the policy gradient approach? [2.5x2][CO4]

[b] How is DOUBLE DQN better than DQN? Also write challenges in Deep Reinforcement Learning. [5] [CO2]

---Best of Luck---

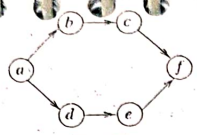


Fig 6a)

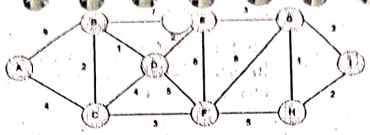


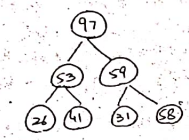
Fig. 6b)

b) Find the minimum cost-spanning tree for the graph given in Fig. 6b) using Kruskal's algorithm. Show every step of the algorithm. [CO 1]

c) Write an algorithm to find if the graph is connected or not. [CO 2]

Q7. Answer all the following questions: [3+4 marks]

a) Consider the following max-heap after the build heap phase. What is(are) the possible input sequences that can create the given heap? Note: To re-heapify, i.e. swapping parent node with child node, choose the largest child for swapping with the parent. [CO 4]



1. 97, 53, 59, 26, 41, 31, 58
2. 26, 31, 53, 58, 41, 59, 97
3. 26, 31, 41, 53, 58, 59, 97
4. 97, 26, 31, 53, 41, 58, 59

b) Construct a B-Tree of order 5 for the following input data: [CO 1]

1 7 6 2 11 4 8 13 10 5 19 9 18 24 3 12 14 20 21 16

Delete 5, 6, 13.

***

Total No of Pages:

B. Tech. [MC]

End Semester Examination

Roll No .....

3rd Semester

(November-2022)

CS 251 Data Structures

Time 3h 00 min.

Max. Marks: 40

NOTE: Attempt only FIVE (05) questions in total. Question 1 is MANDATORY. Assume suitable missing data if any.

Q1 Answer all the following questions: [2 * 6 = 12 marks]

a) What is the return value of the function Function1 when it is called as Function1(513,3)? [CO 2]

```
int Function1(int n, int x)
{
    if (n >0) return ((n%x) + Function1(n/x, x));
    else return 0;
}
```

b) Select the correct option (only one) related to the given linked list: [CO 2]

```
struct item
{
 int data;
 struct item * next;
};

int Function2(struct item *p)
{
 return (
      (p == NULL) ||
      (p->next == NULL) ||
      (( p->data <= p->next->data) && Function2(p->next))
     );
}
```

The function Function2 returns 1, if and only if

1. The elements in the list are sorted in non-decreasing order of data value
2. The elements in the list are sorted in non-increasing order of data value
3. not all elements in the list have the same value
4. none of these

c) Construct a binary tree for the following traversals: [CO 1

Inorder: B F A D E C G H J I

Preorder: G A B F C D E H I J

P.T

d) Which one of the following algorithms can be used to sort a random singly linked list with minimum time complexity? Give the reason. [CO 3]

1. Insertion Sort
2. Quick Sort
3. Heap Sort
4. Merge Sort

e) Which of the following statement(s) is(are) TRUE for undirected graphs? [CO1]

P: The number of odd-degree vertices is even.
Q: The sum of degrees of all vertices is even.

f) Consider a double hashing scheme in which the primary hash function is $h_1(k)=k \bmod 23$, and the secondary hash function is $h_2(k)=1+(k \bmod 19)$. Assume that the table size is 23. Then the address returned by probe 1 in the probe sequence (assume that the probe sequence begins at probe 0) for key value k=90 is _____. [CO 5]

Q2. Answer all the following questions: [2 + 2 + 3 marks]

a) A circularly linked list is used to represent a Queue. A single variable p is used to access the Queue. To which node should p point such that both the operations enQueue and deQueue can be performed in constant time? [CO 1]



b) Consider the following sequence of operations on an empty stack. push(54); push(52); pop(); push(55); push(62); s = pop();

Consider the following sequence of operations on an empty queue. enqueue(21); enqueue(24); dequeue(); enqueue(28); enqueue(32); q=dequeue();

The value of s + q is _____. [CO 1]

c) Consider the following pseudo-code. Assume that IntQueue is an integer queue. What is the output of the function *Function3*? [CO 1]

```
void Function3(int n)
{
  IntQueue q = new IntQueue();
  q.enqueue(0);
  q.enqueue(1);
  for (int i = 0; i < n; i++)
  {
    int a = q.dequeue();
    int b = q.dequeue();
    q.enqueue(b);
    q.enqueue(a + b);
    print(a);
  }
}
```

Q3. Answer all the following questions: [3+4 marks] [CO 2]

a) Write an algorithm to convert a sorted linked list into a Binary Search Tree.
b) Write an algorithm to remove duplicate nodes in an unsorted linked list.

Q4. Answer all the following questions: [2+ 3 +2 marks]

a) Make a Binary Search Tree (BST) for the following sequence of numbers: 51, 36, 12, 90, 64, 8, 73, 55, 29, 47 [CO 1]

b) Construct an AVL tree giving a step-by-step construction process indicating LL, LR, RL, RR rotation at each step, for the following input: 1 12 2 11 3 10 4 9 5 8 6 7 [CO 1]

c) Write an algorithm for the deletion of a node having only the right subtree from the Right in-threaded Binary Search Tree. [CO 2]

Q5. Answer all the following questions: [4+3 marks]

a) Sort the following list of elements using quick sort. Choose the first element as a pivot. [CO 4]

67 78 723 450 11 9 32 22 43

b) The following values are to be stored in a hash table
25, 42, 96, 101, 102, 162, 197
Describe how the values are hashed by using the division method of hashing with a table size of 7. Use chaining as the method of collision resolution. [CO 5]

Q6. Answer all the following questions: [2 + 2 + 3 marks]

a) Consider the directed graph given in Fig. 6a). List all the different topological orderings of the vertices of the graph. [CO 1]

P.T.O

Total No. of Pages 3 113 Roll No

3rd SEMESTER **B.Tech**

END TERM EXAMINATION *Nov-2022*

COURSE CODE EC201 COURSE TITLE Analog Electronics I

Time: 3:00 Hours *Max. Marks: 40*

Note : Q. No. 1 is questions are COMPULSORY. Attempt any FOUR question from remaining five.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1(a) Discuss the impact of base width modulation on input and output characteristics in common emitter configuration. [2][CO2]

(b) For a given V_{DS}, an NMOS device carries 1 mA with $V_{GS} - V_T = 0.6V$ and 1.6 mA with $V_{GS} - V_T = 0.8V$. If the device operates in linear (triode) region, calculate V_{DS} and W/L. [2][CO1]

(c) A silicon bar is purely intrinsic till some distance x_1 in positive x direction and turns into n type semiconductor having concentration density N_D cm^{-3} at distance x_2 such that $x_2 > x_1$. Determine the potential difference between points x_1 and x_2. [2][CO1]

(d) Determine the dc value of the output for circuit of Fig. 1 if $V_{in} = 10 \sin \omega t$. [2][CO5]

Q.2(a) Compute Q point for the circuit of Fig. 2. Assume $\beta = 100$, $V_A = \infty$. [4][CO2]

(b) Draw small signal for circuit of Fig. 2 and compute Voltage gain (A_v), Current gain(A_I), input impedance (Z_i) and output impedances (Z_o). [4][CO3]

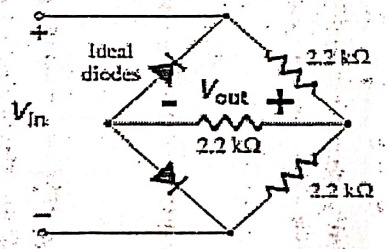


Fig. 1

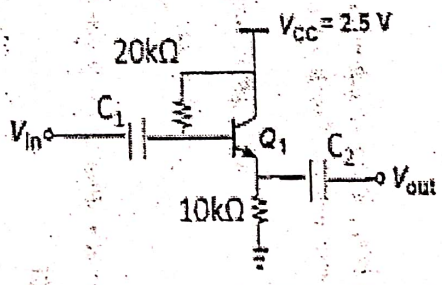


Fig. 2

Q.3 Assuming $\mu_n C_{ox} = 200\ \mu A/V^2$, $V_T = 0.4$ V, $\lambda = 0$, determine the following for the circuit of Fig. 3. [4+4][CO3]

(a) The required value of W/L, if the circuit provides voltage gain of 4 with a bias current of 1 mA, and $R_D = 1$ kΩ, (Assume a drop of 200 mV across R_S). Does the transistor operate in saturation for this choice of W/L?

(b) The required value of R_D if W/L = 50/0.18. Does the transistor operate in saturation for this choice of R_D? Also compute input impedance.

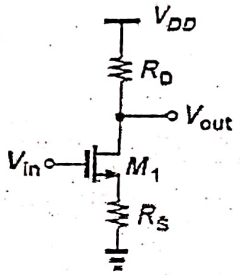


Fig. 3

Q.4 (a) Analyze the multistage transistor amplifier of Fig. 4 and compute no-load voltage gain and output voltage. [4][CO4]

(b) Determine the input impedance of the first stage and the output impedance of the second stage. Compute the overall gain and output voltage if a 4.7 kΩ load is applied to the second stage, and compare to the results of part (a). [4][CO4]

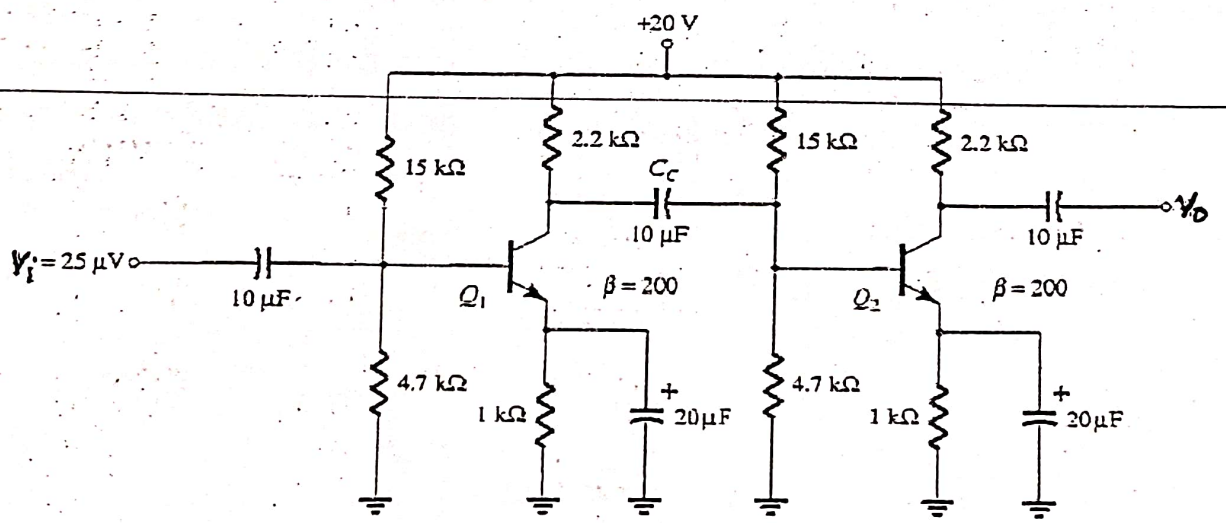


Fig. 4

Q. 5 (a) A CE amplifier with emitter resistance is biased at a collector current of 1 mA. If the circuit provides a voltage gain of 20 with no emitter resistance and 10 with emitter resistance, determine R_C; R_E; and input and output impedances. Assume $\beta = 100$. [4][CO3]

(b) For the circuit of Fig. 5, determine the maximum allowable value of W/L if M1 remain in saturation. Assume $\mu_n C_{ox} = 200\ \mu A/V^2$, $V_T = 0.4$ V, $\lambda = 0$ [4][CO5]

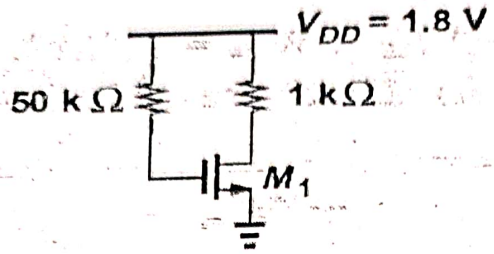


Fig. 5

Q. 6 (a) Taking base currents into account, calculate the value of I_{copy} in each circuit depicted in Fig. 6. Normalize the error to the nominal value of I_{copy}. [4][CO5]

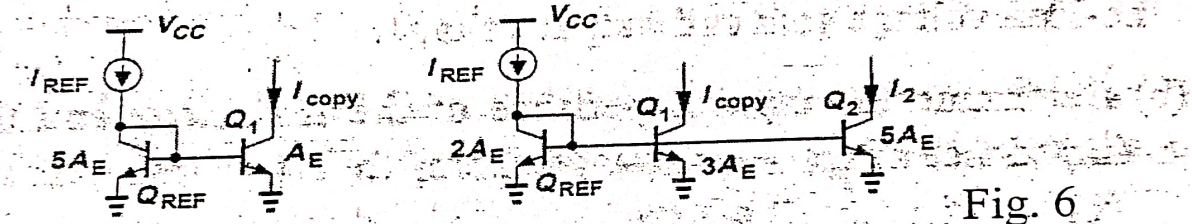
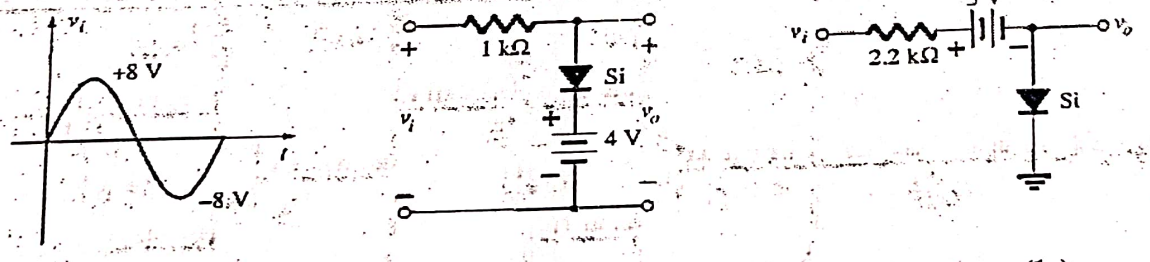


Fig. 6

(b) Determine v_o for the network of Fig. 7(a) and 7(b) for the input shown. [4][CO5]



(a) (b)

Fig. 7

Total no. of Pages: 021 Roll no.....

3rd SEMESTER

B.Tech.[ECE]

ENDTERM EXAMINATION Nov/Dec-2022

EC203 Digital Design-1

Time: 03:00Hours Max.Marks:40

Note : Question no 1 is compulsory. Anwer any six from rest

1. (a) Convert SOP equation $F = A\bar{B} + \bar{A}\bar{C} + A$ into canonical form.
   (b) Find the complement of $\bar{A}C\,(\overline{\bar{A}BD}) + \bar{A}B\bar{C}\bar{D} + A\overline{(\bar{B} + C)}$
   (c) What is master slave flip-flop? Give the excitation table.
   (d) Differentiate between ring counter and twisted ring counter.
   (e) What is the advantage of flash type A/D converter? [2X5][CO1-5]
2. What is Ex-3 code? Write its properties. Design a circuit to convert 8421 BCD code to Ex-3 code. [5][CO1-2]
3. Design a two bit gray code adder circuit and implement by using a suitable size decoder. [5][CO3]
4. Design a binary full substractor circuit by using (i) only one 4:1 Mux (ii)only one 2:1 Mux, along with basic gates. [5][CO3]
5. Design a synchronous counter for counting 15 to 0 and repeat. How it can be converted to an Up counter? Use JK flip-flop. [5] [CO4]
6. With neat circuit diagram, explain the working of successive approximation A/D converter. [5][CO5]
7. Give the classification of logic family. Give the characteristics/Specifications of CMOS logic families. [5][CO6]
8. With neat diagram explain the working of Bi-stable multivibrator. [5][CO6]

Total No. of Pages 02 Roll No.....

III SEMESTER **B.Tech (Electronics & Communication Engineering)**

END TERM EXAMINATION *Nov-2022*

EC-205: SIGNALS & SYSTEMS

Time: 03 Hours *Max. Marks: 40*

Note : Attempt any FIVE questions.
Assume suitable missing data, if any.

Q.1[a] Consider a causal LTI system with the input and output relations as

$$\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = x(t)$$

such that $y(0^-) = 2$, and $y'(0) = 2$

(i) Determine the zero-state response of system for input signal, $x(t) = u(t)$.

(ii) Determine the zero-input response of the circuit for $t > 0^-$

[2 + 2][EC205.1]

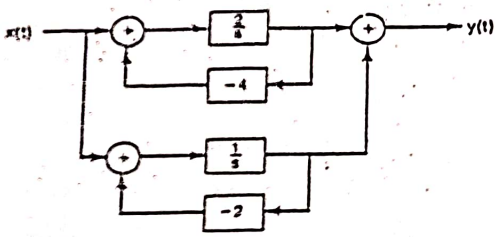
[b] Consider a causal LTI system with impulse response $h(t) = e^{-3t}u(t)$. Find the output of the system for an input $x(t) = e^{-4t}u(t)$. [4][EC205.2]

Q.2[a] Apply the convolution integral to determine and plot the response y(t) of the LTI system with impulse response h(t) to the input x(t) when

$x(t) = (\sin \pi t)[u(t) - u(t-2)]$

$h(t) = u(t-1) - u(t-3)$ [4][EC205.2]

[b] A causal LTI system has the block diagram representation as shown below. Determine a differential equation relating the input x(t) to the output y(t) of this system. [4][EC205.1]



Q.3[a] Find the Fourier transform of following: [2 + 2][EC205.3]
(i) e^{-3t} Sin (4t) u(t) (ii) 5 Cos^2 (3t)

[b] Find the inverse Fourier transform of following:
(i) X (ω) = [4(jω) + 6] / [$(j\omega)^2$ + 6 (jω) + 8] [2 + 2][EC205.3]
(ii) X (ω) = (jω) / $(3 + j\omega)^2$

Q.4[a] Consider the z-transform of a signal, x[n], as follows

$$X(z) = \frac{1}{\left(1 - \frac{1}{3}z^{-1}\right)(1 - 2z^{-1})}$$

Determine the ROC and the sequence x[n] if
(i) x[n] is causal
(ii) x[n] is stable
(iii) x[n] is neither stable, nor causal [4][EC205.3]

[b] Determine the z-transform of the following:
(i) x(n) = n u(n) (ii) $x(n) = n^2(1/3)^n$ u(n-2) [2 + 2][EC205.3]

Q.5[a] Find the Laplace transform and ROC of the following:
(i) $x(t) = e^{-at}$ u(t) - e^{-bt} u(-t)
(ii) $x(t) = t\, e^{-t}$ Cos (2 t) u(t) [2 + 2][EC205.3]

---

[b] Find the inverse Laplace transform of following: [2 + 2][EC205.3]
(i) X (s) = [$s^3 + 7s^2 + 25$ s + 18] / [$s^2 + 6$ s + 18]
(ii) X (s) = [$s^2 + 2$ s + 5] / [(s + 3)$(s + 5)^2$] & $-5 < Re(s) < 3$

Q.6[a] The signal x(t) with Fourier transform $X(\omega) = u(\omega) - u(\omega - \omega_o)$ can undergo impulse train sampling without aliasing, provided that the sampling period $T < (2\pi/\omega_o)$. Justify. [3][EC205.4]

[b] Prove that a signal and its Hilbert transform have the same energy density function and autocorrelation function. Calculate the Hilbert transform of x(t) = Cos(10 π t) Cos(1000 π t). [5][EC205.5]

6 The input impedance for the network shown in Fig. 6 is [10][CO5]

$$Z_{in}(s)=\frac{s^2+1}{s^3+3s^2+4s+3}$$

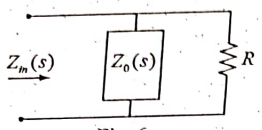


Fig. 6

If $Z_0(s)$ is LC network: (a) Find the value of R and the expression for $Z_0(s)$ (b) Synthesize $Z_0(s)$ in a Foster series network and a first Cauer network.

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THIRD SEMESTER

B.Tech.(ECE)

END SEMESTER EXAMINATION *November-2022*

EC207 Engineering Analysis and Design

(Network Analysis & Synthesis)

Time: 3 Hours *Max. Marks: 50*

Note: *Answer any 5 questions.*
All questions carry equal marks.
Use the answer sheet space judiciously
Assume suitable missing data, if any.

1[a] For the two-port circuit in Fig. 1(a). [4][CO4]

$$Z=\begin{bmatrix}40 & 60\\ 80 & 120\end{bmatrix}$$

(a) Find Z_L for the maximum power transfer to the load.
(b) Calculate the maximum power delivered to the load.

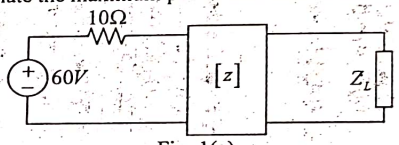


Fig. 1(a)

1[b] Calculate the following two port parameters of the network shown in Fig. 1(b). [6][CO4]
h_{21}, z_{12}, B and y_{22}

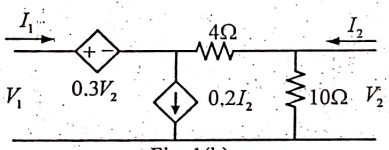


Fig. 1(b)

2[a] Find the expression for $v_L(t)$ in the circuit of Fig.2(a),valid for all time t. Comment on the type of response. [6][CO2]

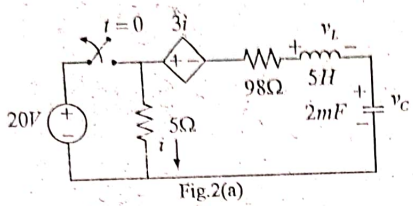


Fig.2(a)

2[b] Test whether given polynomial is Hurwitz. [4][CO5]
$P(s) = 2s^6 + s^5 + 13s^4 + 6s^3 + 56s^2 + 25s + 25$

3[a] Find $v(t)$ for all value of t in the circuit of Fig. 3(a). [4][CO2]

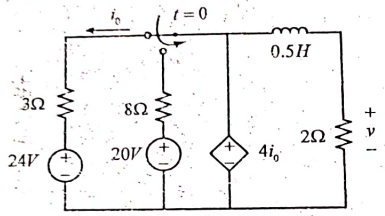


Fig. 3(a)

3[b] For the two port network hybrid parameter is given as [6][CO4]

$$h = \begin{bmatrix} 20\Omega & 2 \\ -\frac{2}{3} & \frac{1}{15}S \end{bmatrix}$$

Calculate the input impedance Z_{in}, when
(a)the output terminals are short circuited
(b)the output port is open circuited
(c)the output port is terminated by 50Ω load.

4[a] Write the necessary and sufficient condition for a rational function F(s) to be positive real. [6][CO5]
Whether given admittance function Y(s) is positive real

$$Y(s) = \frac{s^2 + \frac{3}{4}s + \frac{3}{4}}{s^2 + s + 4}$$

4[b] Consider the circuit shown in Fig. 4 (b). Calculate the current $i(t)$ for all value of t. [4][CO2]

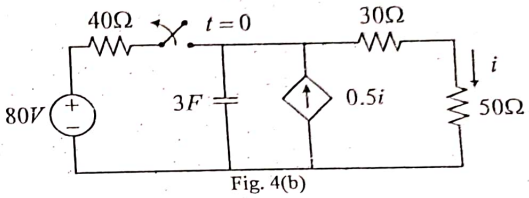


Fig. 4(b)

5 An impedance function has the pole-zero pattern shown in the Fig. 5.If $Z(-2) = \frac{3}{2}$, find $Z(s)$ and synthesize the impedance function in a foster-II form and a Cauer-II form. [10][CO5]

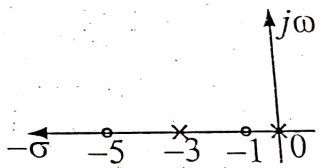


Fig. 5

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Total no. of Pages:2 Roll no.....

3rd SEMESTER

B.Tech

END TERM EXAMINATION *Nov/Dec-2022*

EC251 BASIC ELECTRONICS AND INSTRUMENTATION

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Determine the output voltage V_0 of the inverting amplifier shown in Fig. 1 for $v_I = 1V, R_1 = 2k\Omega, R_2 = 10k\Omega, R_3 = 20k\Omega$, and $R_4 = 40k\Omega$. [M=4][CO3]

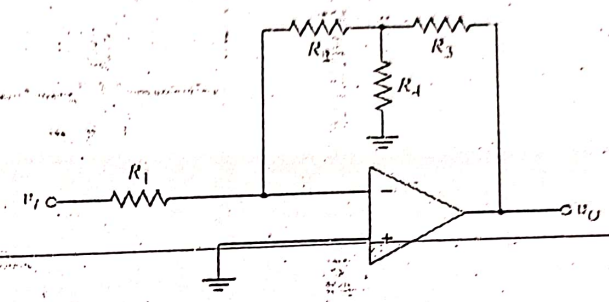


Fig. 1

Q.2 An amplifier with gain A=80dB is connected to a negative feedback network. The feedback factor is 0.04. Due to replacement of active device the internal gain of the amplifier is change by 40%. What would be the percentage change in the gain of feedback amplifier. [M=3][CO2]

Q.3 Draw and explain the characteristics of junction field effect transistor. [M=2][CO1]

Q.4 (a) Draw a diagram to illustrate the operation and working of a capacitive pressure transducer. [M=3][CO5]

(b) Explain piezoelectric effect and discuss how it is applied in a transducer. [M=3][CO5]

Q.5 Drive the output voltage equation of differentiator circuit using OPAMP with the help of suitable circuit diagram. [M=4][CO3]

Q.6 Simplify the following Boolean Expression using K-map in (a) sum of product form (SOP) and (b) product of sum (POS) form. Also implement using logic gates for SOP.
$Y(A,B,C,D)$- $\sum$ m (1, 4, 6, 9, 10, 11, 14, 15) [M=5][CO4]

Q.7 (a) Design Ex-OR gate using NAND and NOR. [M=3][CO4]

(b) Convert the following [M=3][CO4]

$(746.421)_8 = (\quad)_2 = (\quad)_{10} = (\quad)_{16}$

Q.8 The Zener diode regulator circuit shown in Fig. 2 has an input voltage that varies between 10 and 14 V, and a load resistance that varies between $R_L = 20$ and 100. Assume a 5.6 Zener diode is used, and assume $I_{Z(min)} = 0.1 I_{Z(max)}$ [M=5][CO4]

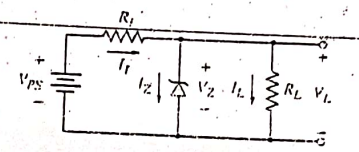


Fig. 2

a. Calculate the maximum Zener current
b. Find the value of R_i required
c. The minimum power rating of the diode.

Q.9 (a) Draw and Explain the input-output characteristics of common base configuration of NPN transistor with the help of circuit diagram. [M=3][CO1]

(b) Differentiate between positive and negative feedback. [M=2][CO2]

(d) Differentiate positive and negative feedback and derive their expressions for voltage gain. Discuss the necessary conditions to produce the oscillations. (2) [CO5]

Q. 5 (a) Make series-shunt and series-series topologies for negative feed back amplifier. (2) [CO5]

(b) An amplifier with negative feedback shows a gain of 1000. It is observed that an input of 50mV is required to produce an output without feedback, however an input of 0.5V is required to produce the same output with feedback. Calculate the values of open loop gain A and β. (2) [CO5]

(c) Make the circuit diagram for RC phase shift oscillator using BJT and derive the expressions of frequency and amplifier gain (A). (4) [CO5]

Q. 6 (a) Determine the output voltage (V_0) for the given circuits (Fig. 5 (i)) and (Fig. 5 (ii)). (4) [CO6]

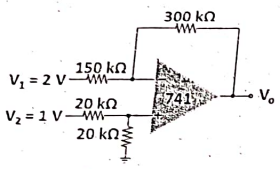


Fig. 5 (i)

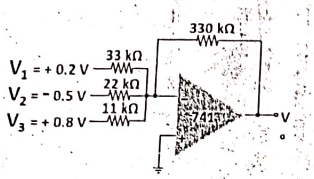


Fig. 5 (ii)

(b) Make the connection diagram for integrator and differentiator using OP-AMP. Also, derive their expressions for output voltage. (2) [CO6]

(c) Define pin diagram for OP-AMP IC. What is the significance of Virtual ground in OP-AMP. Discuss Inverting and Non-inverting configurations. (2) [CO6]

-End-

THIRD SEMESTER
B.Tech. (CS/IT)

Total No. of Pages: 04 *Roll No. .....*

END SEMESTER EXAMINATION (NOV-2022)

EC-261 ANALOG ELECTRONICS

Time: 3.00 Hours ***Max. Marks: 40***

Note: Answer any FIVE questions by selecting all parts from a particular question. All questions carry equal marks.
Assume suitable missing data, if any.

Q. 1 (a) An intrinsic silicon bar is 4 mm long and has a rectangular cross section of 50 ×100 μm^2. At room temperature, determine the electric field intensity and voltage across the bar when a steady current of 1 μA is measured. Assume the resistivity of 2.3×10^5 Ωcm for intrinsic semiconductor at room temperature. Also compare the voltage across the bar if silicon is doped with 1×10^{15} donor atoms/cm^3. Given $n_i = 1.45\times10^{10}$ cm^{-3} and $\mu n = 1500$ $cm^2/V.s$. (4) [CO1]

(b) Why clamper is used? Find voltage across capacitor (V_C) and output voltage (V_0) for the silicon diode-based Clamper Circuit (Fig. 1) with given input signal. Also sketch the output waveform for $0 \le t \le 2T$. **(4) [CO1]**

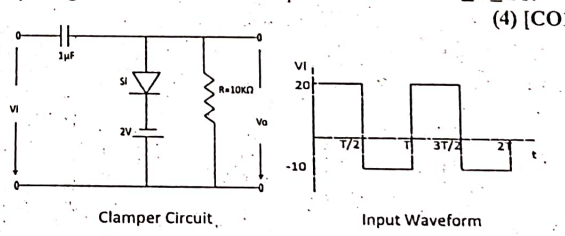


Fig. 1

Q. 2 (a) Determine I_{BQ}, I_{CQ}, V_{CEQ} for the circuit (Fig. 2). Also find stability factor. How stability is achieved in this biasing if, β or temp increases. Consider junction voltage; V_{BE}= 0.7V. (4) [CO2]

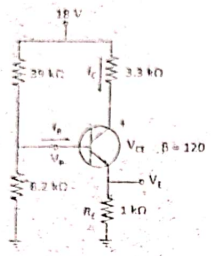


Fig. 2

(b) Write the significance of early voltage. What do you understand by base width modulation? (2) [CO2]

(c) What is the need of biasing in amplifiers and significance of DC load line. (2) [CO2]

Q. 3 (a) Determine Av, A_i, and R_O for given common collector amplifier (Fig. 3). Also find the value of R_E so that amplifier can show $R_I \geq 1$ MΩ. Transistor is biased at I_C = 2mA. Consider β = 125, R_S = 500Ω, $V_A = \infty$ and $C = \infty$. Also, justify that this configuration is not suitable for voltage amplification. (4) [CO3]

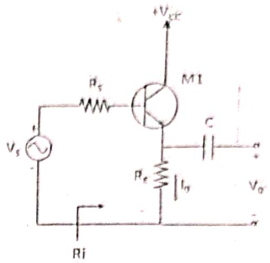


Fig. 3

(b) Determine coordinates of operating point (I_{DQ}, V_{GSQ} and V_{DSQ}) and V_D, V_S, V_G, for given circuit (Fig. 4). Also find voltage gain, if ac input of small magnitude (Vs) is applied. Consider $r_{ds} = \infty$. (4) [CO4]

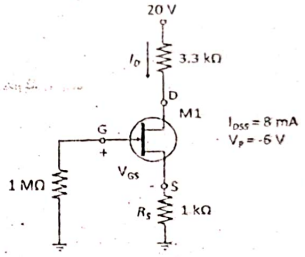


Fig. 4

Q. 4 (a) Differentiate n-channel depletion and enhancement MOSFET in terms of construction and operation. (2) [CO4]

(b) Draw and explain the circuit and characteristics (transfer and drain both) of p-channel enhancement MOSFET. (2) [CO4]

(c) Draw the transfer characteristics of n-channel JFET for given I_{DSS} = 12 mA and V_P = -8V. Also, determine g_m and I_D for V_{GS} = -2V. (2) [CO4]

Total No. of Pages: 02 Roll No._____

III-SEMESTER

B.Tech.

END TERM EXAMINATION *Nov-2022*

EC271 Digital Electronics

Time: 3:00 Hours *Max. Marks: 40*

Note : Attempt any eight questions

Q1. (a) Implement the following function using single 3:8 decoder [2] [CO-4]

$f(x,y,z) = M(2,3,4,5,7)$

$f(w,x,y,z) = M(1,3,5)$

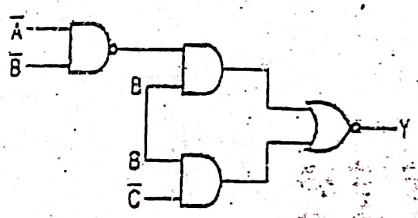
(b) What is the magnitude comparator ? Design a two bit digital comparator by writing truth table, relevant expression and logic diagram. [3] [CO-4]

Q 2. (a) Implement $f(a,b,c,d) = m(0,1,5,6,7,10,15)$ using. [2.5][CO-4]

i) 8*1 mux with a ,b,c as select lines

ii) 4*1 mux with a,b as select lines

(b) For the given figure No. 1, derive the Boolean expression of Y [1] [CO-1]



(c) Compare TTL and CMOS logic families on the basis of following: i) Propogation delay ii) Power dissipation iii) Fan-out [1.5] [CO-2]

Q 3. (a) Using K map, minimize the expression F(A,B,C,D) $=\sum m(1,2,3,8,14,15) + d(0,4,6,10)$. [3] [CO-2]

(b) Realize the Boolean expression Z=ABC + AD + CD' using NAND gates only. [2] [CO-1]

Q 4. Describe function of full subtractor circuit with its truth table, K-map simplification and logic diagram. [5] [CO-3]

Q 5. Explain SISO and SIPO shift registers in detail. Consider the input sequence as 1011. [5] [CO-5]

Q 6. Draw the logic diagram and timing sequence of a 4-bit ring counter. [5] [CO-5]

Q 7. Explain the working of R-2R ladder type DAC. [5] [CO-3]

Q 8. (a) Explain a 3 bit asynchronous up counter. Draw the timing diagram and truth table. [3] [CO-5]

(b) Draw the logic diagram of the J-K flip flop and explain it. What is the advantage of J-K flip flop over S-R flip flop. [2] [CO-5]

Q 9. (a). Implement an 8x1 Mux using 2x1 Mux. [1] [CO-4]

(b) What is a Race Around Condition. How can it be rectified. Explain in detail with diagram. [4] [CO-5]

Total no. of Pages: 3

Roll no.....

5th Semester | **B. Tech.**

END TERM EXAMINATION *Nov/Dec-2022*

Course Code: EC-301 Course Title: Digital Communication

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions are compulsory, and marks are indicated. Q.3(b), Q.4(b), Q.6(a), and Q.6(b) are choice-based questions. Assume suitable missing data, if any.

Q.1(a) Draw the block diagram of modulation and demodulation of the Direct sequence spread spectrum (DS-SS) system. Discuss the effect of despreading on narrowband interference. Discuss the effect on the probability of error for the DS-SS signal when the processing gain reduces the mean jamming power. [3][CO7]

Q.1(b)(i) Fig.1 shows a four-stage feedback shift register. The initial state of the register is 1000. Find the output sequence of the shift register, and show that the output sequence satisfies the balance and run properties of a maximum length sequence. [2][CO7]

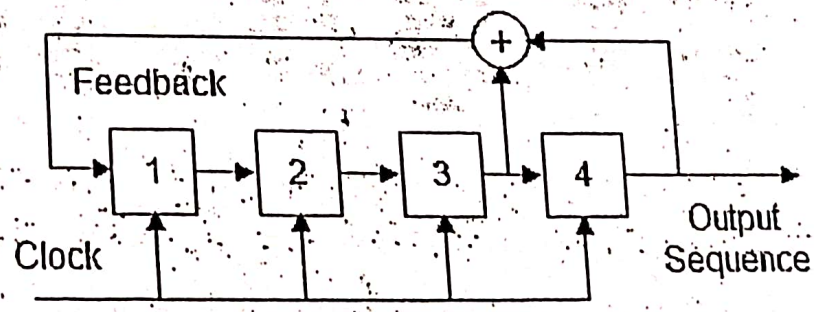


Fig. 1: A four-stage feedback shift register

Q.1(b)(ii) Explain the operation of Scrambler and Unscrambler. [2][CO3

Q.2(a) Determine and sketch the matched filter's output for th following signal: [3][CO5]

$$S(t) = \begin{cases} +A/2; & 0 \le t \le T/2 \\ -A/2; & T/2 \le t \le T \end{cases}$$

Q.2(b) Fig. 2 shows the waveforms of three signals $S_1(t)$, $S_2(t)$, a $S_3(t)$. Using the Gram-Schimdt orthogonalization procedure, find orthonormal basis functions for this set of signals. Also, represent th signals in terms of orthonormal basis functions. [4][CO4

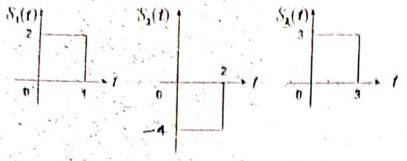


Fig. 2: Waveform of three signals

Q.3(a) Explain the modulation and demodulation of minimum shift keying (MSK) using the block diagram. Derive the average probability of symbol error for the MSK using the signal space diagram. [3][CO6]

Q.3(b) Discuss the block diagrams for the generalized binary receiver for the noncoherent orthogonal modulation using matched filters and correlator receivers. [3][CO6]

OR

Derive the output SNR of the matched filter receiver. Determine the probability of error based on the output SNR for the unipolar NRZ signal ($S_1(t) = 0;\ 0 \le t \le T$ and $S_2(t) = A;\ 0 \le t \le T$). [3][CO5]

Q.4(a) Given the input binary sequence 1100100010, sketch the in-phase and quadrature-phase components of a modulated signal obtained by using the QPSK system. Sketch the QPSK waveforms. [3][CO6]

Q.4(b) Derive the probability of error for the 16-QAM in terms of energy per bit, E_b. [4][CO6]

OR

Explain and derive the expressions for a maximum-a-posteriori (MAP) detector with zero mean additive white Gaussian noise. [4][CO5]

Q.5(a) An FSK system transmits binary data at the rate of 2.5×10^6 bps. During the course of transmission, white Gaussian noise of zero mean and power spectral density of 10^{-20} W/Hz is added to the signal. In the absence of noise, the amplitude of the received sinusoidal signal for bit 1 or 0 is 1 mV. Determine the average probability of symbol error for the following system: [3][CO6]

(i) Coherent BFSK, (ii) Coherent MSK, and (iii) Noncoherent BFSK

Q.5(b) Consider the optimum binary detector as shown in Fig. 3. The received signal $r(t) = S(t) + n(t)$ corresponds to the bits 0 and 1 which are equally probable and have equal energies. The signal $S(t)$ is antipodal ($S_0(t) = -A\ Cos\ (\omega_c t);\ 0 \le t \le T$ and $S_1(t) = A\ Cos\ (\omega_c t);\ 0 \le t \le T$) where $n(t)$ is the additive white Gaussian noise (AWGN) signal with zero mean and a two-sided power spectral density of $N_0/2$. The optimum detector for these signals compares $r_0(T)$ and V_{opt} and decides that bit 0 was transmitted when $r_0(T) < V_{opt}$, and that a bit 1 was transmitted when $r_0(T) > V_{opt}$. Determine the average probability of error along with the optimal threshold voltage. [4][CO5]

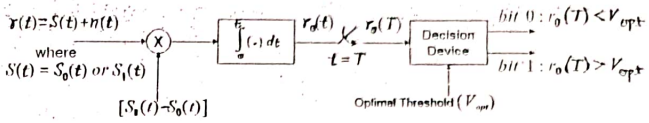


Fig. 3: Optimum binary detector

Q.6(a) Draw the block diagram of the differential-PSK (DPSK) transmitter. If the binary sequence 1100100010 is applied to the DPSK transmitter, then draw the waveform of the DPSK signal and write the transmitter phase. [3][CO6]

OR

Derive the expressions for power spectral density of the QPSK and M-ary PSK signal. Compare the bandwidth efficiency for M-ary PSK with M-ary FSK signals over the values of $M = 2, 4, and\ 8$. [3][CO6]

Q.6.(b) A binary PAM signal is to be transmitted over a baseband channel with an absolute maximum bandwidth of 75 KHz. The bit duration is 10 μS. Find and draw a raised cosine spectrum that satisfies these requirements. [3][CO3]

OR

Derive the expression for the destination SNR for the linear delta modulation. [3][CO1, CO2]

Q5. (i) Draw a neat circuit diagram of a four quadrant Gilbert multiplier cell and illustrate the conditions for which the output of the cell can be used as

(a) Balanced Modulator and
(b) Phase detector

[2+1+1] [CO.5, L4]

(ii) Assume that Z = 0.1XY for the multiplier. In the Fig.6 shown below, determine:

(a) The mathematical relationship between V_{in} and V_{out}.
(b) the dc transfer characteristic of the circuit.

[2+2] [CO.5, L3]

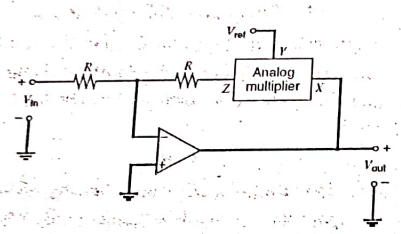


Fig.6

Q6. (i) Design a monostable multivibrator using 555 Timer IC. Using a 10 nF capacitor C, find the value of R that yields an output pulse of 100 μs in the monostable circuit. Explain the circuit with waveforms.

[2+2] [CO.3, L6]

(ii) Describe the three modes of operation of an IC PLL. Explain how PLL can be used for FM demodulation.

[3+1] [CO.5, L2]

Total no. of Pages: 04 Roll no.....

5th SEMESTER
B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

EC303 LINEAR INTEGRATED CIRCUITS

Time: 03:00 Hours *Max. Marks: 40*

Note: Answer *Any five* questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q1. (i) The input voltages of an op-amp are $v_1 = 120\mu V, v_2 = 80\mu V$. The op-amp parameters are CMRR = 90 dB and $A_d = A_0 = 2 \times 10^5$. Determine

(a) the differential voltage v_d
(b) the common-mode voltage v_c,
(c) the magnitude of the common-mode gain A_c, and
(d) the output voltage v_0.

[1+1+1+1] [CO1, L3]

(ii) The Fig.1 below shows an N-output current mirror. Assuming that all transistors are matched and have finite β and ignoring the effect of finite output resistance, determine the relation between I_1, I_2, ..., I_N and I_{REF}. Also, for $\beta = 100$, calculate the maximum number of outputs for an error not exceeding 20%.

[3+1] [CO.1, L3]

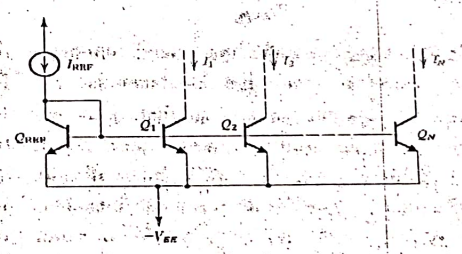


Fig.1

Q2. (i) Design an add–subtract summing amplifier to give an output voltage of the form $v_0 = 5v_a + 9v_b + 3v_c - 8v_1 - 2v_2 - 6v_3$. The minimum value of any resistance should be $R_{min} = 20\ k\Omega$.

[4] [CO.2, L6]

(ii) Assuming finite gain of the OPAMP, $A_v(s) \cong \frac{\omega_t}{s}; \omega_t = A_0\omega_p$, determine the output voltage of the circuit shown in Fig.2.

[4] [CO.2, L3]

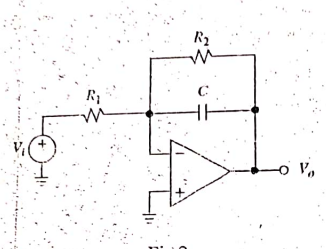
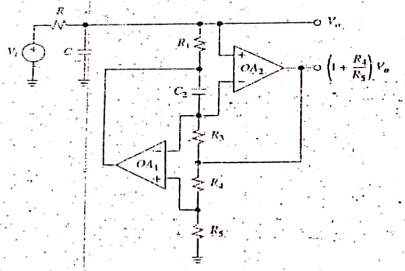


Fig.2

Q3. (i) In the circuit of Fig.3 shown below, specify component values for a band-pass response with $f_0 = 100$ kHz and $Q = 25$.



[4] [CO.3, L5]

Fig.3

(ii) Determine the transfer function of the circuit given in Fig.4 below:

[4] [CO.4, L3]

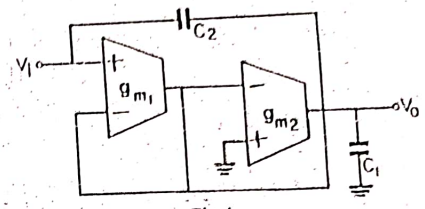


Fig.4

Q4. (i) Determine the values required for the components in Fig.5 shown below in order to simulate an inductor of $L = 2\ mH$.

[4] [CO.3, L3]

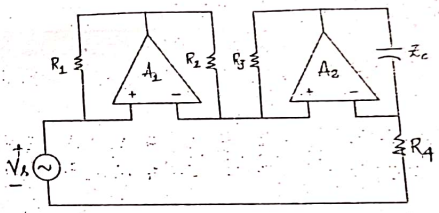


Fig.5

(ii) Design a second-order bandpass filter using the Tow–Thomas biquad with $f_0 = 10$ kHz, $Q = 20$, and unity center-frequency gain. If $R = 10\ k\Omega$, calculate the values of C, R_d, and R_g?

[4] [CO.3, L6]

Total no. of Pages: Roll no.....

5TH & 7TH SEMESTERS [B.Tech.]

END TERM EXAMINATION *Nov/Dec-2022*

COURSE CODE: EC309

COURSE TITLE: Bio-Medical Electronics & Instrumentation

Time: 03:00 Hours *Max. Marks: 50*

Note: Attempt any TEN questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 What do you mean by Wilson's Central Terminal? How it is related to Einthoven triangle? Draw the block diagram of ECG Machine. [05] [CO1]

Q.2 Why the recommended EEG standard is known as "International 10-20 System", illustrate properly? Comment upon the EEG waveforms. [05] [CO1]

Q.3 Discuss the working principle of CT-Scan and its scanning trajectories. [05] [CO2]

Q.4 What are the objectives of Patient Monitoring System? With the help of a suitable block diagram explain Bed Side Monitoring System. Draw and explain Intensive Care Unit [ICU] Monitoring Architecture. [05] [CO5]

Q.5 Describe cell and tissue typing? Why it is required? How Pattern Identification or Recognition techniques can help in better cell and tissue typing? [05] [CO4]

Q.6 Why Cardiac Output measurement is required? Suggest and compare different methods used for cardiac output measurements with special reference to impedance technique and ultrasound method. [05] [CO2]

Q.7 Define Electric Shock Hazards. Comment upon the effect of electric current on the human body. What type of precautions in general are required to be taken to minimize the Electric Shock Hazards? [05] [CO3]

Q.8 Why Ultrasonography is considered as one of the safest Radio Diagnostic techniques? List the applications, advantages and disadvantages of Ultrasonography. [05] [CO5]

Q.9 Evaluate and rate performance of medical professionals including paramedical staff involved in health care system in containing the COVID-19 pandemic with special reference to the second wave or delta variant in Indian setting. [05] [CO5]

Q.10 India being a developing nation with highly venerable and shattered health care system? Do you agree with it? Justify your opinion. [05] [CO4]

Q.11 Suppose, if you're at the apex / helm of the health care system administration, what strategies you will adopt or apply for the overall improvement and revamping of entire health care system in India. [05] [CO4]

Q.12 Write short note on [Any Two]: - [05] [CO3]

a) Cochlear Implants;

b) Neonatal Monitoring;

c) Haemodialysis machine

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Total No. of Pages : 02 Roll No.....

5th SEMESTER, B.Tech.

END TERM EXAMINATION Sept-2022

EC311 : Algorithm Analysis and Design

Time: 3 Hours *Max. Marks: 50*

Note: All questions are compulsory.
Assume suitable missing data, if any.

1. Derive the recursive equation for 0/1 Knapsack problem. If 'n' is number of objects and 'm' is total weight of the bag then find out time complexity of K(n, m) using tree with Dynamic programming and without that and show which one is better. Consider n = 4 and m = 4. Ignore profit while making tree and consider each objects has weight of unity. [5][CO3]

2. Explain NP hard and NP-Complete problems. When a decision problem D is said to be NP-complete? [5][CO4]

3. In a balanced binary search tree with n elements, what is the worst case time complexity of reporting all elements in range [a, b]? Assume that the number of reported elements is k. [4][CO3]

4. (a). Prove that the time efficiency of Warshall's algorithm is cubic. [3][CO3]

(b). Explain why the time efficiency of Warshall's algorithm is inferior to that of the traversal-based algorithm for sparse graphs represented by their adjacency lists. [3][CO3]

5. (a). Differentiate between Backtracking and Branch-N-Bound technique with example. [4][CO3]

(b). Assume that a merge sort algorithm in the worst case takes 30 seconds for an input of size 64. Which of the following most closely approximates the maximum input size of a problem that can be solved in 6 minutes? [4][CO2]

6. A data is given in an array that determines the money stored in each locker in a row. Find the maximum money which can be robbed such that no two adjacent lockers are robbed. Illustrate this problem with the help of suitable example and write the algorithm or pseudocode for that. Show with the help of an example that Greedy approach will not work for this problem.

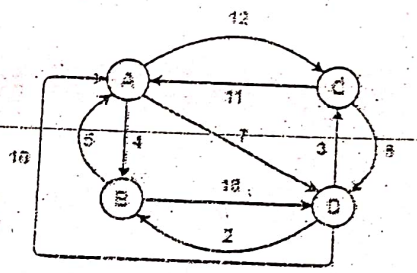
[5][CO3]

7. Solve the all-pairs shortest path problem for the digraph with the following weight matrix

[6][CO3]

$$A = \begin{bmatrix} 0 & 2 & \infty & 1 & 8 \\ 6 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix}$$

8. Solve Travelling Salesman Problem using Branch and Bound Algorithm in the following graph and show each and every steps [6][CO3]



9. Solve this recurrence relation using substitution method and hence find its time complexity:

$$T(n) = \begin{cases} 1 & , \ if\ n = 1 \\ 2T(n/2) + n\log(n) & , \ if\ n > 1 \end{cases}$$

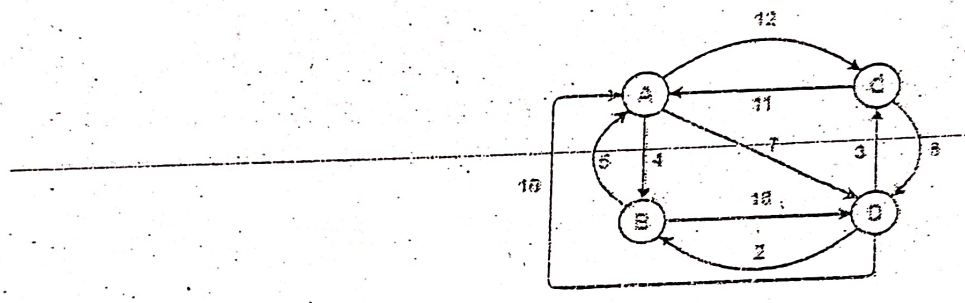
[5][CO1]

6. A data is given in an array that determines the money stored in each locker in a row. Find the maximum money which can be robbed such that no two adjacent lockers are robbed. Illustrate this problem with the help of suitable example and write the algorithm or pseudocode for that. Show with the help of an example that Greedy approach will not work for this problem. [5][CO3]

7. Solve the all-pairs shortest path problem for the digraph with the following weight matrix [6][CO3]

$$A = \begin{bmatrix} 0 & 2 & \infty & 1 & 8 \\ 6 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix}$$

8. Solve Travelling Salesman Problem using Branch and Bound Algorithm in the following graph and show each and every steps [6][CO3]



9. Solve this recurrence relation using substitution method and hence find its time complexity:

$$T(n) = \begin{cases} 1 & , \text{ if } n = 1 \\ 2T(n/2) + n\log(n) & , \text{ if } n > 1 \end{cases}$$

[5][CO1]

Total no. of Pages: 03 *Roll no.....*

V SEMESTER

B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

EC313 MICROPROCESSORS AND INTERFACING

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (a) Draw the functional block diagram (internal architecture) of 8085 microprocessor. [2] [CO1]

(b) Given the components as listed, design the interfacing circuit for the system's memory to meet the following specifications:

(i) 74LS138: 3 to 8 decoder

(ii) 2732 (4K X 8) EPROM: address range should begin at 0000H and additional 4K memory space should be available for future expansion

(iii) 6116 (2K X 8) CMOS R/W memory

Show the schematic of memory design, memory map for each chip and system memory map showing ROM, Memory reserved for expansion, and R/W memory. [4] [CO3]

(c) Calculate the 16-bit count to be loaded in register DE to obtain the loop delay of 2 seconds in LOOP2 (ignore the execution time of first instruction MVI B and assume clock frequency of 3.072 MHz).

```
        MVI B, 14 H      (7T states)
LOOP2:  LXI D, 16-bit    (10)
LOOP1:  DCX D            (6)
        MOV A, D         (4)
        ORA E            (4)
        JNZ LOOP1        (10/7)
        DCR B            (4)
        JNZ LOOP2        (10/7)
```

[2] [CO2]

Q.2 (a) Write 8086 instruction which will perform the indicated operation:

(i) Copy AL to BL (ii) Load 43H into CL (iii) Increment the contents of CX by 1 (iv) Copy SP to BP (v) Add 07H to DL (vi) Multiply AL times BL (vii) Copy AX to a memory location at offset 245A H in the data segment (viii) Rotate the most significant bit of AL into the least significant bit position (ix) Mask the lower 4 bits of BL (x) Invert the lower 4 bits of BL, but do not affect the other bits. [5] [CO2]

(b) Answer the following:

(i) What determines whether a microprocessor is considered an 8-bit, a 16-bit, a 32-bit, or a 64-bit device?

(ii) What does an XLATB instruction do? Explain.

(iii) The 8086 microprocessor may be configured either in Maximum or in Minimum mode. How do we differentiate the same? [1, 1, 1] [CO1, CO2, CO3]

Q.3 (a) Write an 8085/8086 assembly language program to light LED connected to 5th bit of Port A of 8255 PPI. Assume the following port addresses: Port A: 00H, Port B: 01H, Port C: 02H, and Control Register: 03H [1, 1] [CO2, CO4]

(b) Derive control word of 8255 for the following settings; Port A-Bidirectional in Mode 2, Port B-Input in Mode 0, PC0, PC1, and PC2-Output. [1] [CO4]

(c) Write a program to send two ASCII characters (M and N) to a visual display unit (VDU) driven by 8251A. The VDU inputting and outputting port addresses are 20H and 21H respectively.

The Baud Rate generator generates the clock of 76.8 KHz.

The USART is initiated to run at 1200 baud with 7-bit character, 1½ stop bits, and disable parity. [2, 1½] [CO2, CO4]

(d) Show the three Operation Command Words (OCWs) formats of 8259A along with A_0 bit. [1½] [CO4]

Q.4 (a) Initialize the 8237 for memory-to-memory DMA transfer mode using channel 0, masking all other channels. Initialize it for normal timing, fixed priority, extended write with DREQ active high and DACK active-high. The 8237 should work in auto initialization mode with address increment, block mode select with read transfer on channel 0. [3] [CO4]

(b) Interface 8254 with 8086 at an address of 0040H for counter 0. The 8086 and 8254 run at 6 MHz and 1.5 MHz respectively. Connect A_1 and A_2 of 8086 with A_0 and A_1 of 8254 respectively. Remaining 6 address lines may be used for selecting the chip 8254. Hence determine the addresses for counters 0, 1, 2, and control word register. Write down the control words for (i) generating a square wave of period 1 ms and (ii) to interrupt the processor after 10 ms. Also calculate the number of T states required for (i) and (ii). [1, 1, 2, 1] [CO4]

Q.5 (a) Compare and contrast

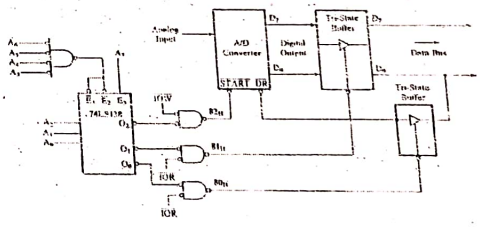
(i) RS232 Vs RS485

(ii) 8086 Vs 80186 [1, 1] [CO6, CO1]

(b) Draw the diagram of Instruction Queue and Dispatch Logic for PowerPC 601 microprocessor and explain its working. [1½] [CO1]

(c) Calculate the values of LSB, MSB, and full-scale output for a 12-bit DAC for the 0 to 10V range. [1½] [CO5]

(d) The following figure shows a schematic of interfacing of A/D converter using status check. Write down the set of instructions (subroutine) that initializes the conversion and reads the output data. [3] [CO5]



Total no. of Pages: 1 Roll no.....

__5th__SEMESTER B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

COURSE CODE _EC 315 COURSE TITLE_Computer Communication Networks

Time: 03:00 Hours *Max. Marks: 50*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (a) Compare OSI model and TCP/IP model qualitatively. [5][CO1]

(b) Compare TCP and UDP qualitatively. [5][CO2]

Q.2 What are controlled access protocols? Explain reservation, polling and token passing protocols in detail. [10][CO3]

Q.3 Explain ALOHA, CSMA, CSMA/CD, CSMA/CA protocols in detail. [10][CO3]

Q.4 Compare IPv4 and IPv6 in detail. [10][CO4]

Q.5 (a) Explain cryptography and digital signature. [5][CO4]

(b) Explain firewall along with its types. [5][CO5]

Q5. (i) Given a system with transfer function $G(s) = \frac{10}{(s+1)(s+4)}$. Find its equivalent state space phase variable canonical representation in the form $\dot{x} = Ax + Bu, y = Cx + Du$.

(ii) Obtain the transfer function of the system defined by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & 0 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = [1 \quad 0 \quad 0] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

[5+5] [CO.5]

6. Write short notes on the following:

(i) Servomotor [2.5] [CO.1]

(ii) Sensitivity of a feedback system [2.5] [CO.1]

(iii) Dominant Root Concept [2.5] [CO.5]

(iv) Force-Voltage and Force-Current Analogy of a control system [2.5] [CO.1]

Total no. of Pages: 04 Roll no.....

VTH SEMESTER

B.Tech

END TERM EXAMINATION ***Nov/Dec-2022***

EC323 CONTROL SYSTEMS

Time: 03:00 Hours *Max. Marks: 50*

Note : Answer *Any five* questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (i) Consider the signal flow graph shown in Fig.1 given below:

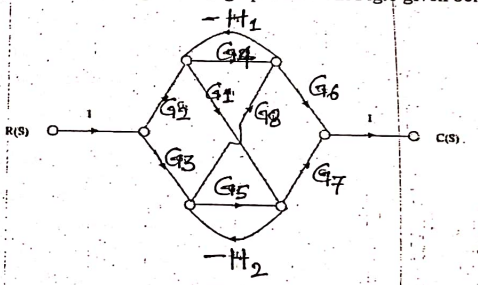


Fig.1

Find the transfer function $\frac{C(s)}{R(s)}$.

[5][CO1]

(ii) Simplify the block diagram shown in Fig.2.Then obtain the closed-loop transfer function $\frac{C(s)}{R(s)}$

[5][CO1]

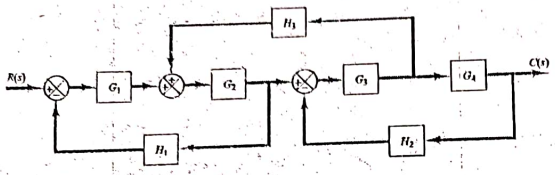
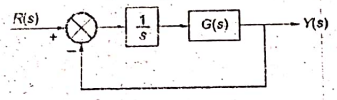


Fig.2

Q.2 (i) For the unity feedback system shown in the figure below, the plant G(s) has a step response of $(3-6e^{-2t}+3e^{-4t})u(t)$ and it is placed in cascade with a block of gain $\frac{1}{s}$. Sketch the Nyquist plot of the system and find its gain and phase margins. Also comment whether the closed loop system is stable or not.



[5] [CO.4]

(ii) Draw the complete Bode Plot for the system having the open loop transfer function :

$$G(s)H(s)=\frac{30(s+10)}{s^2+3s+50}$$

[5] [CO.4]

Q.3 (i) Plot the root loci for a control system with

$$G(s)H(s)=\frac{K(s^2+6s+10)}{s^2+2s+10}$$

What is the shape of the loci traced?

[4+1][CO.3]

(ii) The open-loop transfer function of a feedback control system is given by

$$G(s)=\frac{K(s+8)(s+10)}{s(s+1)(s+2)}$$

(a) Using Routh-Hurwitz criterion, prove that the system is a conditionally stable system and determine the range of value of K for which the system is stable.

(b) Determine the values of K which will cause sustained oscillations in the closed-loop system. What are the frequencies of oscillations?

[2.5+2.5][CO.3]

Q4. (i) Consider the feedback system shown $G(s)=\frac{K}{s(s+a)}$. If the resonant peak and resonant frequency of the system is 1.04 and 11.55 respectively, find its settling time and bandwidth.

[5] [CO.4]

(ii) Compute the error constants and steady-state errors for unit-step, unit- ramp and unit parabolic inputs for a system with

$$G(s)=\frac{K(s+3.15)}{s(s+1.5)(s+0.5)}$$

[5][CO.2]

Total No. of Pages: 02

Roll No.....

SEMESTER: VII
B. Tech.

END TERM EXAMINATION

NOV/DEC-2022

EC-405 Microwave Engineering

Time: 3:00 Hours

Max. Marks: 40

Note : Attempt any 5 questions with its all the parts.
All questions carry equal marks.
Assume suitable missing data, if any.

Q 1. (A) Explain any two advantages and two applications of a microwave systems. Also specify the frequency range for "X Band" and "Ku Band" in microwave system. [2 Marks] [CO1]

Q 1. (B) The microwave component is given in Fig.1, derive its s-parameter matrix if port 3 is perfectly matched at the junction. A signal power 20mW is fed into port 1, determine the power in the remaining ports (port 2 and port 3) which are terminated with matched load. [3 Marks] [CO3]

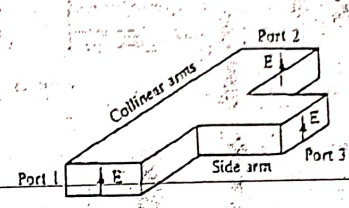


Fig. 1 Microwave Passive component

Q 1. (C) A two-port network has scattering parameters given by

$$S = \begin{bmatrix} S_{11} & S_{12} \\ S_{21} & S_{22} \end{bmatrix}$$

If the port 2 of the network is short circuited, derive S_{11} parameter for the resultant network. [3 Marks] [CO2]

Q 2. (A) Write a short note on the following:
(i) Waveguide bends [1 Mark] [CO3]
(ii) Unitary property of S-matrix [1 Mark] [CO1]
(iii) Matched load [1 Mark] [CO1]

Q 2. (B) Draw a typical magic Tee junction and explain its operation to obtain sum and difference signal
[3 Marks] [CO3]

Q 2. (C) Three fixed attenuators with an insertion loss of 3,6,10 dB areconnected. What is the total insertion loss of the combination
[2 Marks] [CO3]

Q 3. (A) Draw circuit symbol of PIN diode and varactor diode; and also write down two applications of each diode? [3 Marks] [CO5]

Q 3. (B) Explain the working principle of Hybrid ring with its diagram.
[3 Marks] [CO3]

Q 3. (C) What S-parameter stands for? Why these parameter are needed? [2 Marks] [2CO1]

Q 4. (A) Compare IMPATT and TRAPATT devices?
[2 Marks] [CO4]

Q 4. (B) Explain working principle of following devices
(i) Gyrator [2 Marks] [CO4]
(ii) Reflex Klystron [2 Marks] [CO4]
(iii) Gunn diode [2 Marks] [CO5]

Q 5. (A) What is TWT? Explain its functioning with diagram.
[3 Marks] [CO4]

Q 5. (B) Write down the working principle of Magnetron. Draw the spoke wheel pattern?
[2 Marks] [CO4]

Q 5. (C) What is RWH theory? Explain it by drawing all the respective plots.
[3 Marks] [CO5]

Q 6. (A) The magnetron has following operational parameters: Anode voltage, V_o=10kV, Cathode Current, I_o=1A, Magnetic flux density, B_o=0.01 Wb/m^2, a=5cm, b = 10cm. Determine Hull cut off magnetic field density.
[3 Marks] [CO4]

Q 6. (B) What is the velocity component in axial direction, if C=3x10^8 m/s, helix pitch is 1mm, d=10mm, pitch angle=5°, Anode voltage, V_o= 5kV?
[3 Marks] [CO4]

Q 6. (C) For an n-type GaAs, with device length, 10μm, operating frequency, 10 GHz, applied field, 3200V/cm, what will be the drift velocity.
[2 Marks] [CO5]

Total No. of Pages: 02 Roll No.....

VIIth SEMESTER

B.Tech

END TERM EXAMINATION **Nov-2022**

EC407 Optical Communication

Time: 3:00 Hours *Max. Marks: 50*

Note : All questions are compulsory.
Assume suitable missing data, if any.

Q1 a) Derive the relationship between acceptance angle and numerical aperture with the help of well labelled diagram. [CO1]

b) A silicon APD has a quantum efficiency of 75% at a wavelength of 900 nm. If 0.5mW of optical power produces a multiplied photo current of 10mA, then what is avalanche gain? [CO4]

c) Define SONET? Explain briefly the four layers of SONET. [CO6]

[2+3+5 Marks]

Q2 a) Define nonlinear scattering. Briefly describe the two types of nonlinear scattering. [CO2]

b) A multimode step index fiber with a core diameter of 80um and a relative index of 1.5% is operating at a wavelength of 0.85um. Calculate normalized frequency of fiber. Also compute the power in the cladding if the total input power is 500mW. Also find the total modes in the fiber. [CO3] [3+7 Marks]

Q3. a) The radiative and nonradiative recombination life times of the minority carriers in the active region of double heterojunction LED are 50ns and 110ns respectively. Determine the carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is 0.87um at a device current 40mA. [CO4

b) Calculate the maximum loss limited distance of a link operating a 850nm at 100Mb/s. Laser source having 0dBm fiber coupled pows is used. Optical fiber has a loss of 3.4db/km and connectors have loss of 1dB each. Splicing is done at every 2km with each splic having loss of 0.1dB. APD has a sensitivity of 50dBm.

[CO5][5+5 Mark

Q4 a) Describe the working principle of EDFA using energy level diagram. Also draw characteristic curve of EDFA for gain and noise figure and briefly explain it. [CO6]

b) A step-index optical fiber has a numerical aperture of 0.3 and a cladding refractive index of 1.5. Determine:

i) The acceptance angle of fiber in water which has a refractive index of 1.33

ii) The critical angle of core and cladding.

iii) The number of modes transmitted at 1300nm wavelength and 20um is core radius. [CO3] [5+5 Marks]

Q 5 a) Define an Active Y- Junction Electro-optic Switch with the help of well labelled diagram. [CO5]

b) Differentiate between PN, PIN and APD photodetector with the help of diagram. Also describe the working of an APD photodetector. [CO4] [3+7 Marks]

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Total No. of Pages :01 Roll No.....

SEMESTER-8th B.Tech

END SEMESTER EXAMINATION NOV-2022

EC-409 Computer Vision

Time: 3.0 Hours Max. Marks : 50

Note : Answer all **five** questions .
All questions carry equal marks.
Assume suitable missing data, if any.

Q. No. 1 (a) Write the RANSAC Algorithm.Explain the degree of polynomial to be used. Apply this on the presumed data. Show all computations. (5 M)(CO-3)

(b) How can the problems like key localization, Geometric distortion, clusterisation be solved by SIFT? (5 M)(CO-4)

Q. No. 2 (a) Write optimally to explain the ADMM algorithm for signal decomposition. (5 M)(CO-6)

(b) Write about the motion segmentation method using Sub-Space representation. (5 M)(CO-5)

Q. No. 3 (a) How does optical flow helps in the Object segmentation? What are the drawbacks of Optical Flow? (5 M)

(b) Write the Kanade-Lucas-Tomashi algorithm. Show how it is a better feature tracker than the basic Registration Algorithm. (5 M)(CO-2,3)

Q. No. 4 (a) Kalman Filter is optimal if the measurement and the state transition model are both linear. Justify this statement mathematically, if you believe it is correct? (5 M)

(b). How can Gaussian Mixture Model help in background subtraction? (5M)(CO-1,2)

Q. No. 5(a) How does HOG help in object detection. What are drawbacks of HOG? (5 M)

(b) .Write about maximum Likelihood Algorithm and explain mathematically. (5 M)(CO-3,4)

Chi-Square Right-Tail Probability ($\geq \chi^2$)

DF	0.995	0.99	0.975	0.95	0.9	0.1	0.05	0.025	0.01	0.005
1	---	---	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.300
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	14.041	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.114	36.741	40.113	43.195	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	37.916	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	19.768	39.087	42.557	45.722	49.588	52.336
30	13.787	14.953	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672
40	20.707	22.164	24.433	26.509	29.051	51.805	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	46.459	74.397	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	55.329	85.527	90.531	95.023	100.425	104.215
80	51.172	53.540	57.153	60.391	64.278	96.578	101.879	106.629	112.329	116.321
90	59.196	61.754	65.647	69.126	73.291	107.565	113.145	118.136	124.116	128.299
100	67.328	70.065	74.222	77.929	82.358	118.498	124.342	129.561	135.807	140.169

Chi-Square Distribution Table

Total No. of Pages: 4

Roll No. .....

SEVENTH SEMESTER

B.Tech.

END TERM EXAMINATION

Nov-2022

EC455 Data Analytics

Time: 3:00 Hours

Max. Marks: 50

Note: Answer FIVE questions.
Assume suitable missing data, if any.

Q.1 **a)** Discuss briefly about different types of data analytics. **[3] [CO-2]**

b) 1% of the population has a certain disease and the remaining 99% are free from this disease. A test is used to detect this disease. This test is positive in 95% of the people with the disease and is positive in 2% of the people free from the disease. If a person, selected at random from the population, has tested positive, what is the probability that he/she has the disease? **[3] [CO-1]**

c) Differentiate between Lasso and Ridge regression and Which regularization helps in feature selection? **[4] [CO-4]**

Q.2 **a)** Eight coins were tossed 256 times and the following results were obtained:

Numbers of heads	0	1	2	3	4	5	6	7	8
Frequency	2	6	30	52	67	56	32	10	1

Are the coins biased? Use $\chi 2$ test? **[4] [CO-3]**

b) Set up an analysis of variance table for the following per acre production data for three varieties of wheat, each grown on 4 plots and state if the variety differences are significant.

Plot of land	Per acre production data		
	Variety of wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

[6] [CO-3]

Q.3 **a)** Perform KNN classification on following data samples, given in Table 1 and predict the class for X= (P1=3, P2=7) for K=3 using Euclidean Distance and Hamming Distance.

Also comment, out of two which is the preferred distance for KNN classification.

Table 1: Sample data

S.No.	P1	P2	Class
1	7	7	False
2	7	4	False
3	3	4	True
4	1	4	True

b) Compute the Linear Discriminant projection for the following two-dimensional dataset: [5] [CO-6]

- X1= (x1, x2) = {(4,1), (2,4), (2,3), (3,6), (4,4)}
- X2= (x1, x2) = {(9,10), (6,8), (9,5), (8,7), (10,8)}

Q.4 a) Given the data in Table 2, reduce the dimension from two to one using the Principal Component Analysis (PCA) algorithm. [5] [CO-5]

Table 2: Data

Feature	Example 1	Example 2	Example 3	Example 4
X1	4	8	13	7
X2	11	4	5	14

[5] [CO-6]

b) Explain briefly the LMS learning law in perceptron models with suitable example. [5][CO-5]

Q.5 a) Cluster the following eight points (with (x, y) representing locations) into three clusters:
A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9)
Initial cluster centres are: A1(2, 10), A4(5, 8) and A7(1, 2).
The distance function between two points a = (x1, y1) and b = (x2, y2) is defined as:

$$P(a, b) = |x2 - x1| + |y2 - y1|$$

Use K-Means Algorithm to find the three cluster centres after the second iteration. [5] [CO-5]

b) Explain the significance of standardization and normalization. [2] [CO-2]

c) Compare Bagging, Boosting and Stacking. [3] [CO-6]

Q.6 a) Explain Reinforcement Learning and discuss Bellman equation with suitable example [6] [CO-5]

b) To achieve good generalization performance, we require bias and variance to be low at the same time. Illustrate through an example bias-variance trade-off for regression? [4] [CO-6]

Appendix: F-Distribution Table and Chi-Square distribution Table

DF2 \ DF1	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	Inf
1	161.45	199.5	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.95	248.01	249.05	250.1	251.14	252.2	253.25	254.31
2	18.513	19	19.164	19.247	19.296	19.33	19.353	19.371	19.385	19.396	19.413	19.429	19.446	19.454	19.462	19.471	19.479	19.487	19.496
3	10.128	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452	8.8123	8.7855	8.7446	8.7029	8.6602	8.6385	8.6166	8.5944	8.572	8.5494	8.5264
4	7.7086	6.9443	6.5914	6.3882	6.2561	6.1631	6.0942	6.041	5.9988	5.9644	5.9117	5.8578	5.8025	5.7744	5.7459	5.717	5.6877	5.6581	5.6281
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725	4.7351	4.6777	4.6188	4.5581	4.5272	4.4957	4.4638	4.4314	4.3985	4.365
6	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2067	4.1468	4.099	4.06	3.9999	3.9381	3.8742	3.8415	3.8082	3.7743	3.7398	3.7047	3.6689
7	5.5914	4.7374	4.3468	4.1203	3.9715	3.866	3.787	3.7257	3.6767	3.6365	3.5747	3.5107	3.4445	3.4105	3.3758	3.3404	3.3043	3.2674	3.2295
8	5.3177	4.459	4.0662	3.8379	3.6875	3.5806	3.5005	3.4381	3.3881	3.3472	3.2839	3.2184	3.1503	3.1157	3.0794	3.0428	3.0053	2.9669	2.9276
9	5.1174	4.2565	3.8625	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789	3.1373	3.0729	3.0061	2.9365	2.9005	2.8637	2.8259	2.7872	2.7475	2.7067
10	4.9646	4.1028	3.7083	3.478	3.3258	3.2172	3.1355	3.0717	3.0204	2.9782	2.913	2.845	2.774	2.7372	2.6996	2.6609	2.6211	2.5801	2.5379
11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.948	2.8962	2.8536	2.7876	2.7186	2.6464	2.609	2.5705	2.5309	2.4901	2.448	2.4045
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964	2.7534	2.6866	2.6169	2.5436	2.5055	2.4663	2.4259	2.3842	2.341	2.2962
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144	2.671	2.6037	2.5331	2.4589	2.4202	2.3803	2.3392	2.2966	2.2524	2.2064
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458	2.6022	2.5342	2.463	2.3879	2.3487	2.3082	2.2664	2.2229	2.1778	2.1307
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876	2.5437	2.4753	2.4034	2.3275	2.2878	2.2468	2.2043	2.1601	2.1141	2.0658
16	4.494	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377	2.4935	2.4247	2.3522	2.2756	2.2354	2.1938	2.1507	2.1058	2.0589	2.0096
17	4.4513	3.5915	3.1968	2.9647	2.81	2.6987	2.6143	2.548	2.4943	2.4499	2.3807	2.3077	2.2304	2.1898	2.1477	2.104	2.0584	2.0107	1.9604
18	4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563	2.4117	2.3421	2.2686	2.1906	2.1497	2.1071	2.0629	2.0166	1.9681	1.9168
19	4.3807	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4227	2.3779	2.308	2.2341	2.1555	2.1141	2.0712	2.0264	1.9795	1.9302	1.878
20	4.3512	3.4928	3.0984	2.8661	2.7109	2.599	2.514	2.4471	2.3928	2.3479	2.2776	2.2033	2.1242	2.0825	2.0391	1.9938	1.9464	1.8963	1.8432
21	4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205	2.366	2.321	2.2504	2.1757	2.096	2.054	2.0102	1.9645	1.9165	1.8657	1.8117
22	4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419	2.2967	2.2258	2.1508	2.0707	2.0283	1.9842	1.938	1.8894	1.8378	1.7831
23	4.2793	3.4221	3.028	2.7955	2.64	2.5277	2.4422	2.3748	2.3201	2.2747	2.2036	2.1282	2.0476	2.005	1.9605	1.9139	1.8648	1.8128	1.7578
24	4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002	2.2547	2.1834	2.1077	2.0267	1.9838	1.939	1.892	1.8424	1.7896	1.7341
25	4.2417	3.3852	2.9912	2.7587	2.603	2.4904	2.4047	2.3371	2.2821	2.2365	2.1649	2.0889	2.0075	1.9643	1.9192	1.8718	1.8217	1.7684	1.7117
26	4.2252	3.369	2.9752	2.7426	2.5868	2.4741	2.3883	2.3205	2.2655	2.2197	2.1479	2.0716	1.9898	1.9464	1.901	1.8533	1.8027	1.7488	1.6914
27	4.21	3.3541	2.9604	2.7278	2.5719	2.4591	2.3732	2.3053	2.2501	2.2043	2.1323	2.0558	1.9736	1.9299	1.8842	1.8361	1.7851	1.7306	1.6724
28	4.196	3.3404	2.9467	2.7141	2.5581	2.4453	2.3593	2.2913	2.236	2.19	2.1179	2.0411	1.9586	1.9147	1.8687	1.8203	1.7689	1.7138	1.6547
29	4.1183	3.3277	2.934	2.7014	2.5454	2.4324	2.3463	2.2783	2.2229	2.1768	2.1045	2.0275	1.9446	1.9005	1.8543	1.8055	1.7537	1.6981	1.6387
30	4.1709	3.3158	2.9223	2.6896	2.5336	2.4205	2.3343	2.2662	2.2107	2.1646	2.0921	2.0148	1.9317	1.8874	1.8409	1.7918	1.7396	1.6835	1.6233
40	4.0847	3.2317	2.8387	2.606	2.4495	2.3359	2.249	2.1802	2.124	2.0772	2.0035	1.9245	1.8389	1.7929	1.7444	1.6928	1.6373	1.5766	1.5089
60	4.0012	3.1504	2.7581	2.5252	2.3683	2.2541	2.1665	2.097	2.0401	1.9926	1.9174	1.8364	1.748	1.7001	1.6491	1.5943	1.5343	1.4673	1.3893
120	3.9201	3.0718	2.6802	2.4472	2.2899	2.175	2.0868	2.0164	1.9588	1.9105	1.8337	1.7505	1.6587	1.6084	1.5543	1.4952	1.429	1.3519	1.2539
Inf	3.8415	2.9957	2.6049	2.3719	2.2141	2.0986	2.0096	1.9384	1.8799	1.8307	1.7522	1.6664	1.5705	1.5173	1.4591	1.394	1.318	1.2214	1

F-Distribution Table

V/VII SEMESTER Roll No.

B.Tech

END-TERM EXAMINATION NOV-2022

EC457: NATURAL LANGUAGE PROCESSING

Time: 3 Hours *Max. Marks: 50*

Note: All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Describe the following: [2x5 = 10 M]

i. Information retrieval. [CO1]
ii. Finite state automata (with formal definition). [CO2]
iii. Machine Translation. [CO1]
iv. Probabilistic context-free grammar. [CO2]
v. Named Entity Recognition. [CO1]

Q.2 Attempt the following:

i. Design a finite state automaton M_1 such that M_1 recognizes A where $A = \{w \mid w$ *contains at least one 1 and an even number of 0s follow the last 1*$\}$. [5M] [CO5]

ii. Justify that, in general, the accuracy of an estimate/estimator increases as the amount of data used expands (with a suitable example). [5M] [CO4]

Q.3 Answer the following:

i. Fill in the blanks with most appropriate answer. [1x5 = 5 M]

a) Perplexity is used to evaluate _____. [CO4]
b) Smoothing is used to handle_____. [CO4]
c) _____ and _____ are morphological variants of the word **compute,** and both can be mapped to the same root word by the process of_____. [CO3]
d) Models that assign probabilities to sequences of words are called _____. [CO4]
e) Consider the following mini corpus of text
<s> I am Karan </s>
<s> Karan I am </s>

<s> I do not like brown eggs and bread </s>

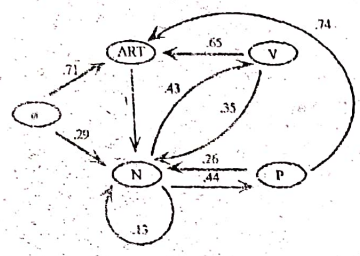
According to the bigram model, the probability for *PROB*(Karan|am) is _____ than *PROB*(am|I). **[CO4]**

ii. Generate a Finite state transducers model for morphological processing and formulate an FST that accepts the following words tie, ties, trap, traps, try, tries, to, torch, torches, toss, and tosses. **[5M] [CO5]**

Q.4 Attempt any two from the following:

i. Outline the evaluation techniques and the metric for evaluating Language models. **[5M] [CO4]**

ii. Determine the POS tagging for the sentence *Flies like a flower* using the Viterbi algorithm with the given Markov Chain and summary of word counts for a corpus. **[5M] [CO4]**



	N	V	ART	P	TOTAL
flies	21	23	0	0	44
fruit	49	5	1	0	55
like	10	30	0	21	61
a	1	0	201	0	202
the	1	0	300	2	303
flower	53	15	0	0	68
flowers	42	16	0	0	58
birds	64	1	0	0	65
others	592	210	56	284	1142
TOTAL	833	300	558	307	1998

iii. Assess the improvement in performance achieved using Best-First parsing algorithms for parsing based on probabilistic context-free grammar. **[5M] [CO3]**

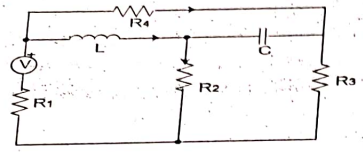
Q.5 Attempt any two of the following:

i. Explain dependency grammar and dependency parsing. **[5M] [CO2]**

ii. Analyse the utility of feature structures and unification. **[5M] [CO3]**

iii. Outline the different applications of NLP, and their challenges, and discuss the state-of-the-art solutions provided by them. **[5M] [CO1]**

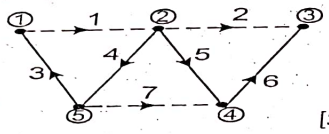
Q.5 (a) Draw the oriented graph of the network shown in Fig. 6. Also obtain the fundamental Cut-set matrix.



[5][CO2]

Fig.6

Q. 5(b) A graph is shown in Fig.7. Find the tie-set and cut-set matrices and obtain KCL and KVL equations [the bold line indicates twig while the dotted line the links].



[5][CO2]

Fig.7

Q.6 (a) Driving point impedance of one port L-C network is given by

$$Z(s) = \frac{8(s^2+4)(s^2+25)}{s(s^2+16)}$$

Obtain first and second Foster form of equivalent networks. [5][CO6]

Q.6 (b) The Driving point impedance of a reactive network is given by

$$Z(s) = \frac{s^4+4s^2+3}{2s^3+3s}$$

Find the first and second form of Cauer network. [5][CO6]

Total No. of Pages: 04 Roll No.....

3rd Semester
B.Tech

End Term Examination Nov/Dec-2022

EE-201 NETWORK ANALYSIS & SYNTHESIS

Time: 03:00 Max. Marks:50

Note: 1. Attempt five questions, question number one is compulsory
2. Assume suitable missing data if any

Q.1 (i) Define Causal and Non-causal Systems with mathematical expression.

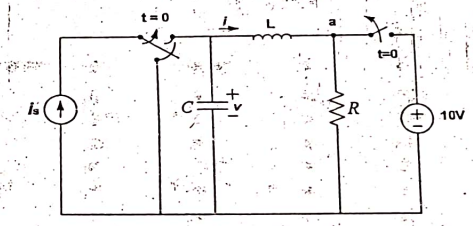
(ii) A wave equation is given by $f(t) = 6u(t-t_1) + 2u(t-t_2) - 10u(t-t_3)$. Draw the waveform.

(iii) Write the properties of a Tree in a graph.

(iv) Write the condition of Reciprocity and Symmetry in Hybrid Parameters.

(v) Check whether the polynomial $P(s) = s^4+7s^3+4s^2+18s+6$ is Hurwitz or not. [5x2]

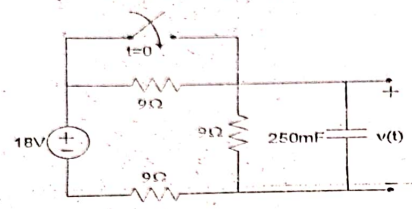
Q.2 (a) Find i(t) for $t > 0$ for the circuit shown in following **Fig1.** When R = 3 ohm, L=1H, C=0.5F, and $i_s = 2e^{-3t}$ A. Assume steady state at $t=0^-$.



[5][CO1,4]

Fig.1

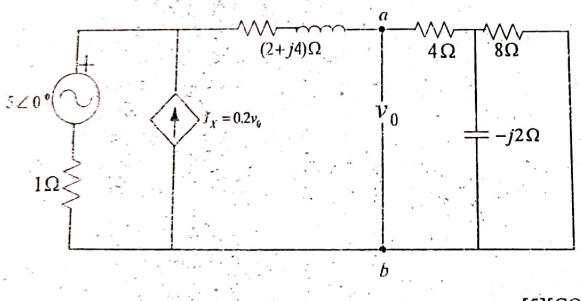
Q.2 (b) The circuit shown Fig.2 is at steady state before the switch closes at time t = 0. The input to the circuit is the voltage of the voltage source, 18V. The output of the circuit is the voltage across the capacitor, v(t). Determine v (t) for t > 0.



[5][CO1,4]

Fig.2

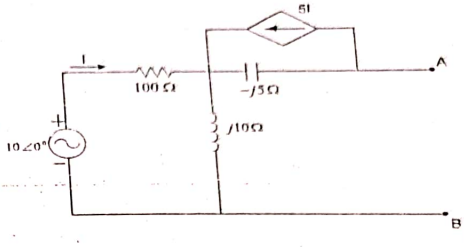
Q.3 (a) Find the Thevenin's equivalent network across terminal a-b for the left part of the network shown in Fig.3.



[5][CO3]

Fig. 3

Q. 3 (b): Obtain Norton's equivalent network across the terminals A and B, network shown in Fig. 4



[5][CO3]

Fig. 4

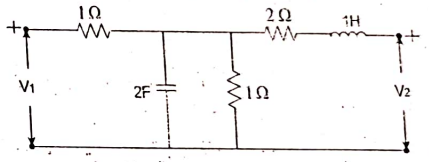
Q. 4 (a) The currents I1 and I2 at the input and output port respectively of two port network can be expressed as

$$I_1 = 5V_1 - V_2$$
$$I_2 = -V_1 + V_2$$

(i) Find the equivalent π-network

(ii) Find the input impedance when a load of $(3+j5)\Omega$ is connected across output port. [5][CO5]

4(b) Obtain Z-Parameters of the network shown in Fig. 5



[5][CO5]

Fig.5

[b] Draw the common-mode and differential mode components of the two voltages whose instantaneous values are given by

$V_1(t) = 2 + 1.5 \sin 1000t$

$V_2(t) = 3 - 1.5 \sin 1000t$ [2][CO5]

8 [a] Explain the functions of the coupling capacitors and the bypass capacitors used in a common emitter amplifier. Under what conditions these capacitors can be replaced by short/open circuit? How will the frequency response of the voltage gain change if the coupling capacitors are not to be ignored? Give a qualitative explanation! [3][CO6]

[b] Define the transit frequency f_T for a bipolar junction transistor and derive an expression for the same using the high frequency model of the BJT. [3][CO6]

Total no. of Pages: 04 Roll no.....

THIRD SEMESTER

B.Tech. (EE)

END TERM EXAMINATION *Nov/Dec-2022*

EE203 ELECTRONIC DEVICES AND CIRCUITS

Time: 03:00 Hours *Max. Marks: 40*

Note : Question No. 1 is compulsory.
Attempt Five more Questions.
Assume suitable value for missing data (if any).

Q.1 Fill up the blanks with suitable answers:

(i) For a pnp transistor the emitter voltage V_E, base voltage V_B and collector voltage V_C were found to be +2.3V, +1.1V and +1.5V respectively. The transistor is working in .....mode. [1][CO3]

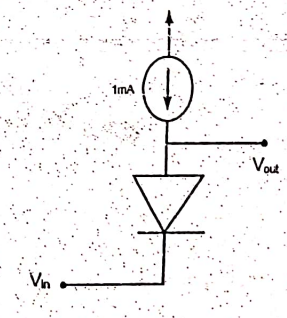
(ii) Draw the V-I characteristics of a silicon diode when it is modeled as a constant voltage drop device. [1][CO2]

(iii) The small signal resistance of a diode is directly proportional to ..... [1][CO2]

(iv) The peak amplitude of ripples is more for a full wave rectifier compared to a half-wave rectifier.(TRUE/FALSE) [1][CO2]

(v) Realize a two-input AND gate using ideal diodes. [1][CO2]

(vi) Draw the waveform for the voltage V_{out} for the circuit given below if the input voltage $V_{in} = 2 \sin\omega t$. $V_{DON} = 0.7V$[1] [CO2]



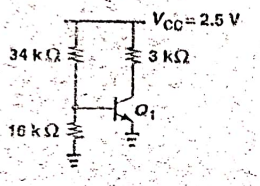
(vii) The output resistance of an npn transistor (V_A=25V) whose collector current is 0.5mA is..... [1][CO3]

(viii) For a common gate amplifier the input resistance is equal to ..... [1][CO4]

(ix) In the small- signal high frequency model of the BJT the capacitance between the collector and base is represented by the symbol..... [1][CO6]

(x) A differential amplifier has very high value of both common – mode as well as differential- mode voltage gain.(TRUE/FALSE) [1][CO5]

2 [a] Calculate the bias point of the circuit shown below if I_S = 5X 10^{-17} Amp and β = 100. Assume the Early voltage V_A to be infinite. [4][CO3]



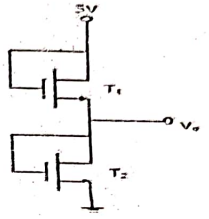
[b] Determine the maximum value of the collector resistance which will permit active mode of operation for the transistor. [2][CO3]

3 A degenerated common emitter stage is biased at a collector current of 1mA. If the circuit provides a voltage gain of 20 with no emitter degeneration and 10 with degeneration. Determine R_C, R_E, R_{in} and R_{out} Assume β = 100. Calculate the output resistance with Early effect included. (V_A=25V) [6][CO3]

4 [a] An NMOS device with $\mu_n C_{ox}$ = 200 μA/V², V_{TH} = 0.4 V operates at 1.5mA when V_{OV}= 0.8 V and 2mA when V_{OV} =1V. If the device operates in the triode region determine W/L and V_{DS}. [4][CO4]

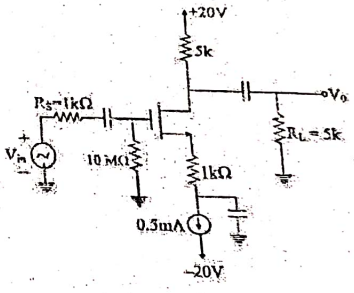
[b] Derive the low frequency small signal model of an NMOS transistor operating in the saturation mode. You may ignore the channel length modulation effect. [2][CO4]

5 [a] Both transistors T_1 and T_2 in the figure shown below have a threshold voltage of 1V. The device parameters K_{1n} and K_{2n} of T_1 and T_2 are 36 μA/V² and 9 μA/V² respectively. Determine the output voltage V_0. ($K_n = \mu_n C_{ox} W/L$) [4][CO4]



[b] An NMOS transistor has $\mu_n C_{ox}$ = 60μA/V², W/L = 40, V_{th} = 1V and V_A =15V. Find g_m and r_o when
(i) Bias voltage V_{GS} = 1.5V
(ii) Bias current I_D = 0.5mA [2][CO4]

6 Calculate A_{VS}, R_{in} and R_o for the common source amplifier with source resistance, if Kn'(W/L) =1mA/V²andV_t=1V,V_A=∞ [6][CO3]



7 [a] Discuss at least two advantages and one limitation of a differential amplifier over its single ended counterpart. Draw the circuit of a Bipolar differential amplifier biased with a current source and derive and plot the transfer characteristics of the amplifier when the input is a purely differential mode voltage. [4][CO5]

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Total no. of Pages:3

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III SEMESTER

B.Tech(EE)

END TERM EXAMINATION

Nov/Dec-2022

EE205 Electromechanical Energy Conversion and Transformers

Time: 03:00 Hours

Max. Marks: 40

Note : Answer any eight questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1. The flux linkage-current (λ-i) relationship for an electromagnetic system (Fig.1.) is given by

$$\lambda = \frac{1.2i^{1/2}}{g}$$

where g is the air gap length.

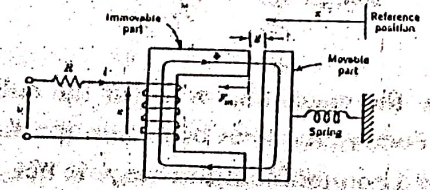


Fig.1. Electromechanical System

For current i=2A and g=10cm, determine the mechanical force on the moving part (a) Using the energy of the system. (b) Using the co-energy of the system

[2.5+2.5 marks] [CO1]

Q.2. Draw a winding diagram of a simplex lap wound armature for a 2-pole with 12 conductors indicating the positions of commutator segments and brushes. Indicate the parallel paths.

[5 marks] [CO2]

Q.3 (a) A four-pole DC motor is lap-wound with 400 conductors. The flux per pole is 0.01wb. Find the back emf of the motor if the machine is running at 1200rpm.

(b) A 6-pole, 148A DC shunt generator has 480 conductors and is wave-wounded. Its field current is 2A. If the brushes are shifted from GNA by 5° mechanical, determine the following:

i. Demagnetizing ampere-turns per pole
ii. Cross-magnetizing ampere-turns per pole
iii. Number of extra turns required to compensate demagnetizing ampere-turns per pole from part (a)

[2+3 marks] [CO3]

Q.4. Explain the commutation process in a DC machine. Briefly describe the reasons for the delayed commutation and indicate the remedial action for the same.

[5 marks] [CO2]

Q.5. Draw the characteristics for the following DC machines: (a) Magnetization characteristic of DC Series Generator, (b) External characteristic of DC Shunt Generator, (c) External Characteristic of cumulative compound DC Generator, (d) Speed-Torque characteristic of DC Series Motor, (e) Speed-Torque characteristic of DC Shunt Motor.

[1+1+1+1+1marks] [CO3]

Q.6. A 20 kW, 250V DC shunt motor has a full-load armature current of 85A at 1100rpm. The armature resistance is 0.18Ω. Determine (a) the internal electromagnetic torque developed (b) the internal torque if the field current is suddenly reduced to 80% of its original value (c) Steady-state motor speed in part (b) assuming the load torque to have remained constant.

[2+1+2 marks] [CO3]

Q.7. Draw the phasor diagram of a practical single-phase transformer for a lagging power factor load by considering the effect of iron losses, finite permeability, winding resistance, and leakage inductance.

[5 marks] [CO4]

Q.8. Explain the operation of the Scott connection using its circuit diagram, and phasor diagram. [5 marks] [CO4]

Q.9. Derive an expression indicating saving in copper used in an autotransformer with respect to a two-winding transformer.

[5 marks] [CO5]

Q.10. Write short notes on any two of the following:

a. Interpoles in DC machines
b. Testing of Transformers
c. Armature reaction in DC machines

[5 marks] [CO2]

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Total no. of Pages: 02 Roll no.....

III SEMESTER
B. Tech

END TERM EXAMINATION Nov-2022

EE 207(a) ELECTROMAGNETIC FIELD THEORY

Time: 3:00 Hours *Max. Marks: 50*

Note: Answer all questions by selecting any two parts from each question.
All questions carry equal marks.
Assume suitable missing data, if any.
Use of proper vector notations and units is compulsory.

Q.1[a] Given $\mathbf{A} = \frac{10}{r}\mathbf{a}_r + r\cos\theta\,\mathbf{a}_\theta + \mathbf{a}_\varphi$. Transform A into rectangular as well as cylindrical coordinates and find its magnitude at (3,-4,0) and (5, π/2, -2). [CO1]

[b] Given $f = x^2y - 2xy^2 + z^3$, calculate the directional derivative of f at point (2,4,-3) in the direction of $\mathbf{a}_x + 2\mathbf{a}_y - \mathbf{a}_z$. [CO1]

[c] Determine the flux $\mathbf{D} = \rho^2\cos^2\varphi\,\mathbf{a}_\rho + z\sin\varphi\,\mathbf{a}_\varphi$ over the closed surface of the cylinder $0 \le z \le 2$, $\rho = 3$. Verify using divergence theorem. [CO2]

Q.2[a] Planes x = 3 and y = -4, respectively, carry charges 20 nC/m² and 30 nC/m². If the line x=0, z=2 carries charge 10π nC/m, calculate E at (4,4,-4) due to the three charge distributions. [CO2]

[b] Derive the equation for current continuity and relaxation time. [CO3]

[c] A conducting sphere of radius 'a' is half-embedded in a liquid dielectric medium of permittivity ε_1. The region above the liquid is a gas of permittivity ε_2. If the total free charge on the sphere is Q, determine the electric field intensity everywhere. Draw suitable sketch to illustrate your understanding of the problem. [CO3]

Q.3[a] A large conducting cone (θ = 30°) is placed on a conducting plane with a tiny gap separating it from the plane lying on x-axis. If the cone is connected to a 30 V source, find V and E at (-3, 4, 2). Also draw a suitable illustration in support of your answer. [CO3]

[b] The space between spherical conducting shells r =4 cm and r = 8 cm is filled with dielectric material for which $\varepsilon = 2.35\ \varepsilon_0$. The two shells are maintained at a potential difference of 60 V. Find capacitance of the system and charge density on shell r = 4 cm. [CO3]

[c] Given the potential field $V = \frac{50\sin\theta}{r^2}$ V in free space. Determine: (a) whether V satisfies Laplace's equation, (b) the total charge stored inside the spherical shell $1 < r < 4$. [CO4]

Q.4[a] Given the field $H = 6r\sin\varphi\ a_r + 18r\sin\theta\cos\varphi\ a_\varphi$ A/m, evaluate both sides of Stoke's Theorem for the portion of the cone $\theta = 0.2\pi$ bounded by r = 2, r = 4, $\varphi = 0$ and $\varphi = 0.3\pi$. Let the direction of dS be + a_θ. [CO5]

[b] A toroid having a square cross section is defined by the surfaces z = 0, z = 10 mm, ρ = 40 mm and ρ = 50 mm. The surface at ρ = 40 mm carries a current K = 20 a_z k A/m. Find the surface currents on the other three surfaces, H within the toroid and if $\mu_R = 50$ within the toroid, find the total stored energy. [CO5]

[c] A straight solid wire segment carrying a current 4 a_y A extends from A(0,1,2) to B(0,4,2) in free space. This wire is subjected to the magnetic field of an infinite current filament lying along the z axis and carrying 35 A in the a_z direction. Find the vector torque on the wire segment about an origin at: (i) P_A (0,0,2), (ii) P_B (0,0,0) and (iii) P_C (0,2,0). [CO5]

Q.5[a] A point charge of 4 cos ($10^8\ \pi$ t) μC is located at P_+(0,0,1.5), while -4 cos ($10^8\ \pi$ t) μC is at P_-(0,0,-1.5), both in free space. Find V at P (450, θ, 0) at t = 15 ns for $\theta = 0°$, 90° and 45° respectively. [CO6]

[b] The square loop of wire has corners at (0,0,0), (0.2, 0, 0), (0.2, 0.2, 0) and (0, 0.2, 0) at t = 0. The loop is perfectly conducting except for a small 50-Ω resistor in one side. It is moving through the field $B = 5[\cos(6 \times 10^8 t - 2x)]\ a_z\ \mu T$ with a constant velocity of 40 a_y m/s. Calculate the power being delivered to the resistor as a function of time. [CO6]

[c] Assume a homogeneous material of infinite extent with $\varepsilon = 2\times10^{-10}$ F/m, $\mu = 1.25\times10^{-5}$ H/m, and $\sigma = 0$. Let $E = 400\cos(10^9 t - kz)\ a_y$ V/m. If all the fields vary sinusoidally (or cosinusoidally), use Maxwell's equation to D, B, H and k. [CO4 & CO6]

Q9.) A.) Compare the specifications of RS-serial data lines (RS-232 C&D, RS-423, RS-422 and RS-485) in terms of mode of operation, allowed number of transmission and reception, Maximum data rate in bps and Maximum cable length (ft) **[1 Mark] [CO5]**

B.) What is Universal Serial bus (USB)? Explain the data transfer Modes in USB **[1 Mark] [CO5]**

C.) What do you understand by General Purpose Interface Bus(GPIB)? Explain its bus structure and its operation? **[2 Marks] [CO5]**

Q.10) A.) A circuit consisting of a coil, a resistance and a variable capacitor connected in series is tuned to resonance using a Q meter. If the frequency is 500 kHz, the resistance 0.5 Ω and the variable capacitor set to 350 pF. Calculate the effective inductance and resistance of the coil if the Q meter indicates 90. **[1 Mark] [CO2]**

B.) Explain the working principle of the following **[2 Marks] [CO2]**

i.) True RMS Voltmeter

ii.) Analog Electronic Voltmeter

C.) A CDS cell has a dark resistance of 100 k Ω and a resistance in a day light beam of 30 k Ω. The cell time constant is 72 ms. Find the resistance of cell after 10 ms of application of beam. **[1 Mark] [CO3]**

Q.11) A.) A simple shunted ammeter using a basic meter movement with an internal resistance of 1800 Ω and a full scale deflection current of 100 μA is connected in a circuit and gives a reading of 3·5 mA on its 5 mA scale. This reading is checked with a recently calibrated d.c. ammeter which gives a reading of 4.1 mA. The implication is that the first ammeter has a faulty shunt on its 5 mA range. Calculate **[2 Marks][CO2]**

(a) The actual value of faulty shunt;

(b) The correct shunt for the 5 mA range.

B.) Briefly describe the working of resistive hygrometer with figure. **[1 Mark] [CO3]**

C.) A quartz piezo electric crystal having a thickness of 2mm and voltage sensitivity of 2mm and voltage sensitivity of 0.055 V-m/N is subjected to a pressure of 1.5 MN/m^2. Calculate the voltage output. If the permittivity of the quartz is 40.6×10^{-12} F/m, calculate its charge sensitivity. **[1 Mark][CO3]**

Total no. of Pages: 4

Roll no.....

III SEMESTER

B.Tech.

END TERM EXAMINATION **Nov-2022**

EE251 Electronic Instrumentation & Measurement

Time: 3:00 Hours *Max. Marks: 40*

Note : Attempt any 10 questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 A.) The four impedances of an A.C. bridge shown in Fig.1 are : Z1 = 400 Ω ∠50°; Z2 =200 Ω ∠40°; Z3 = 800 Ω ∠50° ; Z4 = 400 Ω ∠20° Find out whether the bridge is balanced under these conditions or not. **[2 Marks] [CO 1]**

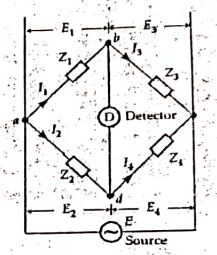


Fig.1

B.) **[2 Marks] [CO1]**

i.) What is the major advantage of Hay's bridge over Maxwell's inductance capacitance bridge?

ii.) Draw circuit and phasor diagrams of Schering Bridge

iii.) List the main type of errors

iv.) Depict the flow chart of different type of instruments

Q.2 A.) An bridge is used to measure the properties of a sample of sheet steel at 2 kHz. At balance, arm ab is Rx in series with Lx ; arm bc is R3 = 100 Ω ; arm cd is C4 =0.1 μF and arm da is R2 = 834Ω in series with C2= 0.124 μF. **[2 Marks] [CO1]**

i.) Determine which bridge is this?

ii.) Draw the circuit and its phasor diagram.

iii.) Derive balance conditions

iv.) Calculate the effective impedance of the arm ab under test conditions.

B.) Three resistors have the following ratings: R1=47 Ω ±5%, R2=75 Ω ±5%, R3=50 Ω ± 5%. Determine the magnitude and limiting error in ohm and in percent of the resistance of these resistances connected in series. **[2 Marks] [CO1]**

Q.3)

A.) A dynamometer ammeter is fitted with two fixed coils having a total resistance of 3.0 Ω and a total inductance of 0.121I, and a moving coil of resistance 30 Ω and an inductance of 0.003H. Calculate the error in reading when the instrument is calibrated with D.C. and used on A.C. 50 Hz with moving coil shunted directly across the field coils. **[2 Marks] [CO2]**

B.) Determine the reading obtained with a d.c. voltmeter in the circuit in Fig. 2 below when switch S is set to position 1 and then to position 2 and determine the reading obtained with a half wave and a full wave rectifier voltmeter. All the meters use a 100 μA full scale deflection meter movement and are set on their 10 V d.c. or a.c. rms range.**[2 Marks] [CO2]**

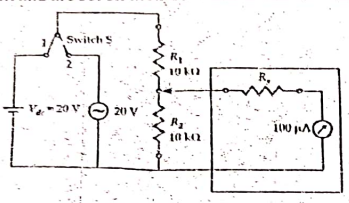


Fig.2

Q.4 A.) The deflecting torque corresponding to a deflection of 60° is 100 x 10^{-6} Nm in an instrument. The control is exerted through two phosphorus bronze springs. Allowing a maximum stress of 65 MN/m² and taking the value of modulus of elasticity as 112.8 GN/m², calculate suitable dimensions for control strings. The width of spring strip is 1 mm. **[2 Marks] [CO2]**

B.) A moving coil voltmeter with a resistance of 20 Ω gives a full scale deflection of 120° when a potential difference of 100 mV is applied across it. The moving coil has dimensions of 30 mm x 25 mm and is wound with 100 turns. The control spring constant is 0·375 x 10^{-6} Nm/deg and Specific resistance for copper= 1·7x10^{-8} Ω m. **[2 Marks] [CO2]**

i.) Find the flux density in the air gap.

ii.) Find the diameter of copper wire of coil winding if 30 percent of instrument resistance is due to coil winding.

Q.5 A) Explain the operating principle of an LVDT. **[2 Marks] [CO3]**

B.) An ac LVDT has the following data. Input =6.3 V, Output =5.2 V, range ±0.5 in. Calculate **[2 Marks] [CO3]**

i.) The output voltage vs core position for a core movement going from +0.45 in. to -0.30 in.

ii.) The output voltage when the core is -0.25 in. from the centre.

Q.6 A.) How can the liquid level position be measured using resistive method. State its advantages and disadvantages. **[2 Marks] [CO3]**

B.) A capacitive transducer uses two quartz diaphragms of area 750 mm² separated by a distance of 3.5 mm. A pressure of 900 kN/m² when applied to the top diaphragm produces a deflection of 0.6 mm. The capacitance is 370 pF when no pressure is applied to the diaphragms. Find the value of capacitance after the application of a pressure of 900 kN/m² . **[2 Marks] [CO3]**

Q7. A.) Two sinusoidal voltage signals of the same frequency but with different peak amplitudes and with a phase difference are applied to the X and Y-plates of a CRO.

What is the shape of the Lissajous figure seen on the screen? If the Y-deflection trace maximum and minimum values are 5 mm and 2.5 mm, determine the phase difference between the two signals. **[1 Mark] [CO4]**

B.) A Lissajous pattern on a CRO is stationary and has six vertical maximum values and five horizontal maximum values. The frequency of the horizontal input is 1500 Hz. Determine the frequency of the vertical input. **[1 Mark] [CO4]**

c.) The x-deflection plates of a CRT are 20 mm long and 5 mm apart. The centre of the plate from then screen is 25 cm away. Th e accelerating voltage is 3000 V. Determine the deflection sensitivity and the deflection factor. **[2 Marks] [CO4]**

Q8. a) Draw the block diagram of an instrument that can deliver sine, triangular and square waves with a frequency range of 0.01 Hz to 100 Khz and explain its working? **[2 Marks] [CO4]**

b) Determine the resolution Bandwidth of a spectrum analyser using an IF filter with in a 3-dB bandwidth of 20 KHz. **[1 Mark] [CO4]**

c) Draw block diagram of Digital Storage Oscilloscope (DSO) and explain briefly its working. **[1 Mark] [CO4]**

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Total No. of Pages: 2 | Roll No .....

FIFTH SEMESTER | B.Tech. (EE)

END TERM EXAMINATION | Nov-2022

EE-301 POWER ELECTRONICS

Time: 3:00 Hours | *Max. Marks: 40*

Note: Answer ANY EIGHT questions and all carry equal marks. Write the ANSWERS IN A SEQUENCE. Assume any data is missing and clearly mention the assumption.

Q(1) What do you mean by two power transistor model of Silicon Controlled Rectifier? Prove that the anode current of the Silicon Controlled Rectifier is given by: $I_A = \frac{\alpha I_G + I_{CBO1} + I_{CBO2}}{1-(\alpha_1+\alpha_2)}$. Discuss the following terms of SCR (a) Finger voltage (b) Latching current (c) Holding current (d) Surge Current

[3+2=5M][CO1]

Q(2) Draw the symbol and V-I characteristics of the following devices: (a) Power Diode (b) Power BJT (c) SCR (d) TRIAC (e) GTO

[5x1=5M][CO1]

Q(3) Derive the expression for the output voltage of a single phase half wave controlled converter feeding R-L load with freewheeling diode while considering the firing angle α? Also determine the DC output voltage, in case the same circuit as shown in Fig.1 is energized with 120V, 50Hz supply while assuming the firing angle $\alpha = 30°$. $R = 5\Omega$, $L = 0.1H$.

[3+2=5M] [CO2]

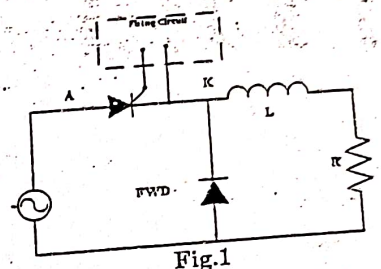


Fig.1

Q(4) Explain the working principle of dual converter with the help of suitable waveforms. A single-phase dual converter is supplied from a 220 V, 50 Hz ac source and it is connected to a load of R = 20 Ω. The value of the current limiting reactor is L = 0.08H. If the firing angle of converter-1 $\alpha_1 = 45°$, determine (a) the firing angle of converter-2 (b) the Average value of load voltage.

[3+2=5M][CO3

Q(5) Discuss the analytical and graphical analysis of a three-phase full-bridge converter having a source inductance L_s in each line with RL load by assuming that the load current is constant and ripple free. A six-pulse three-phase full-bridge converter has a delay angle of $\alpha = 120^\circ$ and operates in an inverting mode. The three-phase ac system is 4160 V RMS line-to-line. The dc source is 3000 V, R=2Ω, and load inductance L=0.15H is large enough to consider the current to be purely dc. Determine the power transferred to the ac source from the dc source.

[3+2=5M][CO3]

Q(6) Discuss the analytical and graphical analysis of a single-phase bidirectional ac voltage controller with RL load. An AC load circuit consists of a resistance of 30Ω in series with an inductance of 0.2H. it is fed from a 120V, 50Hz AC source. Determine the firing angle range in which the load voltage can be controlled and the conduction interval in a half cycle for a firing angle delay of 100°. [3+2=5M][CO4]

Q(7) Explain the operating principle of mid-point-type single-phase step-up cyclo-converter. Mention the conduction of various thyristors in the waveforms. [5M][CO4]

Q(8) Explain the operating principle of the step-down chopper with the help of voltage and current waveforms. Also derive expressions for average output voltage and RMS output voltage. A chopper-controlled electric train is powered by a 1500V DC supply. The power semiconductor switching element has a minimum effective ON time of 40μs. During starting and slow-speed running the output of the chopper has to go as low as 15V. What is the highest chopper frequency possible to satisfy this requirement?

[3+2=5M][CO5]

Q(9) Give a brief description for the operating principle of a basic series inverter with help of analytical and graphical analysis. Discuss Resistance triggering of SCR and the conditions for forced commutation along with Class-A commutation of SCR.

[2+1+2=5M][CO5]

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Total No. of Pages

Roll No. ... ..

FIFTH SEMESTER

B.TECH. (EE)

END SEM EXAMINATION

Nov.-Dec 2022

EE-303 POWER TRANSMISSION & DISTRIBUTION

Time: 3:00Hours

Max. Marks : 40

Note: Answer any *FIVE* questions. Assume suitable missing data, if any.

Q1 Answer briefly: 2x4=8

i) Draw the single line diagram of a typical power system. Show various voltage levels also. [CO1]

ii) A 100km long line has a characteristic impedance of 350 ohms. What will be the characteristic impedance if the length of line is doubled? Give reason in support of your answer. [CO3]

iii) Explain why the voltage is unequally distributed across the insulators in a string of insulators. [CO5]

iv) A single phase overhead line 40km long consists of two parallel wires of 6mm radius, 1.5m apart. If the system voltage is 50kV at 50Hz, calculate the capacitance and charging current with the line open circuited. [CO2]

Q2 a. Define 'Characteristic Impedance' and 'Propagation Constant' for a transmission line. Also explain their significance. [CO3] 2

b. A 3-phase 50Hz 200km long transmission line has following distributed parameters per km: r=0.2ohms, x=0.41ohms, y =3.14x10^{-6} mho. The sending end voltage is 220kV. Determine A, B, C, D parameters of the line and hence determine the sending end current and receiving end voltage of the line under open circuit condition. Consider the line as long line. [CO2,3] 6

Q3 a. Derive the expressions for sag and tension in an overhead transmission line conductor when the supports are at unequal heights. [CO5] 4

b. An overhead line is supported by towers at the same level having a span of 250meters. Calculate the sag in i) in still air condition with no ice

covering ii) under a wind pressure of 400N/m² and ice covering of 1 cm thickness. The conductor diameter and weight are 1.1cm and 650kg/km, respectively. The breaking load and factor of safety are 7000kg and 2 respectively. Ice weighs 915kg/m³. [CO5] 4

Q4 a. Define string efficiency of a string of overhead line insulators. Explain the methods to improve it. [CO5] 4

b. In a string of three disc units, capacitance of each link pin to earth is 10% of the capacitance of one unit. If a voltage of 33kV, 50Hz is applied across the string, calculate i) voltage across each unit ii) string efficiency. [CO5] 4

Q5 a. For a given voltage and sheath diameter, deduce the size of conductor of a single core cable which gives minimum gradient at the surface of the conductor. Also explain the condition for stable operation of the cable. [CO4] 4

b. A 60kV single core cable has a conductor diameter of 2.5 cm and sheath of inside dielectric 6cm. Calculate the maximum stress. It is desired to reduce the stress by using two intersheaths. Determine their best positions, maximum stress and voltage on each. [CO4] 4

Q6 a. Explain different types of distribution systems for the supply of electrical power. [CO1] 4

b. A three phase 220kV, 50Hz transmission line has conductors spaced 5.5meters at the corners of an equilateral triangle. Calculate the corona inception voltage if each conductor has a radius of 1.2cm with surface irregularity factor of 0.92. The temperature of the surroundings is 40°C and atmospheric pressure is 752mm of mercury. Also find the corona loss/km length of the line if there is an over voltage of 1.6pu. [CO3]4

Q7. Write short notes on any TWO 4x2 = 8

i. Lightning Arrestor for protection against over voltages [CO3]

ii. HVDC Transmission [CO1]

iii. Determination of A, B, C, D parameters of a transmission line in lab [CO2]

iv. Determination of capacitance of a 3-core cable [CO4]

Total No. of Pages: 03 Roll No. .....

FIFTH SEMESTER B.Tech.[EE]

END-SEMESTER EXAMINATION (Nov.-2022)

EE-305 SIGNALS AND SYSTEMS

Time: 3 Hour *Max. Marks:50*

Note: Question no.1 is compulsory. Attempt any three questions from Q2 to Q5. Assume any data if missing and clearly mention the assumption.

Q1. a) Determine whether or not the following continuous-time signal is periodic. If the signal is periodic, determine its fundamental period. [4] CO1

$$x(t)=\sum_{n=-\infty}^{+\infty} e^{-(2t-n)}u(2t-n)$$

b) Determine whether the following system is memoryless, time-invariant, linear and stable. [4] CO1

$$y(t)=x(t/3)$$

c) Determine if the following system is invertible. If it is, invertible construct the inverse system. If it is not, find two input signals to the system that have the same output. [4] CO2

$$y[n]=x[2n]$$

d) Let $h(t)$ be the triangular pulse shown in Figure 1(a), and let $x(t)$ be the impulse train depicted in Figure 1(b). Determine and sketch $y(t)=x(t)*h(t)$ for the T=4. [4] CO2

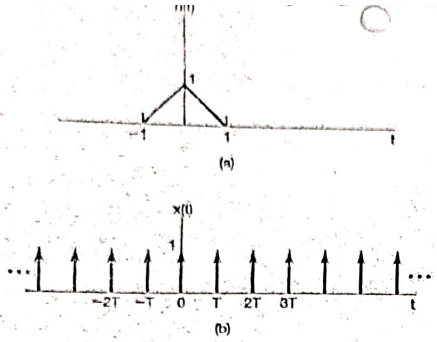


Figure 1.

c) Find the Fourier series representation of the signal $x(t)$ which is periodic with period 4. [4] CO3

$$x(t) = \begin{cases} \sin(\pi t) & 0 \le t \le 2 \\ 0 & 2 < t \le 4 \end{cases}$$

Q2. (a) Consider an LTI system with input and output related through the equation :

$$y(t) = \int_{-\infty}^{t} e^{-(t-\tau)} x(\tau - 2) d\tau$$

What is the impulse response $h(t)$ for this system? [3] CO2

Determine the response of the system when the input $x(t)$ is as shown in Figure 2. [2] CO2

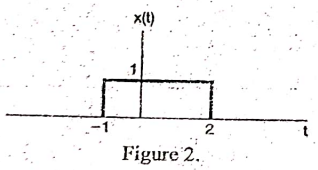


Figure 2.

Q2. (b) Compute and plot the convolution of $x[n]$ and $h[n]$ [5] CO1

$$x[n] = \begin{cases} 1, & 3 \le n \le 8 \\ 0, & \text{otherwise} \end{cases},$$

$$h[n] = \begin{cases} 1, & 4 \le n \le 15 \\ 0, & \text{otherwise} \end{cases}.$$

Q.3 (a) If the Fourier transform of continuous time signal $x(t)$ is $X(\omega)$, then show that the Fourier trasform of $x^*(t)$ is $X(-\omega)$. [5] CO3

(b) Let $x(t)$ be a periodic signal with fundamental period T and Fourier series coefficients a_k. Derive the Fourier series coefficients of $x(3t - 1)$ in terms of a_k. [5] CO3

Q4. (a) Using the power series expansion technique, find the inverse z-transform of the following $X(z)$. [5] CO4

$$X(z) = \frac{z}{2z^2 - 3z + 1} \qquad |z| < \frac{1}{2}$$

(b) Determine the inverse z-transform of [5] CO4

$$H(z) = \frac{z^2}{z^2 - \frac{3}{4}z + \frac{1}{8}} \qquad |z| > \frac{1}{2}$$

Q5. Determine whether the two signals u(t) and v(t) are orthogonal in the interval [0,4] [10] CO5

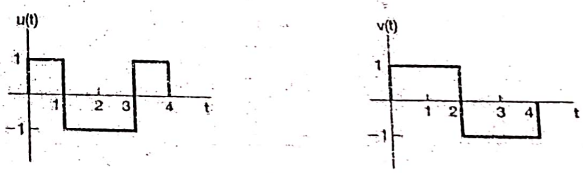


Figure 3

xxxxxxxxxxxxx

the plant capacity factor. Determine the operating schedule of the units in the station. Calculate the plant factor. CO1[5]

Table 1. Load Demand Chart

	kW		kW
11 p.m. to 5 a.m.	500	12 noon to 1 p.m.	1500
5 a.m. to 6 a.m.	750	1 p.m. to 5 p.m.	2500
6 a.m. to 7 a.m.	1000	5 p.m. to 7 p.m.	2000
7 a.m. to 9 a.m.	2000	7 p.m. to 9 p.m.	2500
9 a.m. to 12 noon	2500	9 p.m. to 11 p.m.	1000

Q7 (i) Explain the instrument transformers isolating switches in substation equipment. CO4[2]

(ii) A 3-phase, 50 Hz, 400 V motor develops 100 H.P (74.6 kW), the power factor being 0.75 lagging and efficiency 93%. A bank of capacitors is connected in delta across the supply terminals and power factor raised to 0.95 lagging. Each of the capacitance units is built of 4 similar 100 V capacitors. Determine the capacitance of each capacitor. CO2 [3]

(b) What is transformer substation? Explain different types of transformer substation? Illustrate your answer with the suitable block diagram. Draw the layout of underground substation. CO3[5]

Total No. of Pages: 04 Roll No. .....

FIFTH SEMESTER **B.Tech (DEC)**

END SEMESTER EXAMINATION (DECEMBER 2022)

EE-307: Power Station Practice

Time: 3:00 Hours ***Max. Marks: 50***

Note: Attempt all questions. Assume suitable missing data, if any. All questions carry equal marks. Attempt any five questions out of seven questions. Answers should be precise.

Q.1 (a) What is interconnected grid systems. Discuss the advantages of interconnected grid connected systems. A power station has to meet the following demand:

Group A: 200 kW between 8 a.m. and 6 p.m.
Group B: 100 kW between 6 a.m. and 10 a.m.
Group C: 50 kW between 6 a.m. and 10 a.m.
Group D: 100 kW between 10 a.m. and 6 p.m. and then between 6 p.m. and 6 a.m.

Plot the daily load curve and determine (i) diversity factor (ii) units generated per day (iii) load factor CO1[5]

(b) Define the base load and peak load on power station. The annual load duration curve for a typical heavy load being served by a steam station, a run-of -river station and a reservoir. The ratio of number of units supplied by these stations is as follows:

Steam: Run-of-river: Reservoir :: 7:4:1

The run-of-river station is capable of generating power continuously and works as a base load station. The reservoir station works as a peak load station. Determine (i) the maximum demand of each station and (ii) load factor of each station. CO1[5]

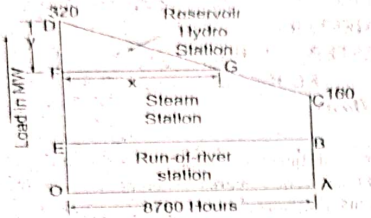


Fig. Q1 (b)

Q.2 (a) A consumer has a steady load of 500 kW at a power factor of 0.8 lagging. The tariff in force is Rs. 60 per kVA of maximum demand plus 5 paise per kWh. If the power factor is improved to 0.95 lagging by installing phase advancing equipment, calculate:

(i) The capacity of the phase advancing equipment
(ii) The annual saving affected
The phase advancing equipment costs Rs. 100 per kVAR and the annual interest and depreciation together amount to 10%. CO2 [5]

(b) A hydroelectric plant costs Rs. 3000 per kW of installed capacity. The total annual charges consist of 5% as interest; depreciation as 2%, operation and maintenance at 2% and insurance, rent etc. 1.5%. Determine a suitable two-part tariff if the losses in transmission and distribution are 12.5% and diversity of load is 1.25. Assume that the maximum demand on the station is 80% of the capacity and annual load factor is 40%. What is the overall cost of generation per kWh? CO2 [5]

Q.3 (a) What is sub-station? Discuss the different ways of classifying substation. Give the comparison of indoor and outdoor substation. CO3[1+3+2]

(b) Draw the layout and schematic connection of pole-mounted substation. What are different types of bus-bar arrangements used in substations? Illustrate your answer with suitable diagrams. CO3[2+3]

Q.4 (a) What is work-permit? What are the features of work permit? When are permit to work systems applicable. Discuss different types of work-permits? CO4[1+1+1+2]

(b) What are different types of industrial hazards? Write the few safe working practices which one should follow while working in power plant. What are the precautions which the worker should take while moving materials mechanically and manually. CO4[2+1+2]

Q.5(a) What is meant by grounding or earthing. What is the difference between system grounding and the equipment grounding. Explain in brief why solid grounding can be used for the systems operating on voltages below 3.3 kV or above 33 kV. CO5[1+1+3]

(b) Why resistance grounding is used for the systems operating on voltages between 3.3 kV and 33 kV. A 33 kV, 3-phase, 50 Hz overhead line 60 km long has a capacitance to ground of each line equal to 0.015μF per km. Determine the inductance and kVA rating of the Peterson coil. CO5[3+2]

Q6(a) A factory works for 16 hours a day for 300 days in a year. The following two systems of tariff are available: - CO2 [5]

High voltage supply at Re 1 per unit plus Rs 50 per month per kVA of maximum demand. Low voltage supply at Rs. 60 per month per kVA of maximum demand plus Rs. 1.10 per unit. The factory has an average load of 250 kW at 0.8 power factor and a maximum demand of 300 kW at the same power factor. The high voltage equipment costs Rs 500 per kVA and losses can be taken as 5%. Interest and depreciation charges are 12%. Calculate the difference in the annual cost between the two systems.

(b) A power station has to supply load shown in Table 1 below.

Draw the load curve. Calculate the load factor. Select the number and size of generator units to supply the load. Reliability of the supply is to be maintained. Find the reserve capacity of the plant required. Calculate

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Total No. of Pages 02 Roll No. .....

FIFTH/SEVENTH SEMESTER B.TECH.(EE)

MID SEMESTER EXAMINATION Sept 2022

EE313a Engineering Analysis & Design

Time: 3:00 Hours *Max. Marks :40*

Note: Attempt ANY FIVE questions. All questions carry equal marks. Assume suitable missing data, if any.

1. Derive the state equation and output equation in matrix form for a separately excited dc motor when excited at armature side, while maintaining field curren constant. Draw the schematic diagram of dc motor and define all the symbol of dc motor with unit. Choose three variables as state variables. Write the stat model also. [CO1]

2. (a) Define the term Solvers in Simulink. Differentiate between the fixed ste solvers and variable step solvers. Discuss the ode solvers available MATLAB.
(b) Solve following first order differential equation using ode23 and ode4 Write MATLAB code in command window (i) without creating an M file; (with creating an M file. $\frac{dy}{dx} = \sin(x) + \cos(y)$, *where* $y(o) = 0$, Interval x lies in the range [0 2*pi]. [CO3]

3. Given the equation $\frac{dy}{dx} = \frac{2y}{x}$, *with* $y(1) = 2$. [CO2]
Estimate y(2) using (i) Euler's method and (ii) Heun's method, using h=0.
Compare the results with exact answers.

4. (a) Find the solution of
$\ddot{x} + 2\dot{x} + x = 0;$ $x(0) = 0, \dot{x}(0) = 1$ [CO2
(b) Solve the equation $\frac{dx}{dt} + 3x = t$, with x(0)=8/9.

5. (a) Discuss the terms ceil, round, marker size and colors in MATLAB [C
example.
(b) Plot the graphs of the following functions using MATLAB:
(i) $y(t) = sin5tsin50t\ for\ 0 \le t \le 3,$
(ii) $x(t) = e^{-t}(cos2t + sin2t) for\ 0 \le t \le 5.$

6. (a) Derive the Newton Raphson method. Draw neat diagram/graph. [CO2]
(b) Find the root of the equation
$f(x) = x^2 - 3x + 2$ in the vicinity of $x = 0$ using Newton Raphson method.

7. (a) Draw the free body diagram and obtain the differential equations of mechanical system shown in figure 1. [CO1]

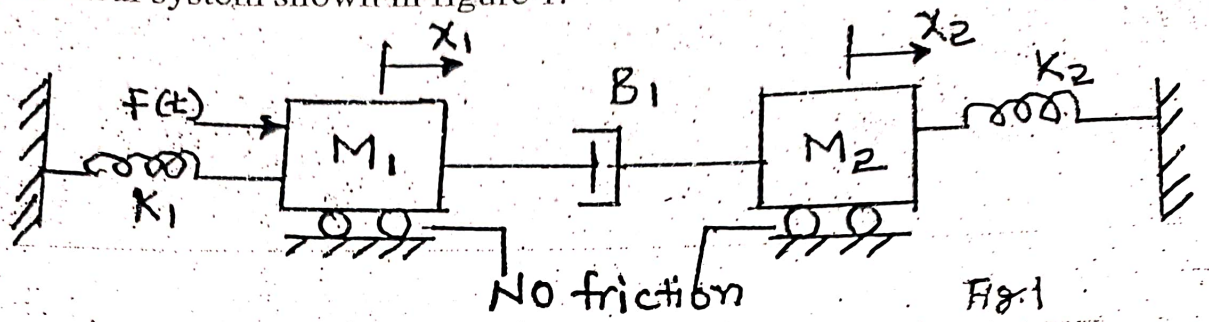


Fig.1

(b) Derive the transfer function of the circuit shown in figure 2.

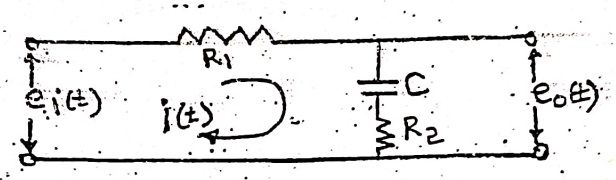


Fig. 2

8. Discuss the PSPICE. Also discuss the fundamental steps of running a PSPICE simulation for the resistive circuit shown in figure 3. [CO5]

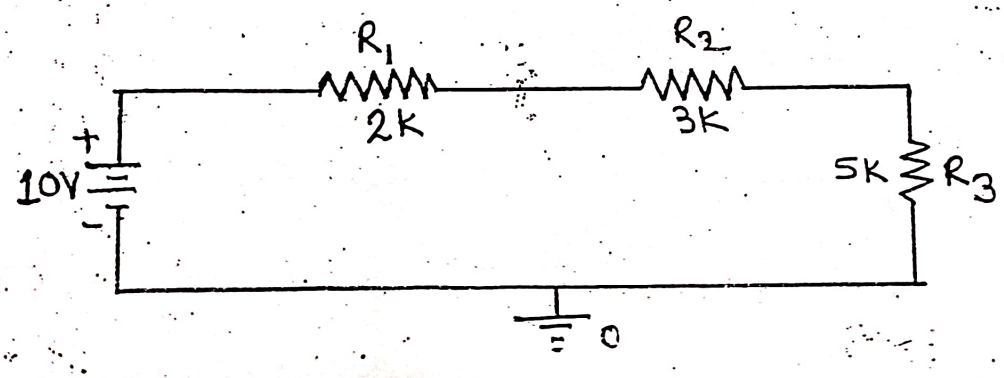


Fig. 3

Total No. of Pages: 03 Roll No.....

5th Semester
B.Tech

End Term Examination Nov/Dec-2022

EE317 RENEWABLE ENERGY SYSTEMS

Time: 03:00 *Max. Marks: 50*

Note: Attempt any five.

Assume the missing data if required.

Q1. (a) Give an account of energy scenario from Indian and global perspective clearly specifying the share of various renewable energy sources. [5][CO1]

(b) Classify solar cells. Derive an expression for maximum power output and efficiency of a solar cell. [5][CO2]

Q2. (a) Classify different types of solar thermal collectors and show the constructional details of a flat plate collector. What are its main advantages? [5][CO2]

(b) A SPV module having total area of 1.646 m^2 and gives a current of 8.08 A and voltage of 29.72 V at maximum power point. The short circuit current of the module is 8.48 A and open circuit voltage is 37.34 V. What is the fill factor, maximum power point and efficiency of the solar cell? Consider STC. [5][CO2]

Q3. (a) Wind at one standard atmospheric pressure and 10°C has a speed of 12 m/s. A 12-m diameter wind turbine is operating at 6 rpm with maximum efficiency of 42%. Calculate (i) the total power density in wind stream, (ii) the maximum power density, (iii) the actual power density, (iv) the power output of the turbine, and (v) the axial thrust on the turbine structure. [5][CO3]

(b) What are the most favourable sites for installing wind turbines? Using Betz model of a wind turbine, derive the expression for power extracted from wind. Under what conditions does the maximum theoretical power can be extracted from the wind turbine? [5][CO3]

Q4. (a) Calculate the power that can be developed from a hydroelectric power station having following data
Catchment area = 250 km²
Average rainfall = 100 cm
Run-off = 75 %
Available Head = 290 m
Overall efficiency of the station = 70 % [5][CO5]

(b) What is geothermal energy? Discuss different systems used for generating the power using geothermal energy. [5][CO4]

Q5. (a) Explain with the help of the diagram, the principle of closed cycle ocean thermal energy conversion system (OTEC). [5][CO4]

(b) Explain the principle and components of tidal power plants. Write the advantages and limitations of tidal power. [5][CO5]

Q6. (a) Describe the layout of grid connected and stand-alone PV systems with neat diagrams. Enumerate the advantages and limitations of the two configurations. [5][CO2]

(b) A layout of a standalone solar photovoltaic system is shown in the figure below. [5][CO2]

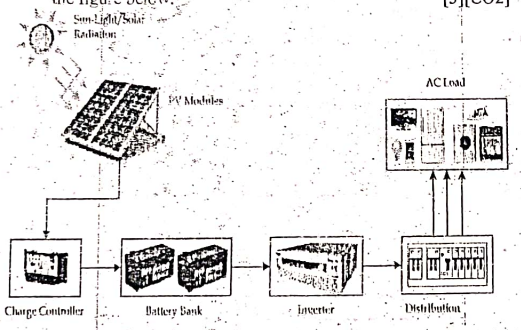


Figure 1. A schematic of a PV system feeding power to a household.

Design the system for a household having the following energy consumption data:

S.No.	Appliance Name	DC Power	Number of appliances	Daily Usage hours	Total Power	Total Energy
1	Tube light	60	4	8	120	720
2	Fan	55	3	14	110	1100
3	TV-32"	37	1	6	35	210
4	Refrigerator	145	1	24	120	2880
5	Air conditioner	1400	1	8	1400	4200

Hours of solar radiation available at the location (5.5 h/day)

Calculate:

(i) Total per day energy consumption of the household.
(ii) Rating of the inverter considering.
(iii) Battery storage (for 1 day) [Take rating of the single battery: 12 V, 200 Ah]
(iv) No. Solar Panels [Consider 250 W panel]
(v) Solar panel rating

Note: Losses to be considered: (a) inverter: 25 % (b) battery: 15% (c) charge controller: 5 %
(d) Solar panel: 25 %

Total No. of Pages: 03 Roll No.....

5th and 7th SEMESTER

B.Tech

END TERM EXAMINATION *Nov-2022*

EE319 Digital System Design

Time: 3:00 Hours *Max. Marks: 40*

Note :
If necessary, make appropriate assumptions and approximations and state them
You must solve all the questions and their parts in the serial order

Q.1 Answer any FIVE. [2X5=10]

(a) What are the major limitations associated with Static CMOS logic? [CO#2]

(b) Explain why present VLSI circuits use MOSFETs instead of BJTs? [CO#1]

(c) What is Verilog? How is it different from normal programming languages? [CO#4]

(d) "NMOS transistor cannot pass strong logic 1". Justify the statement. [CO#2]

(e) Write subthreshold current equation for n-MOSFET. [CO#1]

(f) Why TSPC latches are preferred as compare to Static D latches? [CO#3]

Q2. Answer any THREE. [3X3=9]

(a) Sketch a pseudo-nMOS gate that implements the function

$$F = \overline{A(B+C+D)+E \cdot F \cdot G}$$ [CO#2]

(b) Design a 2 input XOR gate using transmission gate logic and write a Verilog module for the circuit designed. [CO#4]

(c) Differentiate the between the process of ion implantation and diffusion in fabrication of a MOS transistor. [CO#1]

(d) What is the function of the circuit in Figure 1? [CO#3]

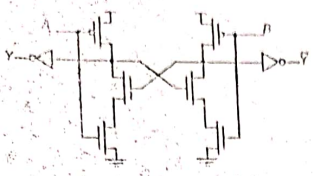


Figure 1

Q3. Figure 2 contains a pass-gate logic network. [3] [CO#2,3]

(a) Determine the truth table for the circuit. What logic function does it implement?

(b) If the PMOS were removed, would the circuit still function correctly? Does the PMOS transistor serve any useful purpose?

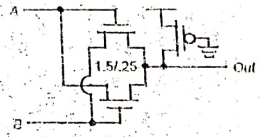


Figure 2

Q4. Sketch a 3-input XOR functions using each of the following circuit techniques: [3][CO#2]

(a) Static CMOS

(b) Pseudo-nMOS

Q5. Design and explain the working of TSPC Flip-Flop. [2] [CO#3]

Q6. Ignore all capacitances at the "out" node: [5][CO#2]

(a) In the high to low transition in Figure 3, which transistor would first turn from ON to OFF state?

(b) During the high to low transition in Figure 3. What are the regions of operation of transistors Mp1 – Mp3 and Mn1 – Mn3 for Vin = 0.7V (Vth = 0.3V)?

(c) What is the value of the current through PUN?

(d) During the low to high transition, which of Mn1 and Mn2 first turns ON?

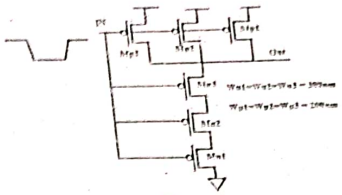


Figure 3

Q7. Consider the circuit of Figure 4. Assume the inverter switches ideally at VDD/2, neglect body effect, channel length modulation and all parasitic capacitance throughout this problem. [4] [CO#2]

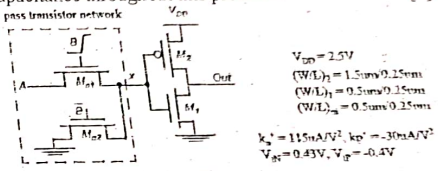


Figure 4

(a) What is the logic function performed by this circuit?

(b) Explain why this circuit has non-zero static dissipation.

(c) Using only just 1 transistor, design a fix so that there will not be any static power dissipation.

(d) Implement the same circuit using transmission gates.

Q8. Write a Verilog code for Full Adder Circuit with test bench. [4] [CO#4]

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Total no. of Pages: 2 Roll no.....

5th and 7th SEMESTER

B. Tech

END TERM EXAMINATION Nov/Dec-2022

COURSE CODE: EE-321 COURSE TITLE: SOFT COMPUTING TECHNIQUES

Time: 03:00 Hours Max. Marks: 40

Note: 1. Total 7 questions are there. All questions are compulsory.
2. Assume suitable missing data, if any.
3. CO means course outcome number.

Q.1 (a) Explain with the help of a suitable example the differences between the crisp and a fuzzy set. [2][CO4]

(b) Define the peak value and the nucleus in the context of fuzzy set. [2][CO4]

Q.2 With the help of a block diagram explain the working of [each component] Mamdani type of fuzzy knowledge-based system. [5][CO4]

Q.3 Use Centre of gravity (COG) defuzzification method on the aggregated output fuzzy set as shown in Fig.1 and compute the corresponding crisp output [where y represents elements of the aggregated output fuzzy set and $\mu_{agg}(y)$ represents the corresponding membership degree]. [4][CO4]

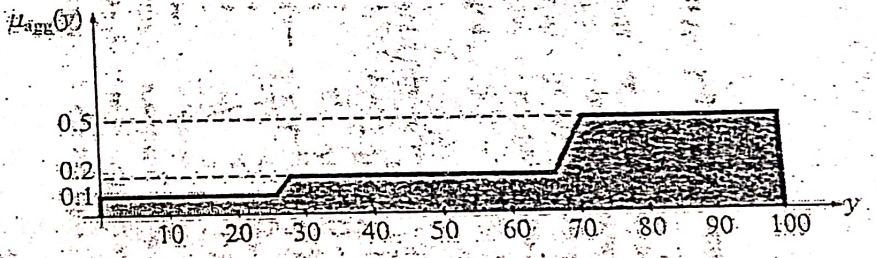


Fig.1

Q.4 Draw the structure of any recurrent neural network (assume only one hidden layer, two external inputs (in input layer) and one output neuron. Assume any nonlinear activation function for the hidden neurons and linear one for the output neuron) and derive its mathematical model. Also, derive its weights/parameter-update equations. [8][CO3]

P.T.O

Q.5 Explain Proportional (P), Integral (I) and Derivative (D) control action with the help of a suitable examples. Explain the advantage of each of them. Briefly discuss how you can implement fuzzy-based PID controller.

[7][CO4]

Q.6 Discuss briefly what is Genetic algorithm. Use it to maximize the function $f(x) = \frac{x^2}{2}$ where the range of independent variable x is [0, 31]. Show one generation step only. Include both the mutation and crossover operations.

[8][CO5]

Q.7 Using Centre of Sum (COS) defuzzification method find the corresponding crisp output in Fig.2 where each of the graphs in Fig.2 represents the modified output fuzzy set [obtained from each of the three If-Then rules].

[4][CO4]

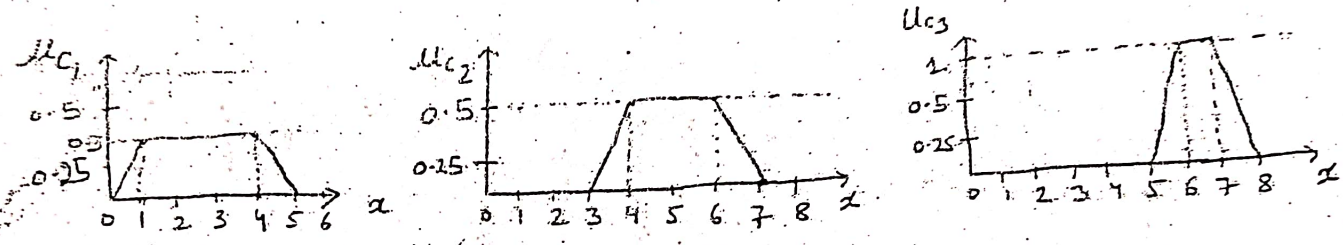


Fig. 2

********** END OF QUESTION PAPER **********

Total no. of Pages: 2 Roll no.....

V & VII SEMESTER

B.Tech

END TERM EXAMINATION *Nov/Dec-2022*

EE323 FUNDAMENTALS OF MACHINE LEARNING

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions carry equal marks (8 marks).
Attempt "ANY 5" questions
Assume suitable missing data, if any.

Q.1 For each statement below, say whether it is true or false, and give a one or two sentence justification of your answer. [8][CO2,3,5]

A. As we increase the number of parameters in a model, both the bias and variance of our predictions should decrease since we can better fit the data.

B. Machine learning models work automatically without the need for the user to manually set hyperparameters.

C. The k-means algorithm is guaranteed to converge to the global minimum.

D. When optimizing a regression problem where we know that only some of our features are useful, we should use $L1$ regularization.

Q.2 ***[Feature Engineering and Evaluation Metrics]*** [8][CO4]

A. Why is feature normalization necessary in Machine Learning? Suggest some techniques?

B. Suppose 10,000 patients get tested for flu; out of them, 9000 are actually healthy and 1000 are actually sick. For the sick people a test was positive for 620 and negative for 380. For the healthy people, the same test was positive for 180 and negative for 8820. Construct a confusion matrix for the data and compute the accuracy, precision and recall for the data.

Q.3 [Gradient Descent Algorithm] [8][CO3]

Run the Gradient Descent algorithm on the error function $F(w_0, w_1) = \frac{1}{2}w_0^2 + w_1^2$ starting at the point $W^{(0)} = [2,2]^T$ and using step size of $\frac{1}{2}$. Output the weight parameters $W^{(1)}$, $W^{(2)}$, $W^{(3)}$, where W vector corresponds to $[w_0, w_1]^T$.

Q.4 **[Principal Component Analysis]** [8][CO4,5]

A. Explain the method of Principal Component Analysis (PCA) in machine learning.

B. Given 3 2D data points: (0,0), (1,1), (-1, -1). Do the following:

i) Find the 1st principal component without solving for eigenvectors or SVD and justify.

ii) Project the original data onto the 1st principal component axis and find the transformed coordinate.

Q.5 **[Clustering]** [8][CO5]

A. The k-means algorithm is designed to reduce the mean squared error between the cluster centers and their assigned points. Will increasing the value of k ever increase this error term? Why or why not?

B. Use K Means clustering to cluster the following data into two groups. Assume cluster centroid are C_1=2 and C_2=4. The distance function used is Euclidean distance.

Data: { 2, 4, 10, 12, 3, 20, 30, 11, 25 }

Q.6 **[Support Vector Machines]** [8][CO6]

A. Explain with a suitable dataset of your choice and plots, how Support Vector Machine can be used for classification of linearly separable data.

B. Describe the significance of Kernel functions in SVM. List any two kernel functions.

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Total no. of Pages: 3 Roll No: .....

V Semester

B.Tech

END TERM EXAMINATION Nov/Dec-2022

EE 327 INTRODUCTION TO PYTHON PROGRAMMING

Time: 03:00 Hours Max. Marks: 40

Note : All questions carry equal marks. Answer any four questions. Assume suitable missing data, if any.

Q1.

Assume the following data (table below Q1) is saved in a csv file named 123.csv. Write a python program to find the names and professions of the voters. Store them in a dictionary named voterlist and copy the content of the dictionary to a csv file named voterlist.csv. Further, print the number of students in the voterlist.

[10 Marks][CO 1,2,4]

age	16	17	31	18	25	40
profession	edtech	student	software	student	student	manager
name	x	y	z	p	q	r

Q.2 Write a python program to define a fraction class with print addition, subtraction, multiplication, inverse procedures. Any objec of this class when printed, should show the numerator an denominator in the format "numerator/denominator".

[10 Marks][CO 3, 4]

Q.3 Write a python program to form a neural network with one hidd layer containing 2 nodes, such that the network can mimic the XO function. Use backpropagation algorithm to train the neural n The program should only use Numpy, Matplotlib, Math and required random modules.

[10 Marks][CO 3,4,

Q.4 Let a list of lists 'M' form a matrix which have same number of rows and columns. Write two separate python functions which take the list of lists "M" as argument, and find the minors and determinant of M, without using Numpy and PANDAS. Then define a main() function to call the previously defined functions and print their outputs. [10 Marks][CO 1,2,3]

Q.5 Write a python program to plot two straight lines '2x+1=y' and '3x+3=y' in a single figure. Further, the program should print the coordinates of the point where these two lines intersect. Use Numpy, Matplotlib modules. [10 Marks][CO 4, 5]

2. (b) A 200 CP lamp is hung 4 metres above the centre of the circular area of 5 metre diameter. Determine the illumination (i) Centre of area (ii) Periphery of the area (iii) Average illumination. Also determine the average illumination if reflector of 80% efficiency is used. [4] [CO-1]

3 (a). Write down *any two* advantages of projection welding over the spot welding. Also compare resistance welding and arc welding in term of power, power factor and temperature. [3] [CO-2]

3 (b). A 4.5 kW, 200 V, single phase resistance oven is to have nichrome wire heating elements. If the wire temperature is to be 1000 °C and that of charge is 500 °C, determine the diameter and length of the wire. The resistivity of nichrome alloy is 42.5 μΩ-cm. Assume the radiating efficiency and the emissivity of the element as 1.0 and 0.9 respectively. [4] [CO-3]

4 (a). Six resistances, each of 60 Ω, are used in a resistance heating; how much power is drawn for the following connections.

(i) Supply is 400 V and three-phase, and they are connected in delta fashion.

(a) Two resistance units in parallel in each branch.

(b) Two resistance units in series in each branch.

(ii) Supply is 400 V and three-phase while the connection is a star combination of:

(a) Two resistance elements in series in each phase.

(b) Two resistance elements in parallel in each phase.

[3] [CO-3]

4 (b). Draw the electrical circuit of an air conditioner. Briefly write about each component. [4] [CO-5]

5 (a). Write down any two practical applications of electrolysis with the help of example. A metal plate having a surface area of 115 cm^2 is to be silver plated. If a current of 1.5 A is passed for 1 hour and 30 minutes, what thickness of silver will be deposited? The specific gravity of silver is 10.5 and ECE of silver = 1.118 kg/C. [3] [CO-4]

5 (b). A worn shaft is to be reconditioned by depositing chromium on its curved surface to a thickness of 0.1 mm. The shaft has a diameter of 3.5 cm and a length of 80 cm. If a current of 4.4 A is passed, calculate how long (time) the plate will take. The density of chromium = 6600 kg/m^3 and ECE of chromium = 90 x 10^{-9} kg/C. [4] [CO-4]

Total No. of Pages: 04

Roll No. .....

5th/7th SEMESTER
B. Tech.
END SEMESTER EXAMINATION
November-2022
EE-357/EE-357a UTILIZATION OF ELECTRICAL ENERGY

Time: 3:00 Hours *Max. Marks: 40*

Note: Answer all questions.
Assume the missing data suitably (if any).

1. *Choose the correct answer.* [10*1 = 12]

(i) The thickness of copper deposited on a plate area of 0.0025 m^2 during electrolysis if a current of 1 A is passed for 100 minutes. The density of copper is 8900 kg/m^3 and ECE of copper is 32.95 x 10^{-8} kg/C [CO-4]

(a) 0.888 mm.
(b) 0.0888 mm
(c) 8.88 mm
(d) 0.00888 mm.

(ii) A lamp emits a total flux of light of 1500 lumens. The value of mean spherical candle power would be approximately [CO-1]

(a) 1500 CP
(b) 120 CP
(c) 375 CP
(d) There is no relation between total flux of light and mean spherical candle power

(iii) A plane surface is placed 3 metres from a 200 CP uniform source of light. The intensity of illumination on the surface when it is parallel to the rays [CO-1]

(a) 22.22 Lux
(b) 19.24 Lux
(c) Zero
(d) None of the above

(iv) Which of the following statement is correct if we use iron into the alloy for making the heating elements [CO-3]

(a) The final product will be cheaper
(b) The life of product will be reduced
(c) The higher the contents of iron the lower the life of alloy
(d) All of the above

(v) Heating element may fail due to [CO-3]

(a) Formation of hot spots.
(b) Embrittlement caused by gain growth.
(c) Contamination and corrosion
(d) All of the above

(vi) Which of the following welding provides leak proof joints and usually employed in welding of pressure tanks, transformers, condensers, evaporators, air craft tanks, refrigerators, varnish containers, etc. [CO-2]

(a) Spot welding
(b) Seam welding
(c) Projection welding
(d) Butt welding

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(vii) The working conditions and comforts of human beings is improved by air conditioning. The most suitable humidity for human beings is to be maintained at approximately [CO-5]

(a) 100%
(b) 0%
(c) 60%
(d) Close to 100%

(viii) Which of the following are the properties of refrigerants [CO-5]

(a) It should be non-corrosive
(b) It should be non-toxic
(c) It should get liquefied at a reasonable low pressure
(d) All of the above

(ix) In spot welding, the composition and thickness of the base metal decides [CO-2]

(a) The amount of squeeze pressure
(b) Hold time
(c) The amount of weld current
(d) All of the above

(x) During spot welding, the current flows for [CO-2]

(a) Fraction of a minute to several minutes
(b) Fraction of a second to several seconds
(c) Few milli seconds
(d) Few microseconds

(xi) Which of the following is not the part of outdoor unit of window air conditioner [CO-5]

(a) Compressor
(b) Condenser
(c) Fan
(d) Evaporator

(xii) Materials used for copper plating are [CO-4]

(a) Copper sulphate and sulphuric acid
(b) Copper sulphate and nitric acid
(c) Copper carbonate and ammonium carbonate
(d) Copper nitrate and sulphuric acid

2. (a) Find the total saving in electrical load and percentage increase in illumination if instead of using twelve 150 W tungsten-filament lamps, we use twelve 80 W fluorescent tubes. It may be assumed that (i) there is a choke loss of 25 per cent of rated tube light wattage (ii) average luminous efficiency throughout life for each lamp is 15 lm/W and for each tube is 40 lm/W and (iii) coefficient of utilization remains the same in both cases. [3] [CO-1]

Total No. of Pages: 03 Roll No.....

7 SEMESTER

B.Tech.

END TERM EXAMINATION **Nov-2022**

EE405 Digital Signal Processing

Time: 3:00 Hours *Max. Marks: 40*

Note : Questions1(one) is compulsory.
Assume suitable missing data, if any.

Q.1 Attempt all question (10)

a) The system having input $x(n)$ related to output $y(n) = log_x[x(n)]$ is
1. Non-linear, causal, and stable
2. Linear, noncausal, and stable
3. Non-linear, causal, and unstable
4. Linear, noncausal, and unstable [CO1]

b) The signal $x_1(t)$ and $x_2(t)$ are both bandlimited to $(-\omega_1, +\omega_1)$ and $(-\omega_2, +\omega_2)$ respectively. The Nyquist sampling rate for the signal $x_1(t)x_2(t)$ will be
1. $2\omega_1 \; if (\omega_1 > \omega_2)$ 3. $2(\omega_1 + \omega_2)$
2. $(\omega_1 + \omega_2)/2$ 4. $2\omega_2 \; if (\omega_1 < \omega_2)$ [CO1]

c) The convolution of a finite sequence with an infinite sequence
1. May be finite or infinite sequence
2. Is always a finite sequence
3. Is always an infinite sequence
4. Cannot be found [CO2]

d) The DTFS coefficient of a real and odd periodic signal are
1. Real and odd 2. Real and even
3.Imaginary and even 4. Imaginary and odd [CO2]

e) The property of Fourier transform that states the expansion in time domain is equivalent to compression in the frequency domain is
1. Duality 2. Time shifting
3.Time expansion 4. Frequency shifting [CO3]

f) The Fourier transform of a real and odd signal $x(n)$ is
1. Imaginary and odd function of frequency
2. Real and odd function of frequency
3. Complex, in general 4. Purley imaginary [CO3]

g) A LTI discrete time system is given by the difference equation $y(n) - ay(n-1) = x(n)$ where $|a| < 1$; if all the initial conditions are zero, then the system is

1. Unstable 2. Stable
3. Critically stable 4. Undamped and oscillatory [CO3]

h) The step response of an LTI system when the impulse response $h(n)$ is unit step $u(n)$ is

1. $n+1$ 2. $n-1$ 3. n 4. n^2 [CO3]

i) A digital filter is said to be an IIR if .....

1. All poles are outside the unity circle
2. it oscillates
3. one of the denominator coefficients is nonzero
4. the current output depends on previous output [CO4]

j) What is the minimum number of multipliers, adders and delay elements required to implement a linear phase filter with $h(n) = 0$ for $n < 0$ and $n > 15$.

1. 15 multipliers, 15 adders, and 15 delay elements
2. 8 multipliers, 8 adders, and 15 delay elements
3. 8 multipliers, 15 adders, and 15 delay elements [CO4]
4. 15 multipliers, 8 adders, and 15 delay elements

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Q.2 What do you understand by Aliasing in DSP and how can avoid it? Consider the analog signal $x_a(t) = 3cos100\pi t$

i) Find the minimum sampling rate required to avoid aliasing.
ii) If the signal is sampled at the rate F_s=200Hz. What is the discrete-time signal obtained after sampling?
iii) If the signal is sampled at the rate F_s=75Hz. What is the discrete-time signal obtained after sampling?
iv) What is the frequency $0 < F < F_s/2$ of a sinusoid that yields samples identical to those obtained in part (iii) [2+4] [CO1]

Q.3 Define the zero-input response and zero state response. Also determine the zero-input response and zero state response of the system characterized by the difference equation

$$y(n) = \frac{3}{2}y(n-1) + \frac{1}{2}y(n-2) = x(n), n \geq 0$$

where $x(n) = \left(\frac{1}{4}\right)^2 u(n)$ [2+4][CO2]

Q.4 Differentiate between linear convolution and circular convolution. Perform the circular convolution of the following two sequences using frequency domain method (means using DFT and IDFT)

$$x_1 = \{\underline{1}, 2, 2\}, \quad x_2 = \{\underline{1}, 2, 3, 4\}$$ [6] [CO2]

Q.5 Determine the cascade and parallel realizations for the system described by the system function

$$H(z) = \frac{10(1-\frac{1}{2}z^{-1})(1-\frac{1}{3}z^{-1})(1+2z^{-1})}{(1-\frac{1}{4}z^{-1})(1-\frac{1}{8}z^{-1})[1-(\frac{1}{2}+j\frac{1}{2})z^{-1}][1-(\frac{1}{2}-j\frac{1}{2})z^{-1}]}$$

[6] [CO3]

Q.6 Design an ideal low-pass filter with N=11 with a frequency response

$$H_d(e^{j\omega}) = \begin{cases} 1, & \text{for } -\frac{\pi}{2} \leq \omega \leq \frac{\pi}{2} \\ 0, & \text{for } \frac{\pi}{2} \leq |\omega| \leq \pi \end{cases}$$

[6] [CO4]

Total no. of Pages:03 Roll no.....

V/VII (DEC) SEMESTER **B.Tech. Electrical (EE)**

END TERM EXAMINATION *Nov/Dec-2022*

EE-407 INSTRUMENTATION AND MEASUREMENT

Time: 03:00 Hours *Max. Marks: 40*

Note: Answer any five questions. All questions carry equal marks. Assume suitable missing data, if any.

Q.1 (a) The resistance of an unknown resistor is determined by Wheatstone bridge. The solution for the unknown is stated as

$$R_4 = \frac{R_1 R_2}{R_3}$$

where limiting values of various resistances are: $R_1 = 500\ \Omega \pm 1\%$, $R_2 = 615\ \Omega \pm 1\%$, $R_3 = 100\ \Omega \pm 0.5\%$. Calculate (a) the nominal value of the unknown resistor, (b) the limiting error of the unknown resistor in Ω, and (c) the limiting error in percent of unknown resistor.

(b) What are different types of external interference signals. Explain capacitive interference and its elimination. [3+5][CO1]

Q.2 (a) The four arm of a bridge are:

arm ab : an imperfect capacitor C_1 with an equivalent series resistance of r_1,

arm bc : a non-inductive resistance R_3,

arm cd : a non-inductive resistance R_4,

arm da : an imperfect capacitor C_2 with an equivalent series resistance of r_2 in series with a resistance R_2.

A supply of 450 Hz is given between terminals a and c and the detector is connected between b and d. At balance : $R_2 = 4.8\ \Omega$, $R_3 = 2000\ \Omega$, $R_4 = 2850\ \Omega$ and $C_2 = 0.5\ \mu F$ and $r_2 = 0.4\ \Omega$. Calculate the value of C_1 and r_1 and dissipation factor for this capacitor.

(b) Explain the working principle of an AC bridge which is suitable for measurement of inductance with low Q coils. Draw its phasor and obtain values for unknown parameters. [3+5][CO2]

Q.3 (a) In an electrodynamometer instrument, the total resistance of voltage coil circuit is 8200 Ω and the mutual inductance changes uniformly from -173 μH at zero deflection to +175 μH at full scale, the angle of full scale being 95°. If a potential of 100 V is applied across the voltage circuit and a current of 3 A at a power factor 0.75 is passed through the current coil, what will be the deflection if the spring control constant is 4.63×10^{-6} N-m/rad?

(b) Explain working of Q-meter for measurement of a low impedance component in the series connection circuit. [3+5][CO3]

Q.4 (a) A pressure measuring instrument uses a capacitive transducer having a spacing of 4 mm between its diaphragm. A pressure of 600 kN/m² produces average deflection of 0.3 mm of diaphragm of the transducer. The transducer which has a capacitance of 300 pF before application of pressure and is connected in an oscillator circuit having frequency of 100 kHz. Determine the change in frequency of the oscillator after the pressure is applied to the transducer.

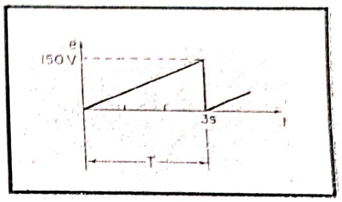
(b) Explain working of photo-emissive cell, photoconductive cell, and photovoltaic cell. [3+5][CO4]

Q.5 The GPIB bus structure has eight control lines subdivided into Handshake lines and Interface Management lines, Explain each of them in detail. [8][CO5]

Q.6 Explain in detail working of Function Generator with block diagram representing basic elements of it. [8][CO5]

Q.7 (a) A strain gauge is bonded to a beam 0.1 m long and has a cross sectional area 4 cm². Young's modulus for steel is 207 GN/m². The strain gauge has an unstrained resistance of 240 Ω and a gauge factor of 2.2. When a load is applied, the resistance of the gauge changes by 0.013 Ω. Calculate the change in length of the steel beam and the amount of force applied to the beam. [4][CO4]

(b) The sawtooth waveform with a peak value of 150 V and a period of 3 sec as shown in figure is applied to an average reading responding ac voltmeter with a scale calibrated in terms of rms value of a sine wave. Calculate (a) the form factor of the sawtooth voltage and (b) the error in meter indication [4][CO3]



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Total No. of Pages 2 Roll No. .....

B.Tech.(EE) SEVENTH SEMESTER

END SEM EXAMINATION (Nov-2022)

EE-409 SWITCH GEAR AND PROTECTION

Time: 3Hours *Maximum Marks: 40*

Note:
Question no.1 is compulsory.
Answer any four from remaining.
Assume suitable missing data, if any.

1. Write true or false and justify the following statements. (8)
(a)The Negative and zero sequence voltages are maximum at fault point and decreases towards the neutral.
(b)The X/R values decreases with separation of fault point from the source and can be substantially decreased by the fault resistance.
(c)The effect of in-feed from one intermediate section decrease the zone reach of the relay in the second zone.
(d)Differential relaying quite often used when coordination becomes problem. [C01]

2
(a). Explain the various ratings of circuit breaker as per BIS. (4)

(b)Explain the construction and working principle of SF6 circuit breaker and write the effect of current chopping on the performance of the breaker. (4)

[C02]

3(a). Explain the percentage biased differential relay and show how to adjust the slope of the percentage differential relay (4)

(b). Explain the method of setting of distance relays for first, second and third zone. How is the high speed and backup protection provided by distance relay? [C03] (4)

4. A 25 MVA, 11kV generator has a X_d'' = 0.2pu. Its negative and zero sequence reactance are respectively 0.3 and 0.1 pu. The neutral of the generator is solidly grounded. Determine the subtransient current in the generator and the line-to-line voltages for subtransient conditions when an LG fault occurs at the generator terminals. Assume that before the occurrence of the fault, the generator is operating at no load at rated voltage. (8) [C03]

5(a). Explain with neat circuit diagram to find positive; negative and zero sequence impedance of 3-phase, 11 KV, 10MVA synchronous generator in your laboratory. (4)

(b). "Over current relaying is the cheapest form of protection". Illustrate it with suitable example. (4) [CO4]

6. Explain the advantage of static relay over electro mechanical type of relay? Draw the block diagram of static IDMT over current relay. (8) [CO2]

7. Explain any two of the following: (4*2=8) [CO-1]
(i) Differential protection of transformer
(ii) Arc interruption theories in circuit breaker
(iii) Vacuum circuit breaker

8(a). Explain the fault characteristics of transmission line in power system and explain the choice of relay and setting using symmetrical component technique. Draw the neat circuit diagram also. (4)

(b)Explain the voltage balanced differential relaying used for protection of bus bar. How it differs from current differential relays? (4) [CO4]

IIIrd-SEMESTER

B. Tech. [Environment Engineering]

End Term Examination (November 2022)

Course Code EN-201 **Course Title: Strength of Materials**

Time: 03.00 Hours Max. Marks: 40

NOTE: All questions are compulsory
All questions carry equal marks
Assume suitable missing data, if any

1.(a) Describe the different types of elastic constants with practical examples. [2][CO-1]

(b) The principal stresses in the wall of a container (see Figure: 1) are 40 N/mm^2 and 80 N/mm^2. Determine the normal, shear, and resultant stresses in magnitude and direction in a plane, the normal of which makes an angle of 30^0 with the direction of the maximum principle stress. [6][CO-1]

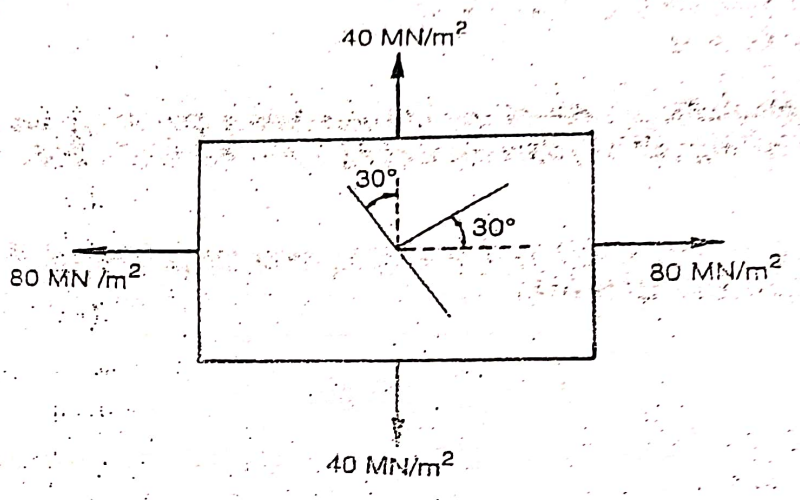


Figure: 1

Or

(b) A steel bar of the variable section is subjected to forces, as shown in Figure: 2. Taking $E = 205$ N/mm^2, determine the total elongation of the bar. [6][CO-1]

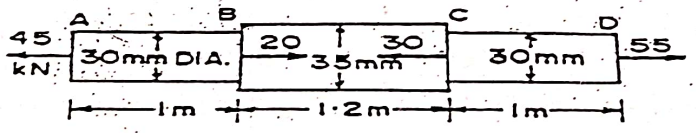


Figure: 2

2. (a) Define the different types of loads and supports with neat sketches. [2][CO-2]

(b) Draw the Shear Force and Bending Moment diagrams for a cantilever-loaded beam as shown in Figure: 3. [6][CO-2]

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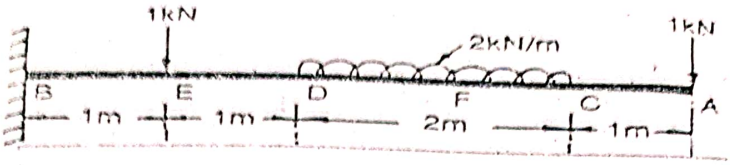


Figure: 3

Or

(b) Draw the Shear Force and Bending Moment diagrams for a simply supported beam as shown in Figure: 4. [6][CO-2]

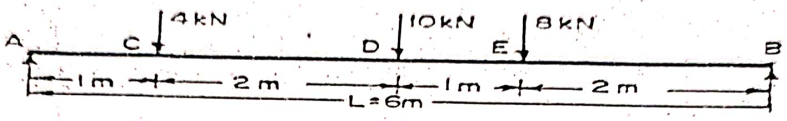


Figure: 4

3. A beam AB of 6 m spans is simply supported at the ends and is loaded as shown in Figure: 5. Determine (a) deflection at C, (b) maximum deflection, and (c) slope at end A. Take $E = 2 \times 10^5$ N/nim^2 and $I = 2000$ cm^4. [8][CO-3]

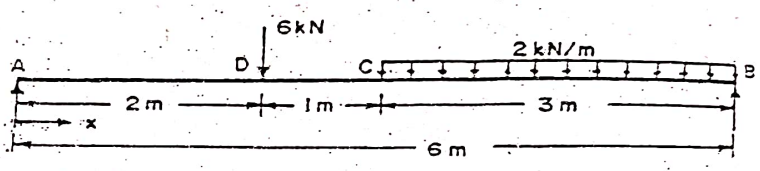


Figure: 5

4. (a) Explain the various end conditions of the column for determining the effective length of the column. [2][CO-4]

(b) A hollow cast iron (C. I.) column whose outside diameter is 200 mm has a thickness of 20 mm. It is 4.5 m long, and it is fixed at both ends. Calculate safe load by the Rankine formula using the factor of safety of 4. Take permissible compressive strength $\sigma_c = 550$ N/mm^2 and Rankine constant $\alpha = 1/1600$. [6][CO-4]

5. A solid shaft is subjected to a torque of 12000 N-m. Find the necessary diameter of the shaft if the allowable shear stress is 60 N/mm^2 and the allowable twist is 1^0 for every 20 diameters length of the shaft. Take shear rigidity for material (N) = 0.8 x 10^5 N/mm^2.

[8][CO-5]

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Roll No.....

III[rd] SEMESTER

B.Tech.(Env. Engg.)

END-TERM EXAMINATION

November-2022

EN-203 Engineering & Environmental Surveying

Duration: **3:00 Hours**

Maximum Marks: 40

Note: All questions are compulsory.

Assume suitable missing data, if any.

		Marks	CO
Q1(a)	A steel tape 40 m long standardised at 55°F with a pull of 10kg was used for measuring a base line. Find the correction per tape length, if the temperature at the time of measurement was 85°F and the pull exerted was 15 kg. Weight of 1 cubic cm of steel = 7.860 g, wt. Of tape = 0.8 kg and E= 2.109 x 10^6 kg/cm^2. Coefficient of expansion of tape per 1°F = 6.2 x 10^{-6} .	4	1
(b)	Convert the following quadrant bearings to whale circle bearing (i) N12°24'E (ii) S68°6'W (iii) N5°42'W (iv) S20°25'E	2	1
(c)	The following fore-bearing are observed for the lines, whose names are written with bearings. Find their back-bearings. (i) BC119°48' (ii) CD 266°30' (iii) ABN86°12'W (iv)DE192°24'	2	1
Q2(a)	An observer standing on the deck of a ship just sees a light-house. The top of the light-house is 60 metres above the sea level and the height of the observer's eye is 10 metres above the sea level. Find the distance of the observer from the light-house.	2	2
(b)	Write short note on any one the following:- (i) Contour (ii) Declination	2	2

1Q2

(c) The following consecutive readings were taken with a level and 5 metre levelling staff on continuously sloping ground at a common interval of 10 metres: 0.385; 1.030; 1.925; 2.825; 3.730; 4.685; 0.625; 2.005; 3.110; 4.485. The reduced level of the first point was 205.125 m. Rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the points by any method also the gradient of the line joining the first and the last point. 4 2

Q3(a) The Following offsets were taken from a chain line to hedge:

Distance(m)	0	10	20	30	40	60	80	100	120
Offset(m)	8.4	10.5	14.6	11.3	10.5	8.4	7.7	6.5	5.5

Compute the area included between the chain line, the hedge and the offset by Trapezoidal Rule. 4 3

(b) A railway embankment is 10 m wide with side slopes 1.5 to 1. Assuming the ground to be level in a direction tranverse to the centre line, calculate the volume by trapezoidal rule contained in a length of 100 metres, the centre heights at 15 m interval being in metres 2.0, 3.5, 4.2, 3.8, 2.8, 2.2. 4 3

Q4(a) Explain the procedure to measure a horizontal angle either repetition method or reiteration method. 4 4

(b) What are face left and face right observations? Why is it necessary to take both face observations?

OR

Describe the functions of the following parts of a theodolite:-
(i) Vernier (ii) Tangent screw (iii) Foot screws (iv) Vertical circle. 4 4

Q5(a) Types of Tacheometric surveying. Explain the principle of stadia method. 4 5

(b) In order to determine the constant of tacheometers two distances 180 m and 300 m were accurately measured from the instrument and the readings on stadia rod on upper and lower wires are as follows:- 4 5

Distance (m)	Reading at lower stadia(m)	Reading at upper stadia(m)
200	2.10	4.20
305	1.70	4.90

Determine the constants and the distance when readings on stadia wires are 2.5 m and 5.5 m.

Total No. of pages: 01 Roll No.....

III SEMESTER
B.Tech. (ENE)

END TERM EXAMINATION Nov/Dec-2022

EN 205 - Environmental Chemistry & Microbiology

Time: 3:00 Hours *Max. Marks: 40*

Note : Attempt any five questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a) Describe the concept and components of aquatic chemistry. [4][CO2]

b) Differentiate between soaps and detergents. What are the environmental problems associated with detergents. Discuss. [4][CO2]

Q.2 a) Calculate the equilibrium concentration of oxygen in water (mg/L) at 25°C at an altitude of 2500 meters. (Henry's law constant (K_H) is 13.84×10^{-4}). [4][CO1]

b) Discuss the chemistry of CFCs and their role in catalytic destruction of ozone. [4][CO3]

Q.3 Write short notes on

a) Tricking filter [4][CO5]

b) Anaerobic Decomposition [4][CO4]

Q.4 a) Describe the key phases of microbial growth and dynamics. [4][CO4]

b) Define heavy metals. What is the environmental concern associated with heavy metals? Explain. [4][CO2]

Q.5 (a) What is green house effect? Define green house gases. What are the environmental consequences of global warming? Discuss. [4][CO3]

b) Can microorganisms be used for the treatment of pollutants of air? Explain the working and environmental benefits of such microbe-based unit. [4][CO5]

Q.6 a) Derive the role of pH in removal of ammonia from wastewater. The equilibrium constant for dissolution of NH_3 in water is 1.82×10^{-5} at 25°C. [4][CO1]

b) The doubling time of a bacterium is 2 hours. If the culturing in exponential phase starts with 5 cells, how many microbial cells will be present after 2 days? [4][CO4]

Total No. of Pages : 01 Roll No.....

IIIrd Semester
B.Tech.

END TERM EXAMINATION Nov.-2022

EN207 : Engineering Analysis & Design

Time: 3.0 Hours Max Marks :50

Note: All question are compulsory
Assume suitable missing data, if any
IS 456, 10262 SP 16 codes should be allowed

Q.1 Compare steel and concrete structures w.r.to environmental, speed of construction, recycling perspective [2] CO[03]

Q.2 What is RMC? Batching plant capacity? Maximum time duration to reach site and placed/ poured? Vehicle name and its maximum capacity ? [2.5] CO[05]

Q.3 Compare Elastic theory (working stress), Ultimate load or strength,& Limit state method of design [2.5] CO[05]

Q.4. What is the difference between column and strut. Classify column based on its slenderness ratio along with its design criteria. [7.5] CO[05]

Q.5.Design RCC square column which is subjected to the axial load of 600kN. Concrete used is M-20grade and steel FE 500, Provide 1% steel with factor of safety 1.5 as per IS 456 [7.5] CO[4]

Q.6 Slabs have a large surface area compared to their volume and hence they are more affected by _____ and _____stresses [1] CO [3]

Q.7 Explain the different types of slabs with suitable diagrams along with design criteria Limit state IS 456 [4] CO [04]

Q.8 Design a one way slab with a clear span of 3.5m, simply supported on 200mm thick concrete masonry walls to support a live load of 4 KN//m^2. Adopt M20 grade concrete and FE 415 HYSD bars [7] CO[4]

Q.9 Classify foundation according to Terzaghi's criterion. Explain with sketches sub structure and superstructure w.r.to building and metro viaduct

[4] CO [5]

Q.10 Describe the different types of Piles based on its function with suitab sketches.

[4] CO [4]

Q.11 To avoid collapse of soil before pouring concrete _____ soluti is used in piling works.

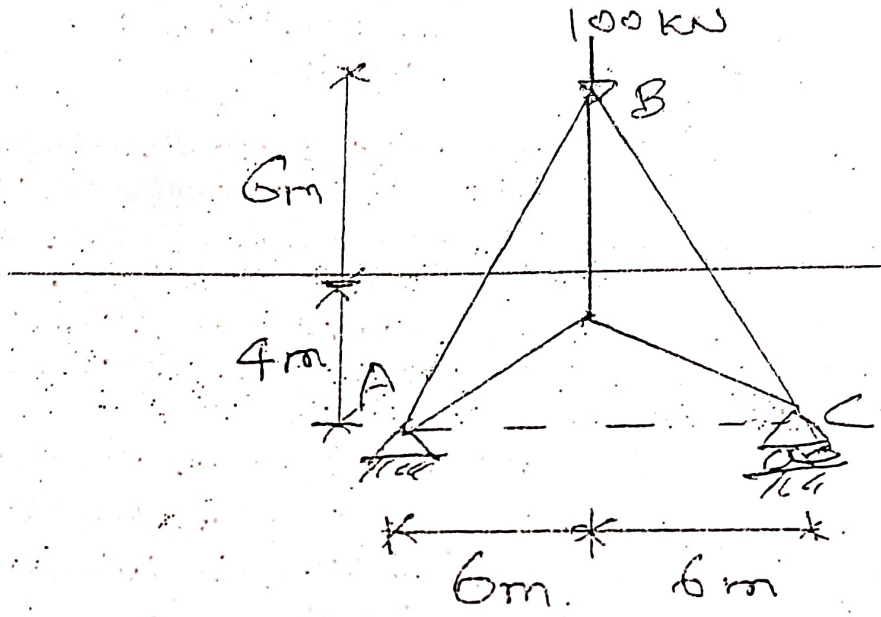
[1] CO [2]

Q.12 Explain the different types of shallow foundation with suitable sketc

[4] CO [3

Q.13 Analyse and tabulate the truss shown in fig

[3] CO [3



FIFTH SEMESTER

B.Tech (ENE)

END TERM EXAMINATION

DEC-2022

EN301 WASTEWATER ENGINEERING: DESIGN AND APPLICATIONS

Time: 3:00 Hours

Max. Marks: 40

Note : All the questions carry equal marks.
Attempt any five questions.
Assume suitable missing data, if any.

Q.1(a) Differentiate between aerobic treatment and anaerobic treatment of sewage, giving an account of major end products.

(b) Draw the flow diagram for sewage treatment plant which uses activated sludge process.

[08][CO1]

Q.2 (a) With the help of sketch, describe the principle involved in the design and construction of grit chamber.

(b) Design a circular settling tank unit for a primary treatment of sewage at 15 million litres per day. Assume suitable values of detention period (presuming that trickling filters are to follow the sedimentation tank), and surface loading. [08][CO2]

Q.3 (a) What is coagulation? Write the merits and demerits of Coagulation process in sewage treatment.

(b) Define sludge volume index. What is its importance in sewage treatment? [08][CO3,4]

Q.4 (a) Explain the working of conventional activated sludge process (ASP) with flow diagram.

(b) The sewage is flowing @ 6.5 Million litres per day from a primary clarifier to a standard rate trickling filter. The 5-day BOD of the influent is 200mg/l. The value of adopted organic loading is to be 200gm/m^3/day, and surface loading 2500 l/m^2/day. Determine the

volume of the filter and its depth. Also calculate the efficiency of the filter unit. [08][CO4]

Q.5 (a) Explain briefly the different stages of sludge digestion process in a "Digestor". With a neat sketch, explain the constructional details of sludge digestion tank.

(b) Design a septic tank for 200 users. Water allowance is 120 litres per head per day. Detention period may be taken as 8 hours. Draw a neat dimension sketch of the septic tank you design. [08][CO5]

Q.6 (a) Discuss the mechanism of working of a UASB reactor.

(b) Write a short note on sewer materials, bringing out the criteria for selection of sewer material. [08][CO6]

Total No. of pages : 1 Roll No: _____

FIFTH SEMESTER B.Tech. [ENE]

END-TERM EXAMINATION November - 2022

EN303 INSTRUMENTATION TECHNIQUES FOR ENVIRONMENTAL MONITORING

Duration: 3 Hours Maximum Marks: 40

Note: Answer ANY TWO PARTS from each question.
All questions are compulsory and carry equal marks.
Assume suitable missing data, if any.

	Marks	CO#
Q. 1 Attempt ANY TWO of the following:		
a. Distinguish between null and deflection-type instruments.	4	CO1
b. Explain errors and their reduction in measurement process.	4	CO1
c. Prepare a sample calibration curve for a potentiometric instrument.	4	CO1
Q. 2 Attempt ANY TWO of the following:		
a. Apply fiber-optic sensor for temperature measurement.	4	CO2
b. Application of resonant-wire devices for pressure measurement.	4	CO2
c. Explain the use of capacitive devices for level measurement.	4	CO2
Q. 3 Attempt ANY TWO of the following:		
a. Compare seperation method and spectroscopic methods of chemical analysis.	4	CO3
b. Analyse the components of gas chromatography.	4	CO3
c. How will you demonstrate Beer-Lambert Law?	4	CO3
Q. 4 Attempt ANY TWO of the following:		
a. Examine NDIR for continuous monitoring of CO_2.	4	CO4
b. Evaluate ultrasonic sensors for continuous monitoring.	4	CO4
c. Explain absorption, fluorescence and phosphorescence.	4	CO4
Q.5 Attempt ANY TWO of the following:		
a. Device a technique for monitoring of oxides of nitrogen.	4	CO5
b. Determine the technique for monitoring ozone.	4	CO
c. Explain guidelines of choosing an appropriate measuring instrument.	4	CO

Total No. of pages: 01 Roll No.....

V SEMESTER
B.Tech.

END TERM EXAMINATION Nov/Dec-2022

EN 305 : Soil Pollution and Remediation

Time: 3:00 Hours Max. Marks: 40

Note : Attempt any five questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a) Briefly discuss the mechanisms of soil contamination and contaminant transport. [4][CO1]

b) What are the criteria for selection of site for landfilling? Discuss. [4][CO2]

Q.2 a) What provisions/elements would you consider to isolate the land filled waste from surrounding environment? [4][CO3]

b) What are the challenges associated with leachate management? Explain. [4][CO4]

Q.3 a) Discuss interlayer swelling of clay with reference of interacting ions. [4][CO2]

b) Explain the daily provisions for proper management f a sanitary landfill. [4][CO3]

Q.4 Write short notes on [4][CO1]

(a) Heterogeneity [4][CO1]

(b) Retardation

Q.5 a) A confined aquifer 20.0 metres thick has two monitoring wells placed 500 metres apart along the direction of groundwater flow. The difference in water levels of the wells is 2.0 metres. The hydraulic conductivity is 5m/day. Estimate the rate of flow per metre of distance. [4][CO5]

b) What precautions an environmental engineer has to take to contain the movement of contaminant from the place to another? Discuss. [4][CO5]

Q.6 a) Proper venting/collection of landfill gas is required for effectively managing it. How does landfill gas generation vary and what provisions are to be made for landfill gas management? [4][CO4]

b) Which methods would you suggest to be most effective in removal of heavy metals from the contaminated soil? Explain its principle and mechanism. [4][CO5]

Total No. of pages: 01

Roll No.....

V SEMESTER
B.Tech.

END TERM EXAMINATION Nov/Dec-2022

EN 305 - Soil Pollution and Remediation

Time: 3:00 Hours Max. Marks: 40

Note : Attempt any five questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a) Briefly discuss the mechanisms of soil contamination and contaminant transport. [4][CO1]

b) What are the criteria for selection of site for landfilling? Discuss. [4][CO2]

Q.2 a) What provisions/elements would you consider to isolate the land filled waste from surrounding environment? [4][CO3]

b) What are the challenges associated with leachate management? Explain. [4][CO4]

Q.3 a) Discuss interlayer swelling of clay with reference of interacting ions. [4][CO2]

b) Explain the daily provisions for proper management f a sanitary landfill. [4][CO3]

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(a) Heterogeneity [4][CO1]

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b) Which methods would you suggest to be most effective in removal of heavy metals from the contaminated soil? Explain its principle and mechanism. [4][CO5]

Total no. of Pages: 02 *Roll no.....*

Fifth Semester

B.Tech.

End Term Examination **Nov/Dec/-2022**

EN309 Water Resource System

Time: 03 hrs **Marks: 50**

Attempt any five questions. Draw neat and labeled diagrams wherever necessary. Assume suitable missing data.

Q.1(a) Explain why planning and management of water resources is needed? [5] [CO1]

Q.1(b) Explain what is meant by integrated resource management program in water resource system ? [5] [CO1]

Q.2(a) When is modeling in Water Resource System (WRS) appropriate? Identify the challenges in modeling of WRS. [5][CO2]

Q.2(b) Describe the seven principles of economic analysis of Water Resource System. [5][CO2]

Q.3(a) What is the need for systems approach to Water Resource System? What are the merits and demerits of systems approach to WRS? [5][CO2]

Q.3(b) What are the different types of systems decomposition? Discuss the various approaches followed in decomposition of Water Resource System. [5][CO2]

Q.4(a) Explain briefly the concept of systems in Water Resource System (WRS) [5][CO1]

Q.4(b) Discuss various aspects in planning and management of water resource system. [5][CO1]

Q.5(a) What is Benefit-Cost (BC) Ratio Method? What are the different steps used for finding the best alternative in BC Ratio method? [5] [CO3]

Q.5(b) What is present worth method ? Discuss the different steps used for finding the best alternative in BC Ratio method? [5][CO3]

Q.6(a) Explain continuity constraints in Linear Programming (LP) [5][CO3]

Q.6(b) Explain reservoir constrains in Linear Programming (LP) [5][CO3]

Q.7(a) Explain what is meant by initial and boundary condition for modeling of water quality system. [5][CO4]

Q.7(a) Discuss various types of boundary conditions which may be followed for modeling of water quality system? [5][CO4]

Q.8(a) Discuss Finite Difference Method with regard to modeling of environmental system. [5][CO5]

Q.8(b) The adjective diffusive transport of pollutant in a river, undergoing a first order decay reaction can be modeled by following equation

$$\frac{\partial C}{\partial t} = E\frac{\partial^2 C}{\partial t^2} - U\frac{\partial C}{\partial x} - kC$$

Where C is the concentration of pollutant, E is the dispersion coefficient, U is the velocity, k is reaction rate constant, t is the time, and x is the distance along the river. Develop the finite difference formulation to solve the above PDE numerically. [5][CO5]

Total no. of pages 02 *Roll No.....*

5TH SEMESTER B.Tech.

END SEMESTER EXAMINATION *November 2022*

ENE311 Climate Change and CDM

Time: 3:00 hours *Max. Marks: 50*

Note: Answer ANY FIVE questions.
Assume suitable missing data, if any
Please keep your answers to the point

1. [a] What are the challenges being experienced by India in implementing various Carbon Capture and Storage techniques? 5 [CO4]

[b] Assume that you are an Environmental Engineer working in the city of Gurgaon and your responsibility is to manage the Municipal Solid Waste (MSW) in the city which is just being dumped to the nearby non-engineered landfill site. Suggest projects you may put up in order to better manage the MSW and which can also earn carbon credits for the Municipal Corporation. 5 [CO5]

[a] A water treatment plant consumes one kilowatt hour of electricity for every 3.5 kilo liter for water it treats. The plant gets its electricity from a coal fired power plant with an emission factor of 680 kg CO_2/MWh. If the facility treats 12 million liters of water each month, how many metric tons of carbon dioxide does it emit each year? Assume that the other emission from water treatment plant are negligible. 7.5 [CO4]

[b] When we experience Ozone hole, which category of UV rays - out UVA, UVB and UVC has the highest tendency to reach the earth's surface and why? 2.5 [CO5]

3. [a] A 0.27 km^2 lined landfill contains 2.4 million tons of waste. At its current level, the landfill emits 2000 metric tons of CO_2 and 2000 metric tons of Methane per year, with traces of other compounds. Looking only at the methane and CO_2 emissions, what are the total emissions per year in terms of CO_2e? Assume methane has a GWP of 21. 7.5 [CO4]

[b] What is radiative forcing? Is the increase in the water vapour a forcing or a feedback? Explain why. 2.5 [CO1]

[a] What are the various catalytic and photolytic reactions that goes on in the atmosphere in relation to Ozone? Briefly explain. 5 [CO5]

[b] What is IPCC? What was the objective of setting up IPCC? 5 [CO3]

4. [a] Explain the term "Adaptation" and "Mitigation" with reference to climate change. Also, list out the adaptation and mitigation strategies adopted by India in order to address climate change. 5 [CO3]

[b] What is the current scenario of carbon market in India? Explain in detail what has replaced CERs. 2.5 [CO4]

[c] Do you think the value of carbon credit generated from putting up a solar power plant is any different from the credit generated from any other project say afforestation project or coral reef protection project? Justify. 2.5 [CO5]

5. Briefly explain the following:

[a] Difference between good ozone and bad ozone. 2.5 [CO5]

[b] Is the reduction of emissions of Carbon Dioxide (CO_2) from a chemical process more climatically effective than the reduction of emission of Nitrous Oxide (N_2O)? 2.5 [CO1]

[c] Feedback Mechanism. 2.5 [CO2]

[d] Why do you think "Carbon Capture and Storage" technique is going to play an important role in combating climate change in times to come? 2.5 [CO4]

END

Total No. of pages: 02 Roll No: _____

FIFTH SEMESTER B. Tech. [ENE]
END-TERM EXAMINATION November / 2022

EN 317 ENVIRONMENTAL MANAGEMENT

Duration: 3:00 Hours Maximum Marks: 50

Note: All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Marks CO#

Q. 1 IKEA systems BV (IKEA) is a Sweden-based furniture retail giant. The present case examines IKEA's journey in becoming an environmentally responsible company by highlighting initiatives taken by the company to ensure by the company to ensure that its operations did not have an adverse effect on the environment. IKEA was primarily involved in furniture retailing. initially most of its furniture was made of wood, which required the felling of trees. To process the wood, many chemicals were used, which were harmful to the environment and to the consumers. IKEA realized that better environmental practices within the company and among its suppliers would have long-term benefits, not only economically but also in presenting a positive corporate image to customers.

Environment Friendly Products: In order to minimize the use of wood in its furniture, IKEA concentrated on bringing out products made of recycled and reusable material. The team ensured that the products were free from substances that caused allergies or products that were harmful to health and the environment.

Environmental Training: IKEA started off with a "train the trainers" approach to spread environmental awareness across the organization. Trainers from each department, employees involved in product design and those in direct contact with the customers, attended a weeklong training course. The training modules included the imparting of basic environmental knowledge.

Eco-Friendly Practice: Apart from developing a wide range of eco-friendly products, IKEA also adopted several eco-friendly practices, right from choosing the location of its new stores, to using alternative sources of energy, waste management, and transportation. For constructing new stores, IKEA followed policies and procedures that ensured that the buildings were durable and sustainable.

Making Suppliers Environmentally Responsible and Following Sound Forestry Practices: IKEA's main activity was furniture retailing, which required huge quantities of wood. The company relied on its suppliers to obtain wood and realized that if the wood was obtained from illegal sources and protected forests, it could considerably damage its reputation. Hence, an audit of Suppliers was put in place to ensure that sustainable forestry practices were employed in sourcing the wood. IKEA obtained timber from 44 countries and took care not to use the timber obtained from intact natural forests. The long-term goal of the company was to source all the wood from well-managed forests.

(i)	Analyse how environmentally friendly practices can help a company minimize its costs.	10	3
(ii)	Examine how environmentally friendly practices can enhance an organization's image.	10	3
(iii)	Expalin how IKEA went about implementing its environmental policies across its global operations.	5	4
(iv)	Throw light on IKEA, how they extended its environmental reposibility initiatives to its employees and consumers.	5	4
Q.2	According to Steven (1991), what are the different reasons for scientists face uncertainties while dealing with environmental problems?	5	2
Q.3	Discuss the different stages for the clearance of a new project? Discuss the cost and benefit of using an EIA process.	10	3
Q.4	Justify the relevance of polluter pays principle in the capital city of India along with the role of judiciary in upholding the PPP.		
	OR	5	3
	Environmental Auditing, being a management tool, what kind of steps are involved in this that can help an organization to move towards sustainability.		

Roll No.....

Total no. of pages : 01

B.Tech.(Env. Engg.)

SEVENTH SEMESTER

NOV- 2022

END-TERM EXAMINATION

EN- 411 OCCUPATIONAL HAZARDS, HEALTH & SAFETY

Duration: 3:00 Hrs.

Maximum Marks: 50

Note: Answer ALL questions.
Assume suitable missing data, if any.

		Marks	CO
Q.1	**Attempt ANY TWO of the following questions.**		
(a)	Classify the various occupational health hazards with a brief explanation.	5	1
(b)	Define accident. Briefly explain Domino's theory of accident causation	5	2
(c)	Analyse the health and safety measures in textile industries	5	5
Q.2	**Attempt ANY TWO of the following questions.**		
(a)	Discuss Factory Act (1948) for safety and the Workmen's Compensation Act (1923).	5	2
(b)	Explain physical hazards and risk factors that affect the employee.	5	3
(c)	Write notes on Pneumoconiosis and its types	5	3
Q.3	**Attempt ANY TWO of the following questions.**		
(a)	Outline the history and development of the occupational safety and health act.	5	1
(b)	Discuss the need and significance of Personal Protection Equipment at the workplace. Name various types of PPEs commonly used by the labour force at a workplace.	5	4
(c)	Identify methods of hazard prevention and control.	5	4
Q.4.	**Attempt ANY TWO of the following questions.**		
(a)	Outline the purpose of the occupational safety and health act of India. List various acts of the Government of India regarding occupational safety and health.	5	2
(b)	Summarize the potential hazards posed for workers at construction sites	5	5
(c)	Write a note on Environmental Sanitation	5	4
Q.5.	**Attempt ANY TWO of the following questions.**		
(a)	Justify the accident investigation. Enumerate the steps involved in accident investigation at the workplace.	5	2
(b)	Classify occupational diseases. Explain the causes, effects and preventive measures of occupational cancer and dermatitis.	5	3
(c)	Write a note on Musculoskeletal Disorders	5	1

Total no. of Pages: 02 Roll no.....

SEVENTH SEMESTER

B.Tech

END TERM EXAMINATION *Nov/Dec-2022*

EN409 **INDUSTRIAL WASTE MANAGEMENT**

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Write short notes on

(a) Waste minimization

(b) Oxidation ponds

(c) Solidification and stabilization of industrial solid waste

(d) Benefits of pollution prevention [8][CO3]

Q.2 Attempt any **TWO** questions out of the following:

(a) State the characteristics of raw waste water from a typical pulp and paper industry. Also explain the scheme for treatment of waste water generated from pulp and paper industry.

(b) Discuss the characteristics of waste water generated from sugar mill when sugar cane and beet used as raw material.

(c) Write down the characteristics of petroleum refinery industry effluent. Explain the treatment given to the effluent. [8][CO2]

Q.3 Attempt any **TWO** questions out of the following:

(a) Discuss briefly various unit operations and unit processes used for treatment of industrial waste.

(b) Explain the working of trickling filters used for treatment of industrial waste water.

(c) Discuss the mechanism of working of a UASB reactor. Write the advantages and disadvantages of UASB reactor. [8][CO3]

Q.4 Attempt any **TWO** questions out of the following

(a) Explain the mechanism of working of activated sludge process used for treatment of industrial waste water.

(b) Can composting be adopted for managing industrial waste? What different types of methods can be used for composting? Discuss.

(c) What are the various aerobic and anaerobic biological methods of treatment used for industrial wastewater? [8][CO3]

Q.5 Attempt any **TWO** questions out of the following

(a) Write a short note on waste characterization. Discuss why waste audit and environmental audit are normally conducted in an industrial facility?

(b) What is solid waste management and what are the various techniques for industrial solid waste management? Differentiate between hazardous and non-hazardous industrial solid waste.

(b) Explain briefly the Characteristics of Industrial Wastewater and its management. [8][CO1]

Total No. of pages : 2

SEVENTH SEMESTER
END-TERM EXAMINATION

Roll No: _____

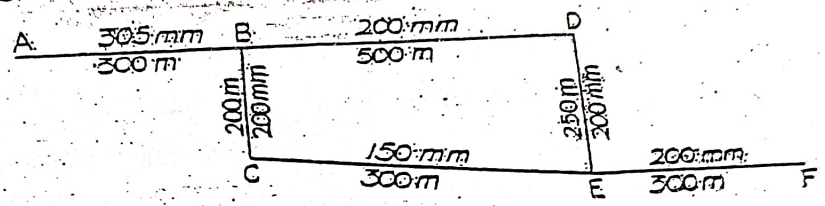
B. Tech. [ENE]
November - 2022

EN421 DESIGN OF WATER DISTRIBUTION NETWORK

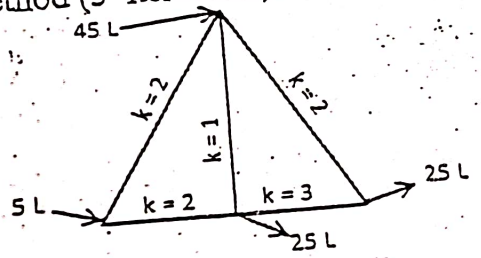
Duration: 3 Hours **Maximum Marks: 50**

Note: All questions are compulsory.
Assume suitable missing data, if any.

		Marks	CO#
Q. 1	**Attempt ANY TWO of the following:**		
a.	Compare grid-iron and ring pattern of water distribution network.	5	CO1
b.	Explain sewer appurtenances using sketches.	5	CO1
c.	Examine the factors affecting population growth.	5	CO1
Q. 2	**Attempt ANY ONE of the following:**		
a.	Determine equivalent pipe diameter for the parallel lines BDE and BCE. The configuration of pipes is shown in figure below.	10	CO2



b.	Determine major headloss for a water supply to a population of 5000 for configuration of pipes as shown in figure above. Assume 30m head at A.	10	CO2
Q. 3	**Attemp ANY ONE of the following**		
a.	Analyze the distribution network as shown in figure by Hardy-Cross Method (3 iterations).	10	CO



b. The main sewer was designed to serve an area of 50 sq.km with an average population of 175 persons/hect. The average rate of sewage flow is 280 lpcd. The maximum flow is 50% in excess of the average together with the rain fall equivalent of 12 mm in 24 hours, all of which are runoff. What should be the capacity of the sewer in cu.m/sec. 10 CO3

Q. 4 Attempt ANY ONE of the following:

a. The population of the town is 3 lakh, and per capita water demand is 250 lpcd. The probable hourly variations in the demand rate are 17, 55, 75, 135, 175, 190, 160, 130, 105, 65, 90, 100, 170, 220, 240, 190, 135, 80, 35, 27, 22, 19, 18, 17 l/h. Determine the capacity of the storage reservoir to be provided for balancing the variable demand against a constant rate of pumping if the pumping is to be done from 5 am to 11 am and 2 pm to 8 pm. Solve the problem using the analytical method. 10 CO4

b. Water is pumped from a reservoir, 3m deep and maximum water level at 35m, to an elevated reservoir at 70m located at a distance of 1.5 km, at a constant rate of 10,00,000 liters/hour. Determine the economical diameter of rising main and water horse power of the pump. Neglect minor losses. Take f=0.01. 10 CO4

Q.5 Attempt ANY ONE of the following:

a. Design a 1 km long circular pressurized water pipe serving a population of 35000 people with a water supply rate of 135 lpcd from an elevated service reservoir at 30m head. Assume Hazen-William Coefficient=120. 10 CO5

b. Design a sewer to serve a population of 35000 people provided with water supply at the rate of 135 lpcd. Channel bottom slope is 1:500. Sewer is designed to carry 4 times the average discharge what will be the velocity generated if n=0.01. Assume sewer to be flowing 1/2 full. 10 CO5

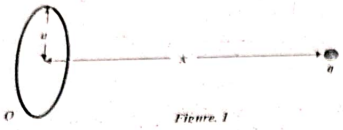


Figure 1

Show all necessary mathematical steps. [CO: 5] [4]

(b) Write a Matlab code to print the following as it is in the file named "output_file.dat" [CO: 3] [4]

```
*******************************
Calculation of Square and Cube
*******************************
square of 1.0 = 1.00; cube of 1.0 = 1.000
square of 2.0 = 4.00; cube of 2.0 = 8.000
square of 3.0 = 9.00; cube of 3.0 = 27.000
square of 4.0 = 16.00; cube of 4.0 = 64.000
square of 5.0 = 25.00; cube of 5.0 = 125.000
square of 6.0 = 36.00; cube of 6.0 = 216.000
square of 7.0 = 49.00; cube of 7.0 = 343.000
square of 8.0 = 64.00; cube of 8.0 = 512.000
square of 9.0 = 81.00; cube of 9.0 = 729.000
square of 10.0 = 100.00; cube of 10.0 = 1000.000
```

Total No. of Pages: 4 Roll No. .....

THIRD SEMESTER B.Tech.[EP]

END SEMESTER EXAMINATION (NOV -2022)

EP-201 INTRODUCTION TO COMPUTING

Time: 3 Hours Max. Marks: 40

Note: Question No. 1. is compulsory. Attempt any four from rest. Use comment line in each program to write the script/function file name.

1. Following commands are written and saved in a Matlab script file. What will the output of this file in the command window? [CO: 1] [8]

```
A=[-4 1 6 0; -10 22 2 13; -1 -2 3 7; 5 6 0 3];
B=max(A,[],2)
C=max(A,2)
D=size(char('MATLAB','C++'))
x=[ 2 4 6 8 ]; y=[ 0 2 3 4];
z=(x>3)|(y>x)
```

2. (a) Explain the following with suitable example [CO: 2] [4]

i. user controlled string input
ii. subplot

(b) Write a function file to demonstrate the animation of collapsing of a circle of radius R at the origin of circle (0,0). [CO: 4] [4]

3. (a) Andrade's equation has been proposed as a model of the effect of temperature on viscosity: $\mu = De^{B/T}$, where μ = dynamic viscosity of water, T = absolute temperature and D and B are the constants. Fit this model to following data for water and find out the values of unknown constants B

and D with proper message on screen. Show necessary mathematical steps required for programming. **[CO: 3] [4]**

T (K)	5	10	15	20	25	30	40
μ (10^{-3} N s/m^2)	1.519	1.307	1.050	1.002	0.85	0.7975	0.6529

(b) Write a function file of name **special_element** that takes matrix **A** as input and find the indexing (row and column position) of that element of given matrix **A** whose value is greater than all the elements of its row and is lowest in its column. **[CO: 2] [4]**

4. **(a)** The motion of a damped spring-mass system is described by the following ordinary differential equation:

$$m\frac{d^2x}{dt^2}+c\frac{dx}{dt}+kx=0$$

where x = displacement from the equilibrium position (meter), t = time (second), m = 20 kg mass, and c = the damping coefficient (N.s/m). The damping coefficient c takes on three values of 5 (underdamped), 40 (critically damped), and 200 (over damped). The spring constant k = 20 N/m. The initial velocity is zero and initial displacement x = 1 m. Solve this equation over the time period $0 \le t \le 15$ s. Plot the displacement versus time and velocity versus time for underdamped condition with proper labeling in separate figure window. **[CO: 5] [4]**

(b) The capacitance of two parallel conductors of length L and radius r, separated by a distance d in air, is given by

$$C=\frac{\pi\varepsilon L}{ln\left(\frac{d-r}{r}\right)}$$

where ε is the permittivity of air ($\varepsilon = 8.854\times10^{-12}$ F/m). Write a script file that accepts user input for d, L, and r and computes and display the value of capacitance C with proper message including unit. **[CO: 4] [4]**

5. **(a)** The equation for voltage $V(t)$across a capacitor as a function of time is **[CO:4] [4]**

$$V(t)=\frac{1}{C}\left(\int_0^t i(t)dt+Q_0\right)$$

Where $i(t)$ is the applied current and Q_0 is the initial charge. A certain capacitor initially holds no charge. Its capacitance is $C=10^{-7}$ F. If a current $i(t)=0.1[1+sin(0.3t)]A$ is applied to the capacitor, compute the voltage $V(t)$ at t = 1.2s by computing the integration numerically by using trapezoidal method and Matlab inbuilt function. The output should properly display the voltage calculated by both methods and with proper unit.

(b) Explain the following with suitable Matlab program. **[CO: 5] [4]**

i. Taking input from .txt file and assigning the input with some variable name
ii. Saving formatted output (text as well as formatted numerical values) in one output file (.dat file)

6. **(a)** A total charge Q is uniformly distributed around a ring-shaped conductor with radius a. A charge q is located at a distance x from the center of the ring (shown in Figure 1. below). The force exerted on the charge by the ring is given by

$$F=\frac{1}{4\pi\varepsilon_0}\frac{qQx}{(x^2+a^2)^{3/2}}$$

where $\varepsilon_0 = 8.9\times10^{-12}$ C^2/Nm^2. Write a Matlab program to find the distance x where the force is 1.25 N if q and Q are 2×10^{-5} C for a ring with a radius of 0.85 m.

Total No. of Pages:01 Roll No. .....

THIRD SEMESTER **B.Tech. (EP)**

END TERM EXAMINATION *Nov/Dec-2022*

EP-203: Mathematical Physics

Time: 3:00 Hours *Max. Marks : 50*

Note : Answer any FIVE questions
Assume suitable missing data, if any.

1. (a) Apply Stokes's Theorem to evaluate $\int_c [(x+2y)dx + (x-z)dy + (y-z)dz]$, where C is the boundary of the triangle with vertices (2,0,0), (0,3,0) and (0,0,6) oriented in the anti-clockwise direction. [07][CO1&5]

   (b) Evaluate $\iint_s \vec{F}.\hat{n}\, ds$ using divergence theorem, where $\vec{F} = 4xz\hat{\imath} - y^2\hat{\jmath} + yz\hat{k}$ and S is the surface of the cube bounded by $x=0$, $x=1$, $y=0$, $y=1$, $z=0$, $z=1$. [03][CO2]

2. Define stress and strain. Discuss the application of tensor analysis to the strain in the case of one dimensional string and then extend the discussion to two dimensional plate. [10][CO1&5]

3. (a) Expand $\frac{1}{z^2-3z+2}$ in Taylor's/Laurent's series in the regions (i) $|z| < 1$; (ii) $|z| > 2$. [06][CO1&3]

   (b)Evaluate $\int_0^{2\pi} \frac{\cos 2\theta}{5+4\cos\theta}\, d\theta$ using calculus of residues. [04][CO3&5]

4. Show that the solution for the one-dimensional wave equation by D'Alembert's Method is $y = \frac{1}{2}[f(x+ct) + f(x-ct)]$ by assuming initial conditions $y(x,0) = f(x)$ and $\frac{\partial y}{\partial t} = 0$ at $t = 0$. [10][CO4]

5. (a) Find the cubic polynomial $f(x)$ which takes on the values $f(0) = -4$, $f(1) = -1$, $f(2) = 2$, $f(3) = 11$, $f(4) = 32$, $f(5) = 71$. Hence, find $f(6)$. [06][CO3]

   (b) Define various types of singularities of an analytic function. [04][CO3]

6. (a) Applying the method of separation of variables technique, find the three possible solutions to the Laplace's equation in cartesian coordinates. [06][CO4]

   (b) Show that any inner product of the tensors A_r^p and B_t^{qs} is a tensor of rank three. [04] [CO2]

Total No. of Pages: 02 *Roll No.....*

Third Semester
B.Tech. EP

END SEMESTER EXAMINATION **(November 2022)**

EP205: Classical and Quantum Mechanics

Time: 3 Hours *Max. Marks: 50*

Note: Attempt all questions.
Assume suitable missing data, if any.

1. Answer all the following questions. (4x6)
(a). Deduce the Lagrangian for a system of double pendulum. [CO2]
(b). Obtain the Hamiltonian for an harmonic oscillator, whose Lagrangian is given by $L(x, \dot{x}) = \frac{1}{2}\dot{x}^2 - \frac{1}{2}\omega^2 x^2 - ax^3$ [CO2]
(c). What is the physical significance of Hamiltonian H? Enumerate the advantages of using Hamiltonian approach over Lagrangian approach. [CO1]
(d). What is a central force show that the motion of a particle under central force is always confined to a single plane? [CO1]
(e). Drive the Hamilton's canonical equation of motion and using them deduce the equation of motion of a simple pendulum. [CO1]
(f). A particle of mass, m, is constrained to move on the surface of a cylinder. The particle is subjected to a force directed towards the origin and proportional to the distance of the particle from the origin. Construct the Hamiltonian and Hamilton's equation of motion. [CO2]

2. The Schrodinger equation of a particle confined to the positive x axis is $\frac{-\hbar^2}{2m}\frac{d^2\psi}{dx^2} + mgx\psi = E\psi$ with $\psi(0) = 0, \psi(x) \to 0 \; as \; x \to \infty$ and E is the energy eigenvalue. Use the trial function x exp (-αx) and obtain the best value of parameter α. (5) [CO4]

3. Using the time independent perturbation theory, calculate the first order energy shift in the ground state by a perturbing potential ax^4 in the Hamiltonian of a linear harmonic oscillator ($V = 1/2kx^2$).(5) [CO5]

4. A stream of particles of mass 'm' and energy 'E' moves towards the potential step $V(x) = 0$ for $x<0$ $V(x) = V_0$ for $x>0$. If the energy of the particles $E>V_0$, show that the sum of fluxes of the transmitted and reflected particles is equal to the flux of incident particles. (5) [CO3]

5. Illustrate the basic idea underlying WKB approximation. Suppose you have an infinite square well potential with a bumpy bottom (as shown in Fig. 1), use WKB approximation to deduce the energy quantization condition (assuming $E > V(x)$) inside the well. (5) [CO5]

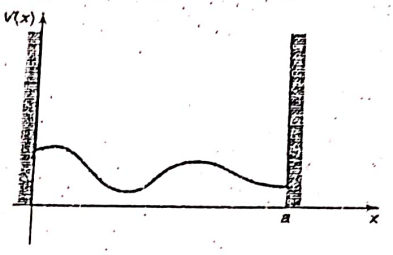


Fig. 1

6(a). Show that the probability density current for a plane wave in a medium is equal to the product of probability density and velocity of the particle in the medium. (3) [CO3]

6(b). If $H = \frac{1}{2}mq^2 + V(q)$ then Show that $\frac{ih}{2\pi}\dot{q} = qH - Hq$ is satisfied if $qp-pq=\frac{ih}{2\pi}$ (3) [CO1]

Total No. of Pages: 2 *Roll No. .....*

THIRD SEMESTER
B.Tech. (EP)

End Semester Examination *(NOV-2022)*

EP-207 DIGITAL ELECTRONICS (ENGINEERING ANALYSIS AND DESIGN)

Time: 3 Hour *Max. Marks: 40*

Note: Question 1 is compulsory. Attempt any four out of the rest. Assume suitable missing data, if any.

1	a.	What is the largest binary number which can be stored in an eight-bit shift register? Write down equivalent Decimal number and Hexadecimal number	2	CO2
	b.	Draw the circuit diagram of a 9-bit odd parity generator circuit and explain its operation	2	CO3
	c.	Convert $(B9F.AE)_{16}$ to Octal.	2	CO1
	d.	Explain Race Around problem in JK Flip Flop How can we overcome this problem	2	CO2
2	a.	Implement the following using an 8 X 1 multiplexer. $F = \sum m\,(0, 1, 2, 3, 4, 10, 11, 14, 15)$	4	CO3
	b.	Convert a D flip flop to a T flip flop.	4	CO2
3	a.	Draw the block diagram and explain a serial adder circuit	4	CO4
	b.	A certain modulo n ripple-counter built with edge triggered D flip flop has propagation Delay $t_{pd} = 45$ Pico seconds and Output frequency f_{out} is 130 MHz What is the largest possible n value and operating frequency which can operate at such a condition?	4	CO4

4	a.	Design a mod-6 asynchronous counter using T flip flops.	4	CO2
	b.	Design A sequence generator to generate a sequence of "0101001" using asynchronous sequential circuit.	4	CO3
5	a.	Design and draw the logic circuit of a combinational circuit that takes a single-digit BCD number (4 bits) as its input and produces output '1 on detecting even number using appropriate K-maps, truth tables, equations and logic circuit.	4	CO3
	b.	Minimize the state table diagram shown in Figure. 1	4	CO4

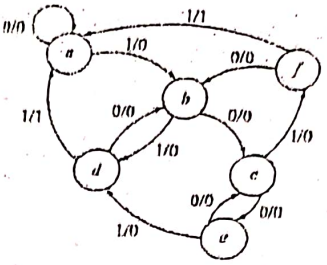


Figure. 1

6		Write a short note on the following:		
	a.	Write and read operation of Random Access memory (RAM).	4	CO5
	b.	And gate operation using Transistor-Transistor, logic (TTL)	4	CO5

Roll Number: .....

Total Pages: 3

FIFTH SEMESTER
B. Tech.

END TERM EXAMINATION *Nov-2022*

COURSE CODE: EP 301 Semiconductor Devices

Time: 3 Hours *Max. Marks: 50*

Note: · Attempt any 5 questions.
· Clearly specify any assumptions you make.

1. (a) A Si bar 0.1 cm long and 100 μm^2 in cross-sectional area is doped with $10^{17}\,cm^{-3}$ phosphorus. Find the conductivity, and current at room temperature if 10 V is applied across the length of the bar. Assume $\mu_n = 700\,cm^2/V.sec.$ [5][CO-1]

   (b) The lower edge of conduction band varies with x (meters) as per equation (1). Find and plot the electric field as a function of x.

$$E_c(x) = \begin{cases} (2 \times 10^{-7}\,x + 0.2)\ eV; & -1\mu m \leq x \leq 0 \\ (-2 \times 10^{-7}\,x + 0.2)\ eV; & 0 \leq x \leq 1\mu m \end{cases} \quad (1)$$

[5][CO-1]

2. (a) With the help of energy band diagrams, describe the motion of charge carriers in a p-n junction diode under forward bias and reverse bias. [5][CO-2]

   (b) The reverse saturation current of a p-n junction diode is 1×10^{-8} A. Find the forward bias voltage needed to get a forward bias current of 1 mA at room temperature (assume $ln(10^5) = 11.5$, $\eta = 1$). What will be the value of the reverse saturation current if dopings on both p and n sides are doubled? [5][CO-2]

3. (a) What is the effect of doping on (i) depletion width (ii) peak electric field, and (iii) reverse bias breakdown voltage V_{BR} of a p-n junction diode? [3][CO-2]

(b) An NPN BJT is biased such that the DC collector current to emitter current ratio is 0.98. If the base current is 50 μA, find the collector and emitter currents. Also find the transconductance g_m for this transistor at room temperature. [5][CO-3]

(c) Draw the small signal model for an NPN BJT and give a brief description of each component in it. [2][CO-3]

4. (a) Draw and explain the energy-band diagram of the MOS capacitor with an n-type substrate for (a) a positive gate bias, (b) a moderate negative bias, and (c) a "large" negative gate bias. [5][CO-4]

(b) Consider a MOS capacitor with a p-type silicon substrate, a Silicon Dioxide insulator with a thickness of $t_{ox} = 20$ nm, and an n^+ polysilicon gate so that the gate to semiconductor work function difference is $\Phi_{ms} = -0.95\,eV$. The semiconductor-insulator interface has a surface charge density of $8 \times 10^{-9}\,C/cm^2$. Dielectric constant of Silicon Dioxide is 3.9 and free-space permittivity is $8.85 \times 10^{-14}\,F/cm$. Find the flat band voltage. [3][CO-4]

(c) Draw and explain the ideal low-frequency capacitance versus gate voltage plot for a MOS capacitor with a p-type substrate. [2][CO-4]

5. (a) Define MOSFET transconductance. How does it vary with V_{DS} in (i) saturation region and (ii) non-saturation region in an n-channel MOSFET. [5][CO-4]

(b) Consider an ideal n-channel MOSFET with parameters $L = 1.25\,\mu m$, $\mu_n = 650\,cm^2/V.sec$, $C_{ox} = 6.9 \times 10^{-8}\,F/cm^2$, and the threshold voltage $V_{TH} = 0.65$V. Design the channel width W such that $I_{D-sat} = 4$ mA for $V_{GS} = 5$ V. [5][CO-4]

6. (a) In an n-channel p-n JFET, show schematically how Gate-to-channel space charge (or depletion) region and I–V characteristics vary for small V_{DS} values and for (a) zero gate voltage, (b) small reverse-biased gate voltage, and (c) a gate voltage to achieve pinch-off. [5][CO-5]

(b) How is a MESFET different from a pn junction FET (JFET). Explain Pinch-off and Threshold conditions for n-channel enhancement mode MESFET. [5][CO-5]

7. (a) Explain the IV characteristics of a p-n junction *solar cell*. Describe the short-circuit current and open-circuit voltage as well. [5][CO-5]

(b) GaAs has a bandgap energy of Eg = 1.42 eV. This material What will be the wavelength of a photon emitted by this material? Which range of solar spectrum does this wavelength correspond to? Take $h = 6.626 \times 10^{-34}\,m^2kg/s$, and speed of light $c = 3 \times 10^8\,m/s$. [2][CO-5]

(c) Consider a silicon p-channel p-n JFET at T = 300 K. Assume that the gate doping concentration is $N_D = 1 \times 10^{18}\,cm^{-3}$ and channel doping concentration is $N_A = 2 \times 10^{16}\,cm^{-3}$. Determine the channel thickness so that the pinchoff voltage is Vp = 2.25 V. [3][CO-5]

Total no. of Pages: 03

Roll no.....

V-SEMESTER

B.Tech (Engineering Physics)

END TERM EXAMINATION

Nov-2022

EP 303: ELECTROMAGNETIC THEORY, ANTENNAS AND PROPAGATION

Time: 3 Hours

Max. Marks: 40 M

Note:

1) Question no. 1 is **COMPULSORY.** Answer any 5 questions.
2) Answer all the part of each question.
3) All questions carry equal marks except Q-1.
4) Assume suitable missing data, if any.
5) Smith Chart has been provided for Q-2 (a)

Q-1. (a) Write down the time harmonic Electromagnetic field equations in integral form and also mention the law it follows. [2M] [CO-1]

(b) How to determine the power associated with the EM field and its direction of propagation? [2M] [CO-1]

(c) Draw Lumped Circuit Model of the transmission line. Is there any change in Lumped Circuit Model will take place if TL is lossless. If yes, draw the modified circuit of TL; if no, state why? [2M] [CO-3]

(d) Define radiation resistance of an antenna? Find the radiation resistance of a vertical antenna of length 7.5 m and it is operating at a frequency of 2 MHz. [2M] [CO-4]

(e) Define Ground Wave Propagation? Find the range of Line Of Sight (*LOS*) when the receive and transmit antenna heights are 10 m and 100 m respectively? [2M] [CO-5]

(f) Determine input impedance of short circuited and open circuited TL? [2M] [CO-3]

P.T.O.

Q-2 (a) $Z_L = 1/Y_L = 100 + j100$ Ohm and $Z_0 = 50$ ohm, determine the length of both the open circuited stubs in the Fig.1 below. [3.5M] [CO-3]

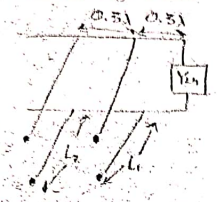


Fig.1

Q-2 (b) A 40 meter long transmission line of 72 ohm is connected to a 100 ohm load. Find [3.5M] [CO-3]

(i) The input impedance Z_{in}
(ii) The propagation constant
(iii) Standing wave ratio due to this mismatch
(iv) Reflection coefficient
(v) Percentage of incident power reflected from the load

Q-3 (a) A telephone line has R = 30 Ohm/km, L = 100 mH/km, G = 0, and C = 20 μF/km. At f = 1 kHz, obtain: [3.5M] [CO-3]

(i) The characteristic impedance of the line
(ii) The propagation constant
(iii) The phase velocity.

Q-3 (b) (i) What are Degenerate modes, Dominate mode and Evanescent modes?

(ii) Draw the E-field and H-field distribution in TE10, TE11, TM11, TM21 mode of rectangular waveguide.

(iii) A rectangular cavity resonator has dimension of a = 5 cm, b = 2 cm, and d = 15 cm. Find the resonant frequency of the dominant mode for an air filled cavity. [3.5M] [CO-2]

Q-4 (a) A half-wavelength dipole is used to transmit at 80 MHz and 100 W. A receiving antenna in the form of a Hertzian dipole, λ/50 m in length, is used to receive, 20 km away. Calculate: [3.5M] [CO-4]

(i) The maximum power received by the Hertzian dipole.
(ii) The maximum current (magnitude) in the Hertzian dipole

Q-4 (b) Design broadband Microstrip patch antenna for 5G wireless communication systems operating at 28 GHz. Choose substrate as RT Duroid 5880 with a thickness of h=1.57mm, permittivity ϵ_r=2.2 and loss tangent of (9×10^{-4}). [3.5M] [CO-4]

Q-5 (a) Derive expression for array factor of an N element linear Uniform array and obtain its maximum value. [3.5M] [CO-4]

Q-5 (b) By the application of pattern multiplication theorem, draw the array patterns of two-element arrays with currents having a relative phase shift α = kd and the distance between two elements (i) d= 0.5λ (ii) d= 0.25λ, where k is propagation constant. (Assume antenna elements are Hertzian dipole). [3.5M] [CO-4]

Q-6 (a) Derive expression for effective refractive index, critical frequency, maximum usable frequency and Skip distance (Assuming flat earth's surface) for Sky wave propagation. [3.5M] [CO-5]

Q-6 (b) Define Duct Propagation? Mention Salient features of duct propagation. [3.5M] [CO-5]

**********END**********

Q 19

Total Number of Page 2
V SEMESTER
END SEMESTER EXAMINATION
Roll. No.....
B.TECH (EP)
Nov/Dec-2022
EP-305 Atomic and Molecular Physics
Time: 03:00 Hours
Max. Marks: 50

Note: Answer All questions.
Assume suitable missing data, if any.

Part A (Atomic Physics)

Q1. What were the beginning steps of the introduction of quantum mechanics in the study of atoms? How does the Bohr's theory account for the observed phenomenon of the emission of discrete wavelengths of light by excited atoms? Determine the parity of the ground states of atoms Na and K. 5 [CO:1,2]

Q2. i) Which of the quantum number governs the spatial orientation of an atomic orbital? Mention physical significances with the possible subshells of Azimuthal quantum number? Write a set of quantum numbers for each of the electrons with an n of 4 in a Se (Selenium, Z=34) atom? 3 [CO:1, 2]

ii) Calculate (a) the de Broglie wavelength of an electron moving with a velocity of 5.0×10^5 ms^{-1} and (b) relative de Broglie wavelength of an atom of hydrogen and atom of oxygen moving with the same velocity (h $= 6.63 \times 10^{-34}$ J-s, $m_e = 9.11 \times 10^{-31}$kg). 3 [CO:2]

Q3. i) Explain the meaning of state, energy level, sublevel, configuration, and degenerate states. Compute the ground state term of hydrogen like atom having the ground state configuration 1s? 3 [CO:2]

ii) Explain couplings? Considering and atom having two optical electrons with outer configuration 4p 4d, apply LS coupling and calculate the possible values of S and L. 5 [CO:2]

iii) Write short notes on the following: 6 [CO:2]
Perturbed and unperturbed states, Pauli's exclusion principle and its physical significance, Quantum energy

Part B (Molecular Physics)

Q4. Attempt any **Five** from the following. All parts carry equal marks. [15][CO:3,4,5]

(a) Discuss types of rotation of a molecule and molecular groups.

(b) In CO, the J =0 -->J=1 absorption line occurs at a frequency of 1.15 × 10^{11} Hz. What is the bond length of CO molecule?

(c) Explain Kasha's rule with a diagram.

(d) The force constant of the bond in CO molecule is 1870 N m^{-1}. Calculate the frequency of vibration of the molecule and the spacing between its vibrational energy levels in eV. Given that the reduced mass of CO=1.14×10^{-26} kg, h=6.63×10^{-34} J s and 1eV=1.6×10^{-19} J.

(e) Do you expect any difference in the C=O stretching frequency of o-hydroxybenzoic acid and p-hydroxybenzoic acid? If so, how?

(f) Discuss Fortrat diagram.

(g) Discuss Predissociation.

Q5.

(a) Drive energy (frequency) expression of a diatomic vibrating rotator considering the concept of Born-Oppenheimer approximation and obtain the transitions between the rotational-vibrational energy levels, i.e., the vibration-rotation spectrum. [5][CO:5]

(b) The carbon monoxide (CO) molecule has a bond length R of 0.113 nm and masses of the ^{12}C and ^{16}O atoms are 1.99×10^{-26} kg and 2.66×10^{-26} kg, respectively. Find (i) the energy and (ii) the angular velocity of the CO molecule when it is in its lowest rotational state. [5][CO:5]

Total No. of Pages: 2 *Roll No.....*

5th SEMESTER
B. Tech. (EP)

END SEMESTER EXAMINATION *(November -2022)*

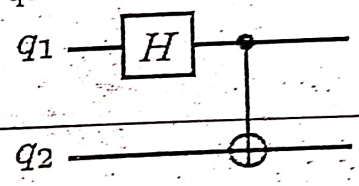
EP 309: Quantum Information and Computing

Time: 3 Hours **Max. Marks: 50**

Important Note:
i) All questions are compulsory.
ii) Assume suitable missing data, if any.

1. Suppose Alice has a quantum state $\psi = \alpha|0\rangle + \beta|1\rangle$ in her possession, which she wishes to send Bob. Design a quantum circuit for her, using the idea of quantum teleportation, that enable her to send the state ψ to Bob. Also discuss the underlying process in detail. (10) [CO5]

2(a) Let us consider the following quantum circuit



where q_1 denotes the first qubit, while q_2 denotes the second. Evaluate the outputs for the inputs $|00\rangle$, $|01\rangle$, $|10\rangle$ and $|11\rangle$? (5) [CO4]

(b) Design a quantum circuit to obtain following Bell's state:

$$\frac{|01\rangle + |10\rangle}{\sqrt{2}}$$ (5) [CO4]

3. (a) Demonstrate the process of Quantum Key Distribution (QKD) using Bennet and Brassard's scheme (BB84). (6) [CO2]

(b) State and prove quantum no-cloning theorem. (4) [CO3]

4. **Answer all the following questions. (3×3)**

(a) Define Turing Machine and what are its basic components.(3) [CO1]

(b) What you understand from quantum entanglement how it is useful in quantum computing. (3) [CO4]

(c) What is EPR paradox? How this paradox can be resolved. (4) [CO3]

5. Design and write a program for single tape Turing Machine to compute a constant function f(x)= 1. (3) [CO5]

6. How the Bell's inequality is important for the field of quantum information and computing? What are the assumptions of local realism? (5) [CO1]

Total No. of Pages 1

Roll No. .....

Seventh SEMESTER

B.Tech. (EP)

END SEMESTER EXAMINATION

(November-2022)

EP-415 Nanoscience & Technology

Time: 3 Hours

Max. Marks: 50

Note : Answer any 5 questions.
All questions carry equal marks.
Assume suitable missing data, if any.

1. (a) By applying the uncertainty principle, prove the relation density of states for Three Dimensional System. Plot the DOS curve for Two Dimensional Systems. [5][CO#1,5]

(b) Explain, what is difference between acceptor and donar level, Work function, Electron affinity, Fermi energy, Fermi level, sublevel and subband? [5][CO#3,5]

2. (a) Prove the relation for the population of conduction band, valance band and Fermi level in Three Dimensional System.[5] [CO#1,4,5]

(b) In a finite 2-DEG system of length L (along x-direction) and width W (along y-direction), calculate the number of electrons in a fully filled Landau Level. [5][CO#2,3]

3. Explain single-electron tunneling phenomenon and draw a schematic diagram of the energy levels of a quantum dot coupled to the source and drain. Also prove the relation for the energy required for single electron charging of the quantum dot and explain the charging energy model and capacitive coupling constant. [10][CO#2,3,4,5]

4. (a) Briefly explain Shubnikov-deHass Oscillation and prove the relation between period of oscillation and sheet concentration. Explain oscillations observed in strong magnetic field. [5][CO#1,2,3]

(b) Prove that in ideal 2-DEG system Hall resistance is quantized. Explain the Integer and Fractional Quantum Hall effect. [5][CO#1,2,3]

5. (a) Write, the effective bandgap of nanoparticle of radius R, and explain why effective bandgap can be tuned with size of nanoparticle. [5][CO#1,2,3]

(b) Briefly, explain optical absorption, interband transition and inter sub-band transition. [5][CO#2,3,5]

6. (a) Explain the mechanism of charge transfer between analyte and nanotube. [2.5][CO#2,4,5]

(b) Explain molecular interaction between carbon nanotubes and protein molecules. [2.5][CO#2,4,5]

(c) Explain, response (I_{SD}-V_G response curve) of CNTFET device with a single semiconducting SWCNT as the conduction channel to NH_3 and NO_2 gas. [2.5][CO#2,4,5]

(d) Draw the diagram and explain the mechanism of protein detection by using carbon nanotubes. [2.5][CO#2,4,5]

7. Answer any two parts:

(a) Field emission characteristics of CNTs or nanomaterial [5][CO-2

(b) Application of nanomaterial [5][CO-2,

(c) ZnO based oxygen sensor [5][CO-2,

Total No. of Pages: 01

Roll No.

5th Semester
B.Tech.

END TERM EXAMINATION NOV/DEC-2022

EP-315 Introduction to Automation and Motion Control

Time: 3 Hours Max. Marks: 50

Note: Attempt any five(05) questions.
All questions carry equal marks.

Q-1-(a) What are the basic components of a robotic system? State the main functions of each of the components? (CO 1)

(b) What are the near term applications of robots? Discuss them. (CO 1)

Q-2-(a) What are the common sensors used in the robots? State different types of sensors mentioning the specific attribute to be measured by each. (CO 2)

(b) What are the types of actuators used for robots and end – effectors? State the advantage of each actuator? (CO 2)

Q-3-(a) What is control resolution in a robot positioning? Differentiate between repeatability and accuracy in a robotic manipulator? (CO 3)

(b) Determine the manipulator Jacobian matrix and singularities for the 3-DOF articulated arm? (CO 3)

Q-4- (a) What is robot vision? What are the types of vision sensor used to take the image of an object? (CO 4)

(b) How a robot vision is advantageous for online inspection work? Describe a typical robot vision to inspect- (CO 4)

i) A plastic component
ii) A machined mechanical metallic component

Q-5-(a) Describe the MEMS working principle with suitable examples? (CO 5)

(b) What are the possible robot applications in manufacturing industries? Classify such robots from the viewpoints of drives and controls? (CO 5)

Q-6 Write short notes on the following: (CO 4/5)

A Nano robots
B Robot intelligence
C Obstacle Avoidance
D Sensing and Digitizing

Total No. of Pages: 1 Roll No.....

SEVENTH SEMESTER
B.Tech. [EP]

END SEMESTER EXAMINATION NOV/DEC-2022

EP-423 Space & Atmospheric Science-I

Time: 3:00 Hours Max. Marks: 50

Note: Answer all FIVE questions
Assume suitable missing data, if any.

1. What is an automatic weather station and explain the measurement of different meteorological parameters using automatic weather station. What are the advantages of automatic weather station? [10M][CO1]

2. What are the uses of upper air observations. Describe the construction and working condition of
(i) Radiosonde
(ii) GPSsonde. [10M][CO2]

3. Discuss about the space borne systems for the measurement of meteorological parameters in detailed. [10M[CO3]

4. What is a boundary layer. Discuss in detailed the factors that can influence the boundary layer. [10M][CO4]

5. Explain what are T-phigrams? Write the significance of T-phigrams. [10M][CO5]

Total No. of Pages:01 Roll No. .....

SEVENTH SEMESTER **B.Tech. [EP]**

END SEMESTER EXAMINATION *Nov/Dec-2022*

EP-427: Advanced Materials for Photonic Devices

Time: 3:00 Hours *Max. Marks : 50*

Note : Answer any FIVE questions.
Assume suitable missing data, if any.

1. Write short notes on the following with example: [4×2.5= 10][CO1 &4]
   (a) Atomic Packing Factor (b) Van der Waals bond
   (c) Electric and Magnetic dipole transitions
   (d) Radiative and non-radiative relaxations
2. (a) An element of atomic weight 60 has density 6.23 gm/cc. What is the radius of its atom if it has FCC structure? [4] [CO1]
   (b) Describe construction and working of any rare earth laser. [6] [CO5]
3. (a) What are Lanthanides and describe the significant properties of Lanthanides. [4][CO4]
   (b) What is phosphor converted w-LED and give an example. Describe the basic principles and approaches to generate white light. [6][CO5]
4. (a) Discuss synthesis procedure to prepare any phosphor using solid state reaction method. [3][CO2]
   (b) What is structure factor? Assuming the proper atomic positions in a body centered cubic (bcc) unit cell, estimate the structure factor for both the mixed and unmixed states. [4][CO3]
   (c) In a powder diffraction pattern, the size of crystallite (t) is observed 50 nm at an angle of diffraction (θ), 30^0 for the X-ray beam of wavelength (λ), 0.1540 nm. Find out the full width at half maxima (FWHM), β for the peak in degree. [3][CO2]
5. (a) Write down the characteristic information deduced from scanning electron microscope (SEM) for materials. How SEM is different is from optical microscopy? [3][CO3]
   (b) Discuss the working principle of scanning electron microscope (SEM) with suitable diagram. Write any two applications of SEM. [7][CO3]
6. (a) List the thermal analysis techniques used for material characterization. Write difference between differential thermal analysis (DTA) and differential scanning calorimetry (DSC). [3] [CO3]
   (b)Describe working principle of thermo-gravimetric analysis (TGA). Write any two applications of TGA. [7][CO3]

Total No. of pages : 1 Roll No: _____

FIRST SEMESTER B. Tech.

END-TERM EXAMINATION November - 2022

FEC-7 INTRODUCTION TO ENVIRONMENTAL SCIENCE

Duration: 2 Hours Maximum Marks: 50

Note: Write Slot/Group (e.g. S1-G1) on top of the answer-booklet.
All questions are compulsory.

		Marks	CO#
Q. 1	**Attempt ANY TWO of the following.**		
a.	Evaluate the merits and demerits of green-house gasses.	5	CO1
b.	Discuss the role of an individual in conservation of natural resources.	5	CO1
c.	Track the resources consumed in manufacturing of paper.	5	CO1
Q. 2	**Attempt ANY TWO of the following.**		
a.	Explain the thermal stratification of the atmosphere.	5	CO2
b.	Classify ecosystems at global and sub-global levels.	5	CO2
c.	Illustrate hydrological cycle using a sketch.	5	CO2
Q. 3	**Attempt ANY TWO of the following.**		
a.	How would you apply sustainability to consumptions of energy resources?	5	CO3
b.	Develop a stategy to improve public awareness about environment.	5	CO3
c.	Carry-out assessment of the threats to biodiversity.	5	CO3
Q. 4	**Attempt ANY TWO of the following.**		
a.	Analyse the effects of fertilizers on soil quality.	5	CO4
b.	Evaluate landfills as a source of pollutant.	5	CO4
c.	Appraise the role of human activities in air pollution.	5	CO4
Q.5	**Attempt ANY TWO of the following.**		
a.	Find a solution to prevent exploitation of mineral resources.	5	CO5
b.	Justify environmental ethics as a solutions to social issues.	5	CO5
c.	Assess the role of population growth on economic condition of people.	5	CO5

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Total no. of Pages: 02 Roll no.....

III - SEMESTER

B.Tech./B.Des

END TERM EXAMINATION *Nov/Dec-2022*

FEC-9 Spoken Skills

Time: 02:00 Hours *Max. Marks: 50*

1. Illustrate the process of Communication. (10) (CO1)

2. Describe with examples, the following types of written communication: (10) (CO2)

   Explanatory
   Analytical
   Argumentative

3. Explain the psychological barriers in Communication. (10) (CO3)

4. Write a critical essay on the topic "Communication Problems of Engineering Students". (10) (CO4)

5. Analyse how Technology helps in making the communication process effective. (10) (CO2)

Total No. of pages...03

3rd SEMESTER
B.Tech

Roll No.....

END TERM EXAMINATION

NOV-2022

FEC 10 : Communication Skills

Time: 2 Hours

Max. Marks: 50

Note: All questions carry equal marks.
Assume suitable missing data, if any.

Q 1. Differentiate between successful and ineffective communication. (CO1)

Or

Explain flow of communication. Illustrate it with examples.

Q 2. Write short notes on the following- (CO-2)

1. Oral and Nasal Sounds
2. Voice and Unvoiced
3. Vowels and Consonants
4. Articulation
5. Pronunciation

Or

Provide phonetic transcription for the following words-

1. English
2. Aim
3. Passed
4. Epic
5. low

Q 3. A) Read each sentence and fill in the blank, choosing the correct homophone. (CO3)

1. Jack had a good_____ for stage. (troop, troupe)
2. The event is seeking to _____ enthusiasm in young people. (incite, insight)

B) Select the correct form of the verb given below and write it in the space.

1. The doctor or the nurse _____wrong. (is/are)
2. The loud noise of the laughter came _____ the room. (from within/within)

C) Write Synonym for the two given words.
1. Loyal
2. Intelligent

D) Write Antonym for the given two words.
1. Plentiful
2. Rigid

E) Give the nearest meaning of the following phrases-
1. To feel under the weather
2. A piece of Cake

Or

Read the following passage and answer the questions based on it.

Long ago Emperson wrote: "A man's task is his life- preserver". This seems to be remarkably correct in a modern life. The man without task is like a ship without a ballast and anchor, he is all too often merely a drifter. Few men seem to have initiative enough to choose a task for themselves if they do not need to work. When the inevitable disappointments come, as they assuredly will, they are completely overwhelmed. But the man who has his task has no time for vain regret, he escapes the disastrous fate which overtakes his less fortunate brother. Work is one of the greatest safety-valves which was ever invented and youth especially needs it.

1. It seems to be remarkably correct in modern life that:
   a) a man has enough leisure
   b) youth needs less work and more rest
   c) the correct choice of the task preserves one's life
   d) men fail to choose a task for themselves

2. The expression 'safety-valve' mean:
   a) something which blows up safety
   b) an outlet for rent-up energy
   c) something which guarantees safety
   d) a leaf of a folding door

3. A ship without ballast and anchor:
   a) is in great danger
   b) merely drifts
   c) is very safe
   d) may not go in the right direction

4. A man who suffers from vain regrets must have;
   a) chosen his life's work rather carelessly
   b) met with disastrous fate
   c) been a victim of adverse circumstances to do

5. A person who has chosen the right task has no time to regret because he
   a) is engrossed in his work
   b) has too much to do
   c) has succeeded in life
   d) has a safe and secured life

Q 4. Write down the conversation between two friends about exam preparation. C04)

Or

Summarize the following passage in about one-third of the total number of words.

When our childhood has fallen behind us and taken on some of the glamour of distance we often ransack our memories in order to call up our minds eye the picture of the children we were. Then we are surprised to discover how little we remember of our earliest days; they have gone forever and seemingly have left nothing behind them. All is lost in haze, and no definite image rewards our efforts to recapture the incidence of infancy.

Some, however, can recall more than others; one may remember something that happened when he was only a child of two, while another may find his memory blank- a clean sheet of paper as far as anything is concerned which befell him before he was five. Yet, perhaps as regards things generally, the memory of the latter may be stronger than that of the former, it is only in regard to his early childhood that the first man's memory is stronger.

To account for these variations is not easy: there are so many factors to be taken into account. Nature and circumstances have to be considered. One may be markedly introspective, unconsciously looking into himself from his earliest days: another may have had an accident which could not fail to impress itself on his memory. Again, one man may remember earlier events because his memory is a visual one, while another looks not so far because his memory is more of the mind and a child's mind is of slower development than his sight.

Q 5. How can *Animal Farm* by George Orwell be considered an allegory? (CO4)

Or

Elaborate upon the significance of the Seven Commandments in *Animal Farm*.

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Total no. of pages: 01

End Term Exam November 2022

Course Code: FEC 11

Course Title: Soft Skills and Personality Development

Max. Marks: 50 Time: 2 Hour

Note: Answer all questions accordingly.

Q1. Attempt any *two* Short Notes. [10] CO2

a. Grapevine
b. Non-Verbal Communication
c. Advantages of Written Communication

Q2. Give arguments for a GD (Group Discussion) on "Compulsory Dress-code at College Level. [10] CO3

Q3. What are soft skills? Name at least five soft skills that are essential for an engineer to become employable. Explain any two with relevant examples [10] CO4

Q4. Imagine you have to attend a press conference for *any two* of the following personalities. Prepare at least *five questions for each* personality mentioned below: [10] CO5

a) Your favourite sportsperson
b) Your favourite Actor/Actress
c) Your favourite National leader
d) Your favourite TV Anchor/host.

Q5. Differentiate between a Traditional meeting and Video-conferencing [10] CO2

Total no. of Pages: 1

Roll no.....

III SEMESTER

B.Tech

END TERM EXAMINATION Nov/Dec-2022

FEC12 Business Communication and Presentation Skills

Time: 03:00 Hours Max. Marks: 50

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 You are the Marketing Manager of an organization dealing i Electric vehicles. You are entrusted with the responsibility understanding the perception of customers towards the product tha your organization manufactures. Write a report with the objecti of understanding the perception of people towards it. [10][CO4,2

Q.2 Discuss the following [10][C
1. Minutes of the meeting
2. Types of Business report

Q.3 "In the effective communication, conciseness and completeness a as importance as courtesy and clarity". Discuss [10][CO1,

Q.4 Write a letter to the customer service manager of ABC Electron Pvt. Ltd. complaining about a defect in the music syste purchased from the store. [10][CO2,

Q.5 You work in a hotel that has a lot of employees who are educated. As a senior manager of the company, you feel that th is a need to communicate with them regularly about the decisi of the company. The biggest challenge is that they are based multiple locations. Discuss the plan to ensure s communication with them in the organisation [10][CO

Total No. of pages...01 Roll No.....

3rd SEMESTER
B.Tech

END TERM EXAMINATION NOV-2022

FEC 14 Appreciation of Short Stories

Time: 2 Hours Max. Marks: 50

Attempt any FIVE of the following Questions-

1. Discuss the elements of humour in the story "The Catbird Seat." (CO 2) (10)
2. Discuss the elements of war presented in the story "In another Country." (CO 2) (10)
3. Critically analyse the different types of conflicts in "The use of Force." (CO3) (10)
4. Discuss the tone of the story "Wet Saturday." (CO 1) (10)
5. "Wet Saturday" is a psychological story, Explain. (CO 3) (10)
6. Discuss the character of Mr. Princey in detail. (CO 4) (10)
7. How does the power play an important role in the story "The Use of Force?" (CO 4) (10)
8. Discus the mood of different people in the story "In Another Country." (CO 1) (10)
9. Explain the setting of the story "The Enemies." (CO 2) (10)
10. In the story "The Catbird Seat" explain how suspense is aroused and maintained till the end. (CO 2) (10)

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Total no. of pages: 1 *Roll No.....*

3rd Semester

B.Tech

End Term Examination Nov/Dec-2022

FEC 15 Appreciation of prose and Poetry

Time: 2 Hours Max. Marks: 50

Note: Read instructions carefully and answer accordingly.

Q1. Critically analyse "My Last Duchess" by Robert Browning. (10) (CO-4)

Q2. Explain these terms and support your answer with appropriate examples. (10) (CO-3)

1. Metaphor
2. Synecdoche
3. Onomatopoeia
4. Hyperbole
5. Rhythm

Q3. Write a critical appreciation of "The Two Races of Men". (10) (CO- 5)

Q4. Is feminism essential? Describe your viewpoint through a discussion on "Female Orators" by Addison.

Or

How does Bacon describe the art of reading? Shed light through the essay "Of Studies." (10) (CO- 2)

Q5. Critically compare Jonson's "To the Memory of my Beloved, the Author, William Shakespeare" and Hardy's "Last Words to a Dumb Friend". (10) (CO-1)

Total no. of pages: 1 Roll No.....

3rd Semester

B.Tech

End Term Examination Nov/Dec-2022

FEC 16 Appreciation of Fiction

Time: 2 Hours Max. Marks: 50

Note: Read instructions carefully and answer accordingly.

Q1. What role did Gerasim play in comforting Ivan? (10) (CO-1)

Q2. Brief upon the miserable life of Ivan Ilyich? (10) (CO-1)

Q3. How did the man who died make use of his second chance at life? (10) (CO-2)

Q4. How was the death of Ivan Ilyich different from the death of 'the man who died'? (10) (CO-3)

How did the peasant couple and Madeleine influence the man who died?

Q5. When Ivan Ilyich dies, do you think Praskóvya suffers a mournful loss? Why or why not? (10) (CO-4)

Total no. of Pages: 02 Roll No.....

3rd Semester

B.Tech

END TERM EXAMINATION Nov/Dec- 2022

FEC18 Financial Statement Analysis

Time:02 hours Max Marks:50

Note: Answer any Five Questions.
Assume suitable missing data, if any.

1) Why do businesses prepare financial statements? Also define the following term with appropriate examples: Current assets, Fixed assets, Revenue, Depreciation, Gain, Debtors, Creditors, Goods, Inventory and Drawings. **(10 Marks)**

2) Marina Company's cost of goods sold for the current year is Rs.5,700. The company's beginning and ending inventories are, respectively, Rs.1,200 and Rs.2,600. On average, for how long did the company hold inventories during the year? "A high holding period (or low inventory turnover) indicates poor management of inventory", Do you agree, explain in brief. Also explain three limitations of ratio analysis. **(10 Marks)**

3) Explain in brief the purpose of the statement of cash flows? Give two examples each of three different types of cash flow viz: Cash flow from operation, Cash flow from Investment and Cash flow from Financing activities. **(10 Marks)**

4) What is Financial Forecasting? Why is it important? Also Explain the purpose and importance of proforma statements? **(10 Marks)**

5) From the given table, perform Horizontal Analysis and comment on the analysis. State two limitations of horizontal analysis. (10 Marks)

DR. REDDY'S LABORATORIES LIMITED
Condensed Statement of Profit and Loss
For the year ended March 31, 2016

	2016	2015 (in millio
Revenue from operations	₹156,978	₹150,2
Other Income	2,693	2,7
Total revenue	159,671	15
Total expenses	(128,299)	(123,3
Profit before exceptional items and tax	31,372	28,9
Exceptional items	(4,621)	
Profit before tax	26,751	28,9
Tax	(5,237)	(5,4
Profit for the year	21,514	2

6) From the data given below perform a trend analysis of 3 years and comment on the performance. (10 Marks)

DR. REDDY'S LABORATORIES LIMITED
Selected Financial Data

	2016	2015	2014	2013	2012 (in millions)
Item					
Revenue from operations	₹156,978	₹150,233	₹134,153	₹118,956	₹98,145
Net profit	21,514	23,364	19,632	15,263	13,009
Property, plant and equipment	46,296	41,837	37,496	31,416	25,732
Trend					
Revenue from operations	160	153	137	121	100
Net profit	165	180	151	117	100
Property, plant and equipment	180	163	146	122	100

XXXXX

Roll No:-

III Semester
B.TECH

Final Term Examination (NOV- Dec 2020)

(FEC-25- Universal Human Values: Self & Family)

(Total Marks-50, Time-2 Hours)

(Total Five Questions (All questions are compulsory), Marks indicated in the questions)

Que.1

a) Explain four important aspects of relationship. What are nine feelings in relationship. Differentiate between glory & Gratitude. -5 Marks

b) Briefly explain seven types of relationships. How pre-conditioning affecting our relationships. -5 Marks

Que.2.

a) What is goal of education & what are five major aspects that need to be developed in students. - 5 Marks

b) What is competition & what is excellence? What is the difference between them?. -5 Marks

Que.3.

a) (a) What do you mean by decentralization? What are its benefits? -3.5 Marks

(b) What do you mean by Swaraj? Who coined the term? -3.5 Marks

(c) How can one apply the ideas of swaraj in their life?- 3 Marks

P.T.O

Que.4.
a) Mention four noble truths of Buddha & the eight-fold path. What is Nirvana? Where did Buddha achieve Nirvana?.-4 Marks

b) A large-scale non-cooperation movement was launched by the Congress under Mahatma Gandhi's leadership in 1920. However, an enraged crowd in Chauri-Chaura village burnt the police station and killed the policemen. It was an unprecedented large-scale movement, but Gandhiji called it off. Why? The Congress leaders argued that such a preparation might never happen again for years. But Gandhiji did not agree. He said means must be as pure as the ends.
(a) What do you understand by 'ends' and 'means'?
(b) Can the ends and means be separated? Do the 'means' influence the 'ends' (that we would reach wrong 'ends', by following the wrong 'means')?
(c) Is non-violence an end (goal) or a means (method)? Explain with reasons. - 6 Marks

Que-5.
a) Give three examples from nature (One each from first three orders) showing that first three orders are difenite-3.5 Marks.
b) How human beings are disturbing the balance in nature & When relationship of fulfilment can be obtained?.-3.5 Marks
c) Give an innovative idea to eradicate plastics (Single use) from society?.-3 Marks

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Total No. of Pages : 1 *Roll No. .....*

3rd SEMESTER

B.Tech.

END TERM EXAMINATION NOV-2022

FEC 27 PROFESSIONAL ETHICS & HUMAN VALUES

Time: 2:00 Hours *Max. Marks : 50*

Attempt any five questions (5 X 10 = 50 marks)

Q.1. Compare with examples the three different types of ethical theories: Utilitarianism, Deontology and Virtue Ethics. (CO# 6 & CO#8)

Q.2. Explain the major ethical issues and challenges in Environmental ethics/ Computer ethics? What are the steps that can be taken up to overcome ethical issues related to concerned field? (Explain any one) (CO #7 & CO# 1)

Q.3. What do you mean by the terms 'profession', 'professional' and 'professionalism'. Elucidate the important characteristics and moral responsibilities of a professional. (CO #1 & CO# 3)

Q.4. What are the ethical obligations of an engineer? Elaborate the different roles played by engineers. (CO#3 & CO#4)

Q.5. Explain engineering ethics and its objectives? What are the ethical issues (product specific) that are faced by the engineering professionals? (CO#2 & CO#3)

Q.6. What are the rights of professionals? Explain in detail the concept and importance of Whistle Blowing and IPR. (CO#1 & CO#6)

Q.7. What do you mean by risk-benefit analysis in engineering project? How the risk assessment technique can be applied? (CO#4 & CO#5)

-END-

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Total No. of pages: 01 Roll No.....

3rd Semester

END TERM EXAMINATION Nov/Dec-2022

FEC-28 Emotional Intelligence

Time: 02 hours Max. Marks: 50

Note: All questions are compulsory.
All questions carry equal marks.
Illustrate your answers with suitable examples, and incidents.

Q.1 What are five components of Emotional Intelligence? What is the role of these components? [10] [CO#1]

Q.2 Why emotional intelligence is said to be similar to the concept of golden mean of Aristotle? Explain. [10] [CO#1]

Q.3 Tracing to the evolutionary history of emotion, explain why emotions are vital for survival? [10][CO#1,CO# 3]

Q.4 How our emotional development gets affected by schooling of emotions? [10] [CO#3]

Q.5 "The roots of morality are to be found in empathy", explain this statement with suitable reasons. [10] [CO#4]

Total No. of Pages 2 *Roll No. .....*

Third Semester

B.Tech.

END TERM EXAMINATION **Nov-2022**

FEC 32 LOGICAL REASONING

Time: 2:00 Hour *Max. Marks : 50*

Note :Answer all questions.

Q.1. Explain in detail any two of the following: (6x2=12 Marks) (CO#1 & CO#6)

a. Deductive and Inductive Argument

b. Traditional Square of Opposition

c. Truth and Validity

Q.2. Test the validity/invalidity of any one of the following syliogistic mood an figure by Venn diagram. (6x1= 6 Marks) (CO#8 & CO#5

a. AEI-4

b. IAO-3

Q.3. If "All poets are artists" is given as true then what can be inferred abo truth/falsity of the following propositions: (2.5 x2=5 Marks) (CO#1 & CO#8

a. Some artists are non-poets.

b. All non-poets are non-artists.

Q.4. Test the validity/ invalidity of the following syllogistic forms by the tradition method of rules and fallacies, after rearranging them into standard-form (wherev necessary: (5 Marks) (CO#2 & CO#

No poets are accountants, because some artists are poets and some artists accountants.

Q.5.Symbolize any **six** of the following statements using suggested notion (6x1= 6 Marks) (CO#3 & CO# 4)

a. She was upset but she attended the party. (U, P)
b. Karan and Bela will go to market if Anu goes to school. (K, B, A)
c. Deepa will get job only if Shekhar does not, but it is not the case that both Deep and Shekhar get job. (D, S)
d. Unless it rains in time, harvest will not be good. (R, H)
e. It is not true that the guard raised his gun yet could not scare away the thieves. (G, S)
f. You will pass in exam if and only if you study for six hours a day (P, S)
g. If it does not rain today then India will win the match today. (R, I)

Q.6.Use truth table method to determine the logical status (tautologous, contingent or self-contradictory) of the following expression: (5 Marks) (CO#5 & CO#7)

$$p \vee [(p \vee q) \supset (\sim q \cdot r)]$$

Q.7.Test the validity/invalidity of the following using truth table method: (5 Marks) (CO# 7 & CO# 8)

$$p \supset (q \vee \sim r)$$

$$(p \supset \sim q) \quad / \text{Therefore } (p \vee r)$$

Q.8. Symbolize the following arguments and determine the validity/invalidity by truth table method: (6 Marks) (CO#4 & CO#8)

If terrorists' demands are met, then lawlessness will be rewarded. If terrorists' demands are not met, then innocent hostages will be murdered. So either lawlessness will be rewarded or innocent hostages will be murdered. (T, L, I)

-END-

12) Possessiv Pronomen: (2)
ihr, seine, dein, unsere

1. Martin, Wo ist _____ Projekt.
2. Der Manager ist sehr freundlich, aber _____ Frau ist arrogant.
3. Wir sind Studenten an der DTU. _____ Universität ist in Rohini.
4. Nina und _____ Mann wohnen in Frankreich.

13a) Schreiben Sie 10 Sätze über Ihre Universität? (5)

Oder

b) Was machen Sie am Wochenende?Schreiben Sie 10 Sätze darüber?

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Total No. of Pages 4 *Roll No. .....*

2nd SEMESTER
B.Tech.
END SEMESTER EXAMINATION **Nov/Dec.-2022**
FEC40 GERMAN

Time: 3:00 Hours *Maximum Marks : 50*

Note : Answer all the questions.
Assume suitable missing data, if any.

1)Lesen Sie den Text und beantworten Sie die folgenden Fragen? (4)

Felix arbeitet in einer Bank. Sein Arbeitstag beginnt um 8 Uhr. Er fährt mit dem Auto zur Bank. Er spricht mit den Kunden und arbeitet viel am Computer. Er muss auch viel plannen. Am Mittag macht er eine Stunde Pause. Um 6 Uhr am Abend fährt er nach Hause zurück. Am Wochenende spielt Felix gern Tennis und geht schwimmen. Seine Frau ist Lehrerin und arbeitet in einer Schule. Er hat auch zwei Kinder. Seine Tochter ist 4 Jahre alt und sein Sohn ist sechs Jahre alt.

1. Wann beginnt Felix mit seiner Arbeit?
2. Was sind seine Hobbys?
3. Was ist seine Frau von Beruf?
4. Wie alt sind seine Kinder?

2. Events in Berlin. Ergänzen Sie die Fragewörter. Ordnen Sie die Antworten zu.(Fill the following question words and match the answers.) (6)
wann, was, wie lange, wen, wie, wo,

1. _____ fährst du nach Berlin? _____ A. Im Hotel Ibis.
2. _____ bist du in Berlin ? _____ B. Das Konzert.
3. _____wohnst du in Berlin? _____ C. Zwei Tage.
4. _____gibt es im Oktober? _____ D.sehr schön.
5. _____ findest du die Stadt? _____ E. eine Freundin Maria
6. _____ besuchst du in Berlin? _____ F. Im Oktober

3) Welches Wort Passt nicht? (Wich word in not fitting) (2)
1.Das Handy – die Digitalkamera – der Kaffee - der USB Stick
2. der College – das Klassenzimmer – das Parfum – die Kantine

12) Possessiv Pronomen: (2)
ihr, seine, dein, unsere

1. Martin, Wo ist _____ Projekt.
2. Der Manager ist sehr freundlich, aber _____ Frau ist arrogant.
3. Wir sind Studenten an der DTU. _____ Universität ist in Rohini.
4. Nina und _____ Mann wohnen in Frankreich.

13a) Schreiben Sie 10 Sätze über Ihre Universität? (5)

Oder

b) Was machen Sie am Wochenende?Schreiben Sie 10 Sätze darüber?

.....

Total No. of Pages : 4 Roll No .....

2nd SEMESTER
B.Tech.

END SEMESTER EXAMINATION Nov/Dec.-2022
FEC40 GERMAN

Time: 3:00 Hours Maximum Marks : 50

Note : Answer all the questions.
Assume suitable missing data, if any.

1)Lesen Sie den Text und beantworten Sie die folgenden Fragen? (4)

Felix arbeitet in einer Bank. Sein Arbeitstag beginnt um 8 Uhr. Er fährt mit dem Auto zur Bank. Er spricht mit den Kunden und arbeitet viel am Computer. Er muss auch viel plannen. Am Mittag macht er eine Stunde Pause. Um 6 Uhr am Abend fährt er nach Hause zurück. Am Wochenende spielt Felix gern Tennis und geht schwimmen. Seine Frau ist Lehrerin und arbeitet in einer Schule. Er hat auch zwei Kinder. Seine Tochter ist 4 Jahre alt und sein Sohn ist sechs Jahre alt.

1. Wann beginnt Felix mit seiner Arbeit?
2. Was sind seine Hobbys?
3. Was ist seine Frau von Beruf?
4. Wie alt sind seine Kinder?

2. Events in Berlin. Ergänzen Sie die Fragewörter. Ordnen Sie die Antworten zu.(Fill the following question words and match the answers.) (6)
wann, was, wie lange, wen, wie, wo,

1. _____ fährst du nach Berlin? _____ A. Im Hotel Ibis.
2. _____ bist du in Berlin ? _____ B. Das Konzert.
3. ____wohnst du in Berlin? _____ C. Zwei Tage.
4. _____gibt es im Oktober? _____ D.sehr schön.
5. _____ findest du die Stadt? _____ E. eine Freundin Maria
6. _____ besuchst du in Berlin? _____ F. Im Oktober

3) Welches Wort Passt nicht? (Wich word in not fitting) (2)
1.Das Handy – die Digitalkamera – der Kaffee - der USB Stick
2. der College – das Klassenzimmer – das Parfum – die Kantine

3. der Spielplatz – der Fussball – die Sportschuhe – die Musik
4. derFlughafen – derBahnhof – dieBushaltestelle – das Cafe

4) Ergänzen Sie die geeigneten Verben in der richtigen Form: (Fill the suitable verb in the right form) (4)

lernen, schmecken, essen, helfen, sehen, hören, kaufen, treffen

1. _____ du Rock Musik?
2. Wir _____ Deutsch an der DTU.
3. Wollen Sie heute einen Film _____?
4. Ich möchte einen Mercedes _____.
5. Heute _____ ich eine Pizza.
6. Wir _____ unsere Freunde in der Kantine.
7. Kannst du mir _____?
8. Der Salat _____ mir sehr.

5) Präpositionen: (3)

mit, für, ohne, seit, nach, bei

1. Wir fahren _____ der Metro zum college.
2. Ich habe eine Information _____ dich.
3. ____ Internet kann man nicht online lernen.
4. Am Wochenende fahren wir _____ Agra.
5. Mein Vater arbeitet _____ Siemens.
6. _____ 2 Monaten lernen wir Deutsch.

6) Trennbare Verben (4)

mitkommen, einkaufen, zurückgehen anrufen

1. Ich _____ gern online _____.
2. Wir gehen in die kantine. _____ du _____?
3. Wann _____ Sie nach Hause _____?
4. Kannst du mich heute abend _____?

7) Ergänzen Sie das geeignete Modal Verb! (2)

dürfen, können, möchten, müssen,

1) _____ ich Den Direktor sprechen?
2) Ich _____ heute bis 10 Uhr arbeiten. Morgen haben wir eine Presentation.
3) _____ Sie Kaffee trinken?
4) Frau Maria, _____ Sie Deutsch sprechen?

8)Übersetzen Sie ins Englische: (5)

1. Gibt es hier ein Cafe?
2. Ich zeige Ihnen die Fotos von Deutschland.
3. Darf ich Sie zum Kaffee einladen?
4. Wo finde ich einen Supermarkt hier?
5. Ich schreibe meinem Chef eine Email.
6. Ich fahre mit meinen Freunden nach Jaipur.
7. Ich gebe Ihnen die Information.
8. Wo ist die Bibliothek.
9. Wie viel Uhr ist es?
10. Ich bin auf dem Flughafen.

9)Formulieren Sie die Sätze?(Form the sentences) (5)

1. finde / ich / sehr / Berlin/ schön.
2. dir / eine Pizza / schmeckt ?
3. kostet / der / Kaffee /in der Kantine/ was?
4. arbeite / gern / ich / Computer / am.
5. es/ geht / wie / Ihnen ?

10) Lesen Sie den Text und markieren Sie die Sätze richtig oder falsch?Read the following text and mark the sentences true/false (2)

Paul studiert B.tech in Deutschland.Er findet Europa sehr teuer. Er wohnt mit Freunden im Studentenwohnheim. Das Essen in der Kantine schmeckt ihm nicht. Sein Kurs dauert 4 Jahre. Nach dem Studium möchte er nach Amerika fahren. Er spricht sehr gut Englisch, Hindi und ein bisschen Deutsch.

	Richtig	Falsch
1. Paul studiert im Europa.		
2. Er findet Deutschland billig.		
3. Nach dem Studium möchte er in England arbeiten.		
4. Paul spricht drei Sprachen.		

11) Ergänzen Sie die Pronomen: (6)

mich, mir, du, Ihnen, sie, er

1. Martina, kannst du _____ hören ?
2. Wo arbeitest _____ ?
3. Es geht _____ gut.
4. Wir danken _____ für die Hilfe.
5. Meine Chefin ist nett, aber ich finde _____ sehr unfreundlich.
6. Heute kommt der neue Professor. _____ heisst Paul Schuhmacher.

Total no. of Pages: 1 Roll no.....

III SEMESTER

B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

FEC 45 ENGINEERING EXPLORATION

Time: 02:00 Hours *Max. Marks: 40*

Note: All questions carry equal marks.
Assume suitable missing data, if any.

Q. 1 What is the baud rate? and duty cycle? Generally, at what baud rate Arduino communicates with serial USB? [5M][CO3]

Q. 2 Write down the program to interface Arduino with 16×2 LCD and 7-segment display. [5M][CO3]

Q. 3 What are the different types of motors generally used in 3D printers? Which printing materials are generally employed in 3D printing technology? [5M][CO5]

Q. 4 What is sustainability? Describe education for sustainability. [5M][CO6]

Q. 5 What does work ethic means? Write five characteristics of having a good work ethic. [5M][CO6]

Q. 6 Describe all the steps involved from the time of project initiation to project completion. [5M][CO4]

Q. 7 What is pulse width modulation? Write down the program to control RGB LED using Arduino Uno. [5M][CO3]

Q. 8 Explain different types of sensors. Write the program to interface any sensor with Arduino Uno. [5M][CO3]

Total no. of Pages: 02 Roll no.....

III - SEMESTER

B.Tech./B.Des

END TERM EXAMINATION Nov/Dec-2022

FEC 46 – Technical Communication

Time: 02:00 Hours Max. Marks: 50

Note :- All the questions are compulsory.
All questions carry equal marks.

1. What is technical communication? Explain. (10) (CO 3,1)
2. How can you make communication effective? Explain. (10) (CO 2,4)
3. Discuss the following:
   a. Minutes
   b. Agenda
   c. Netiquettes
   d. Memo
   e. Letter report (10) (CO 1,2)
4. The Dean of the Community Welfare Division, wishes to know whether the BITS supermarket should stay open at night. For collecting the relevant data 300 customers were interviewed at random. The results of the survey are given below in the tabulated form:

Table showing % response to the question: 'Do you want the store to stay open at night?'

Age Group	Yes	No	Don't Know
10–15	43.5	38.0	18.5
16–21	64.2	29.0	6.5
22–30	54.5	44.0	1.5
31–45	37.5	47.5	15.0
46–60	18.4	70.0	11.6

Now, as Research Officer, write a Letter Report to be submitted to the Dean, CWD, to enable him to take a necessary decision in this regard. Invent the necessary details. (10) (CO 1,3)

5. Create **APA citation** of the following:

a. Book name: My Story
Author: Kamla Das
Year: 1989
Publication: Cambridge
Pages: 179

b. Research article name: The Art of Coding
Journal name: Robotics.
Author: William James
Year: 2020
Publication: Macmillan
Page no. 2
Issue: 1
Volume: 12

(4+6) (CO 3)

Total no. of pages_One Roll No.....

B.Tech

End Sem Examination Nov-Dec 20

FEC 47 Value Driven Leadership

Time: 2 Hours Max. Marks: 50

Attempt any FOUR questions. All questions carry equal marks. Assume suitable missing data, if any.

Question 1. Critically evaluate the Corporate Governance practices adopted by Satyam. **(12.5 Marks)**

Question 2. Discuss the various provisions mentioned in the Companies Act 2013 regarding Corporate Social Responsibility. **(12.5 Marks)**

Question 3. In the context of 'Moonlighting' i.e. have a second job, typically secretly and at night, in addition to one's regular employment; discuss the concept of morals and ethics. **(12.5 Marks)**

Question 4. Explain the concept of Diversity in an organisation. What are the challenges involved in it. **(12.5 Marks)**

Question 5. Clarify the concept of Social Capital. Also, discuss the importance of Social Capital for an Organization. **(12.5 Marks)**

Total No of Pages: 02 Roll No: .....

III Semester
B.Tech

MID TERM EXAMINATION Dec - 2022
FEC 48 - INTRODUCTION TO BIOLOGICAL SCIENCES
Time: 2:00 Hours Max. Marks: 50

Note:
All the three questions are compulsory.
Question 1 is fill in blanks. Each blank carry half mark.
Question 2 is short answer type questions and each question carry 2 marks. You have to attempt any 10 questions.
Question 3 is long answer type questions and each question carry 5 marks. You have to attempt any 5 questions.

Q1 Fill in the blanks: [5][CO1]

1. State of complete physical, psychological and social well -being and not merely the absence of disease or infirmity is known as .....
2. Lymphocytes begin their life in .....
3. An .....is any substance that can spark an immune response.
4. ..... immunity is borrowed from another source.
5. Natural running water ecosystem is known as .....
6. ..... is the zone of junction or transition area between two biomes.
7. ..... consists of dead plant remains like leaves, bark, flowers and dead remains of animals, including fecal matter.
8. .....is a boundary between troposphere and stratosphere, marked in most places by a temperature inversion
9. ..... pH is the range of acid rain.
10. Amount of dissolved oxygen needed by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period is known as .....

Q2 Short answer type questions (Attempt any ten): [10][CO3]

1. What is the importance of white blood cells in the body? Write about the lymphoid organs.
2. Define endocrine system of human body.
3. How bioethics play role in medicine and biotechnology?
4. Differentiate between B lymphocytes and T lymphocytes.
5. What is immunization? Write the name of four immune system disorders.
6. What is the difference between population and community?
7. What will happen if two species occupy the same niche?
8. Why abiotic factors are known as limiting factors for their ecosystem?
9. Name the greenhouse gases and their adverse effects.
10. Write about the particulate matter (PM) in air pollution. How it effects the health of human being?
11. Draw a neat and clean labelled diagram of nucleus of eukaryotic cell.
12. How plasmids of bacterial cell can be utilized by a biotechnologist?

Q3 Long answer type questions (Attempt any five): [10][CO2,4]

1. What do you understand by immune system? Differentiate between innate and acquired immunity in detail.
2. Define homeostasis. Imagine a condition that you are encountered to extremely cold conditions, how your body will fight back to maintain normal conditions. Discuss the mechanism.
3. What are pathogens? How they spread? Write any four methods.
4. Describe how pond is a complete ecosystem?
5. What are the abiotic factors? How organisms respond to abiotic factors? Explain any four ways.
6. How can we mitigate the pollution using biotechnology?
7. What is biodiversity? Write down the importance of biodiversity.

DELHI TECHNOLOGICAL UNIVERSITY, DELHI
DEPARTMENT OF DESIGN

ODD SEMESTER

END TERM EXAMINATION NOV- 2022

FEC49 SKETCHING & RENDERING

Time: 02:00 Hours Max. Marks: 50

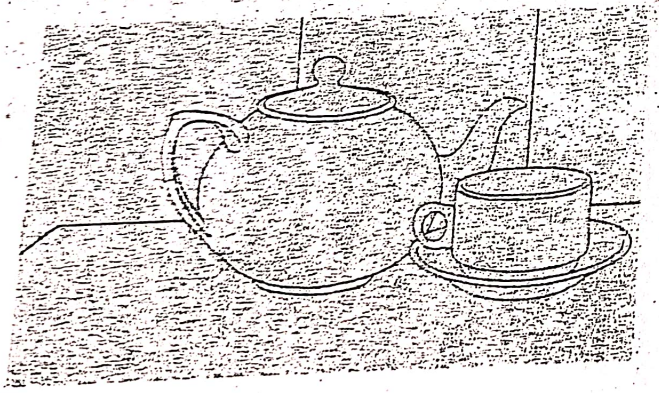
Q1. Write a brief note on below mentioned artists and their works in 200 words. [Attempt any Three) 6 X 3=18 Marks] Marks: 18

(i) Amrita Sher-Gil
(ii) Nand Lal Bose
(iii) Rabindranath Tagore
(iv) Satish Gujral

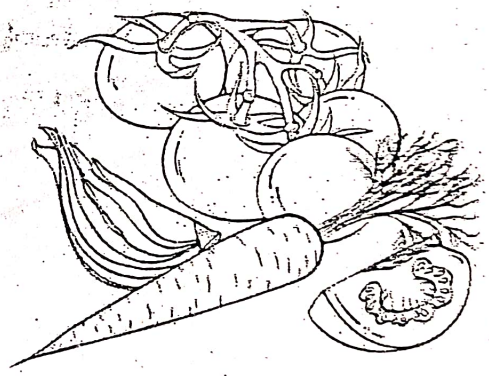
Q2. Draw 2 Images on A3 size. [10x2=20 Marks] Marks: 20

Use drawing as a medium to copy the shape and bring out the 3D look by rendering. Keep in mind light to dark tones to create volume. Size: Approx. 8 x 10 inches.

A

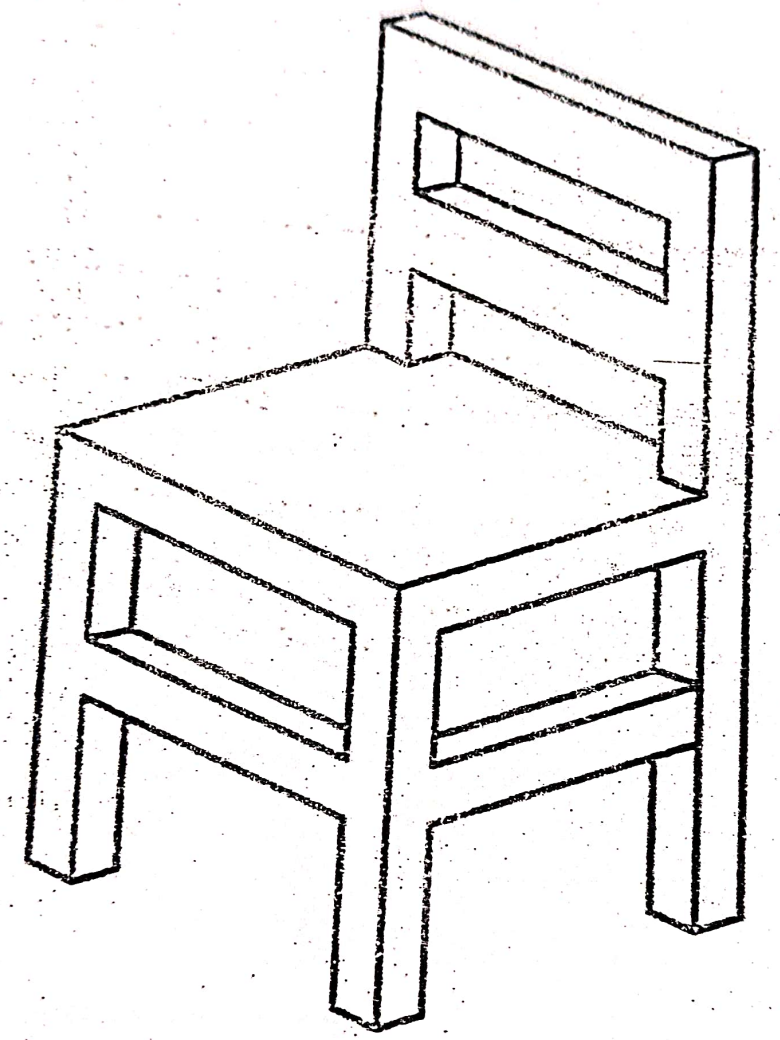


B



Q3. Draw this chair in a one point perspective manner having vanishing point on the right corner of drawing paper (A3 size). Marks: 12

FEC 49



Roll No:—

III Semester
B.TECH

Final Term Examination (Nov-Dec, 2022)

(FEC-54- Negotiation and Leadership)

(Total Marks-50, Time-2 Hours)

(Total Five Questions (All questions are compulsory), Marks indicated in the questions)

Que.1.

(a) What is complex Negotiation and what are the techniques to deal with Complex Negotiations? 3.5 Marks

(b) What are Hofstede's Cultural Dimensions? -3.5 Marks

(c) How to deal with people with difficult behaviour? -3 Marks

Que.2

(a) What are the criteria for decision making in negotiation? -3 Marks

(b) How to assess the legitimacy of negotiated terms? - 3.5 Marks

(c) When to say Yes in Negotiation and when to walk away? - 3.5 Marks

Que.3

(a) What are the four criteria which are useful for evaluating potential agreement, explain-3 Marks

(b) When the other side is powerful how can you deal with this by improving your BATNA-3 Marks

P.T.O

C) What are the bottlenecks in decision making-4 Marks

Que.4.

(a)Explain importance of effective ,communication and relationship building. -3.5 Marks

(b) What are the methods of building trust and empathy -3 Marks

(c) How to overcome Communication barriers in negotiation-3.5 Marks

Que.5.

(a) What are the four major obstacles in most of the negotiations. Explain? -3.5 Marks

(b) What are the common mistakes in negotiations-3 Marks

(c) How can you change what seems like a win-lose to win- win (or if other party does not play by rules)- 3.5 Marks

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Total no. of pages: 01 Roll no.....

3rd Semester

B.Tech

End Term Examination Nov/Dec-2022

FEC 56 Universal Human Values

Time: 2 Hours Max. Marks:50

Note: Read instructions carefully and answer accordingly.

Q 1. Explain three programs of action, and also explain the difference between discovery and purity. [10][CO-1]

Q2. Explain the human order's five dimensions (systems). [10][CO-2]

Q3. Examine eight statements for 'Trust' – the Foundational Value in a Relationship. [10][CO-2]

Q4. Elaborate on the "Understanding Harmony in the Self". [10][CO-3]

Q5. Attempt *any two* of the following: [10][CO-4]

a) Importance of value education

b) Two basic requirements for prosperity

c) Prevailing notions of prosperity.

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Total No. of Pages 1

Roll No. .....

THIRD SEMESTER

B.Tech.

END SEMESTER EXAMINATION

November-2022

FEC-57 Leadership Mastery through Self Management

Time: 2hours Max. Marks :50

Answer any five questions

Q.1 What do you mean by healthy lifestyle? What are the various aspects of it? What's your opinion about Lifestyle and Character ? (CO2)

Q2. How do you keep your mind and body healthy? Is these two interconnected ? If yes , How? Is Brain Gym Exercises something you are familiar with? (CO3)

Q3. (a) what is state of flow mean? When was the last time you felt that you were in flow? (CO4)

(b) What influences you to be the best version of yourself? Why? (CO1)

Q4. (a) What is your understanding of NVC? (CO5)

(b) Can you explain the science behind Meditation ? (CO3)

Q5. (a) What is Stress Detox ? What is your own experience with it? How to do the detox? (CO6)

(b) What is mental cleaning of impression ? When is to be done? (CO4)

Q6. (a) How does the Yerkes-Dodson Law explain stress and performance? (CO5)

(b) In your mind, how would you deal with ANTs? (CO3)

Total No. of Pages : 02

Roll no :

III Semester

END TERM EXAMINATION

Nov/Dec-2022

FEC–58 Science and Practice of Happiness

Time: 2 hours

Max. Marks 50

Section A: MCQ (1 mark each, attempt all of them)

1. Preconditions feeds our perception database.
   a. true
   b. false
2. Which is happiness hormone?
   a. Serotonin
   b. Cortisol
   c. Testosterone
3. Hedonic mechanisms are found deep in the brain. Some the brain areas implicated are;
   a. nucleus accumbens
   b. ventral pallidum,
   c. Brainstem
   d. All of the above
4. Research suggests that _____plays a special lateralized role in positive affect
   a. frontal left hemisphere plays more than the frontal right hemisphere
   b. frontal right hemisphere plays more than the frontal left hemisphere
5. Humans are inherently social creatures
   a. true
   b. false
6. Social environment has been found to play a critical role in preventing;
   a. cognitive decline
   b. distractions
   c. desires
7. Attending with attention is practised for
   a. Concentration/focus
   b. Awareness of the body
   c. Releasing the tension
8. Happiness can be learnt
   a. True
   b. false
9. Flow is -
   a. Focusing entirely on task in hand
   b. Complete absorption in the activity
   c. Living present moment
   d. All of the above
0. Research says that having meaning or purpose of life
   a. is guided by personal values
   b. influences greater life satisfaction

c. results in fewer health problems
d. All of the above

11. Flourishing and wellbeing come when accomplishment is tied to
    a. Obtaining materialistic things in life
    b. striving toward things with an internal motivation
    c. Comparing ourselves to others achievements
12. According to James-Lange theory of emotions;
    a. external stimulus leads to a physiological reaction
    b. Perception follows bodily states
    c. None
13. Canon and Bard claims that we feel the emotions and experience the physiological reactions such as sweating, trembling and muscle tension simultaneously
    a. True
    b. False
14. Achieving _____ goals leads to larger gains in wellbeing than _____ goals
    a. Intrinsic, extrinsic
    b. Extrinsic, intrinsic
15. Intrinsic goals are;
    a. Growth and connection
    b. Money or fame

Section B: Short Answer Questions **(5 marks each, answer any 3)**

1. What are positive emotions? Give ways in which we can build positive emotions (CO1)
2. Discuss the PERMA profiler. Give examples of each of its factors. (CO3)
3. What are reference points? How do they influence happiness and emotions (CO2)
4. Discuss the emotional episode timeline and how it is linked to our happiness. (CO5)

Section C: Long Answer Questions **(10 marks each, answer any 2)**

1. Describe various methods by which we can measure happiness. Give example and explain (CO4)
2. What are some of the myths of happiness and annoying features of mind. (CO5)
3. Write a note on neuroscience research on Happiness. (CO2)

Total no. of Pages: 4

Roll no.....

V - SEMESTER

B.Tech

END TERM EXAMINATION Nov/Dec-2022

HU 301 - ENGINEERING ECONOMICS

Time: 03:00 Hours

Max. Marks: 50

Note: Attempt any five questions. All questions carry equal marks.

Q.1 (a) A consumer consumes only two goods X&Y both priced at 3 per unit. If the consumer chooses a combination of these two goods with the marginal rate of substitution equal to 3. Is the consumer in equilibrium? Give reasons: What will a rational consumer do in this situation? [CO:1][5 Marks]

(b) What do you mean by Production Function? Explain the likely behaviour of Output when all the inputs are increased in the production process. [CO:1,2][5 Marks]

Q.2 (a) How are commercial banks different from the Central Bank? Discuss the mechanism of credit creation by commercial banks. [CO:2][5 Marks]

(b) What causes the fluctuations in the Economic output over a period of time. Discuss phases of the business cycle. [CO:2,3][5 Marks]

Q.3 (a) Investment A costs Rs.10,000 today and pays back Rs.11,500 two years from now. Investment B costs Rs.8000 today and pays back Rs.4500 each year for two years. If an interest rate of 5 % is used, which alternative is superior? [CO:4] [5Marks]

(b) A company can make a particular component or purchase from the market. The cost detail is as below:

If it purchases from the market. The purchasing price per unit	Rs.3050+GST @18%
If it makes:	
Cost of the machine	Rs 1020300+GST @18%

Salary of the machine operator per month	Rs 30000
Rent of the workshop per month	Rs25000
Raw material-1 per unit	Rs 400+GST@18%
Raw material -2 per unit	Rs 1100 +GST @18%
Other cost per unit	Rs 300

If the annual demand is 1500
Whether company should 'Make' or 'purchase'. Suggest
[CO:2,4] [5 Marks]

Q.4 (a) A monopolist has the cost function $TC(y) = 200y + 15y^2$ and faces the demand function given by $p = 1200 - 10y$. On the basis of given information, calculate the following: [CO:1,4][5 Marks]

(i) What output maximizes its profit?
(ii) What is the profit-maximizing price?
(iii)What is its maximal profit?

(b) Discuss the guiding principles of Indian Five Year Plans.
[CO:3][5 Marks]

Q.5 (a) A person is planning for his retired life. He has 10 more years of service. He would like to deposit 20% of his salary which is 4000 at the end of the first year and thereafter he wishes to deposit the amount with an annual increase of Rs 500 for the next 9 years with an interest rate of 15%. Find the total amount at the end of the 10th year of the above series. [CO:4][5 Marks]

(b) What do you mean by Fiscal policy? How can Fiscal Policy be used to close an Inflationary and Recessionary gap? [CO:2,3][5 Marks]

Q.6 (a) A company invests in one of the two mutually exclusive alternatives. The life of both alternatives is estimated to be 5 years with the following investments, annual returns and salvage value.

	Alternatives	
	A	B
Investment (Rs)	-1,50,000	-1,75,000
Annual equal return (Rs)	+ 60,000	+70,000
Salvage value (Rs)	+15,000	+35,000

Determine the best alternative based on the annual equivalent method if i = 25 % [CO:4] [5 Marks]

(b) Discuss the major trade barriers imposed by countries to restrict trade. [CO:2,3] [5 Marks]

Q.7 (a) A company is planning to expand its business after 10 years. To meet the expansion expenditure, at the end of first year the company is planning to deposit Rs. 20,00,000 in the reserve and from the next year it will increase the amount to be deposited Rs. 15,000 from the previous deposit for the next 9 years with an interest rate of 12%. Calculate the total amount which the company will have for the expansion at the end of 10 years. [CO:4] [5 Marks]

(b) From the following information calculate the break- even point and the turnover (sales) required to earn a profit of Rs 36000.

Fixed overheads	Rs. 18000
Variable cost per unit	Rs. 2
Selling price	Rs. 20

If the company is earning a profit of Rs. 36000 express the margin of safety level. [CO:4][5 Marks]

Total no. of Pages: 2 Roll no.....

V/VII - SEMESTER B.Tech./B.Des.

END TERM EXAMINATION ***Nov/Dec-2022***

HU-305 - MACROECONOMICS

Time: 03:00 Hours *Max. Marks: 50*

Note: All questions carry equal marks.
Answer any 5 out of 7 questions.

Q1. What is meant by double counting? How does it affect the measure of GNP? What is the method used to avoid double counting?
[CO:1] [10 Marks]

Q2.Explain the concept of the present value of a future income. Explain why it is necessary in investment decision to discount the future income stream? [CO:2] [10 Marks]

Q3.How will you distinguish between exchange depreciation and devaluation? How does devaluation work to correct the disequilibrium in the balance of payments? [CO:3,4] [10 Marks]

Q4. What is macroeconomic policy? Why does the need for macroeconomic policy arise? [CO:1,2] [10Marks]

Total no. of Pages: 2 Roll no.....

V/VII - SEMESTER B.Tech./B.Des.

END TERM EXAMINATION Nov/Dec-2022

HU-305 - MACROECONOMICS

Time: 03:00 Hours Max. Marks: 50

Note: All questions carry equal marks.
Answer any 5 out of 7 questions.

Q1. What is meant by double counting? How does it affect the measure of GNP? What is the method used to avoid double counting?
[CO:1] [10 Marks]

Q2.Explain the concept of the present value of a future income. Explain why it is necessary in investment decision to discount the future income stream? [CO:2] [10 Marks]

Q3.How will you distinguish between exchange depreciation and devaluation? How does devaluation work to correct the disequilibrium in the balance of payments? [CO:3,4] [10 Marks]

Q4. What is macroeconomic policy? Why does the need for macroeconomic policy arise? [CO:1,2] [10Marks]

Q5. Distinguish between total credit control and selective credit control measures of monetary control. Under what conditions are the qualitative controls preferred to qualitative controls? [CO: 4] [10 Marks]

Q6 What is Mundell Flaming model. Why LM curve is vertical in this model. [CO:4] [10 marks]

Q7. What is Inflation? Briefly describe its anti- inflationary policies. [CO:4] [10 Marks]

Q5. Distinguish between total credit control and selective credit control measures of monetary control. Under what conditions are the qualitative controls preferred to qualitative controls? [CO: 4] [10 Marks]

Q6 What is Mundell Flaming model. Why LM curve is vertical in this model. [CO:4] [10 marks]

Q7. What is Inflation? Briefly describe its anti- inflationary policies. [CO:4] [10 Marks]

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Total no. of Pages : 02 Roll no.....

V SEMESTER

B.Tech

END TERM EXAMINATION Nov/Dec-2022

HU-307 BASIC ECONOMETRICS

Time: 03:00 Hours Max. Marks: 50

Note : All questions carry equal marks.
Assume suitable missing data, if any.

1. What do you mean by Econometrics? Explain its methodology. Also discuss its significance for engineering students. [CO-1][10]

2. You have been asked to find out whether effect of COVID-19 on engineers of different branches are significantly different from each other. Engineering branches have been grouped as Traditional, Modern and Digital. What size of sample and which econometrics method you will use to study? Discuss in detail with taking a hypothetical case.
[CO3][10]

3. a) Elucidate Ordinary Least square (OLS) method. How are OLS estimates different from the estimates of Method of Maximum Likelihood (ML)? [CO-2][5]

b) Explain: i) Gauss Markov Theorem ii) Monte Carlo Experiments [CO-2][5]

4. a) Your data set has Heteroscedasticity. What does it mean and how you will correct it before analysis?
[CO-2] [5]

b) What is the significance of Coefficient of Determination and how is it different from Coefficient of Correlation? (CO-1) [5]

5 a). Why does the Normal Distribution hold the most honourable position in Probability theory? When does Binomial or Poison

distribution tend to a Normal distribution? [CO-3] [5]

b) Consider the following distribution; [CO-1] [2.5x2=5]

	Distribution A	Distribution B
Mean	100	90
Median	90	80
Standard Deviation	10	10

Find out whether following are true or False, Give reasons:

i. Distribution A has same degree of variation as Distribution B
ii. Both distributions have the same degree of skewness.

6 a) What is F-test and when is it used? [CO-3] [5]

b) A manufacturer of a certain make of bulbs claims that their bulbs have a mean value of 25 months with a standard deviation of 5 months. A random sample of 5 such bulbs have the following values: [CO1] [5]

Life in Months: 24, 26, 30, 20, 18.

Can you regard the manufacturers claim to be valid at 1% level of significance? The table values of appropriate statistics at the said level are 4.032, 3.707 and 3.499 at 5,6, and 7 degrees of freedom.

7. Differentiate between any two of the following and discuss their significance in taking decision. [CO-1] [5x2=10]

a) One-tailed test vs. Two tailed test

b) Qualitative data vs Quantitative data.

c). Type I error vs. Type II error

----END----

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Total no. of Pages: 01 Roll no.....

V - SEMESTER B.Tech./B.Des

END TERM EXAMINATION, Nov/Dec-2022

HU-309: INDIAN ECONOMY-CONTEMPORARY ISSUES IN INDIAN ECONOMY

Time: 03:00 Hours Max. Marks: 50

Note: All questions carry equal marks. Answer any 5 out of 7 questions.

Q1. What was the rationale of implementing economic reforms in India in 1991? Briefly discuss the major components of economic reforms introduced in 1991. [CO:1] [10 Marks]

Q2. Briefly discuss the features of industrial policy in India after 1991. [CO:1,2] [10 Marks]

Q3. What are the problems of small-scale industries in India? Discuss the government policy towards small industries in India.[CO:2][10 Marks]

Q4. Explain Economic reforms in India which have influenced agriculture sector? Outline the future reform agenda for overall agricultural growth in India. [CO:2] [10 Marks]

Q5. Briefly discuss the concept of 'Global Production Networks.' What are the areas on which India should focus to promote its manufacturing output and enhance the export earnings? [CO: 2,3] [10 Marks]

Q6. Do you think it is justified to regard the service sector as the engine of growth of the Indian Economy? Give arguments and evidence in support of your answer. [CO:3] [10 Marks]

Q7. Briefly outline the important labour laws applicable for organised sector in India. Discuss the recent labour market reforms undertaken in India [CO:4] [10 Marks]

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Total No. of Pages : 01 *Roll No.....*

V SEMESTER

B.Tech.

END TERM EXAMINATION *NOV-2022*

HU 313 CREATIVE WRITING SKILLS ENGLISH

Time: 3 Hours *Max. Marks: 50*

Note: Answer any five questions.
All questions carry equal marks.
Marks are indicated against each question.
Assume suitable missing data, if any.

1. 'Literature is an ideological manifestation'. Comment. (10) (CO4)
2. How is literature built up through psychological portrayal of characters? Explain. (10) (CO3)
3. What are the major components of a literary genre like novel? Illustrate your answer. (10) (CO1)
4. Distinguish between connotation and denotation. Illustrate your answer. (10) (CO2)
5. What are the major genres of literature? Discuss with examples. (10) (CO2)
6. What are the different types of media? Explain in detail. (10) (CO1)
7. Write a note on the use of language in Bollywood cinema. (10) (CO3)
8. 'Web series makes abundant use of abusive language.' Comment. (10) (CO4)
9. Discuss the major characteristics of language of advertisement. (10) (CO2)
10. Present a critical appreciation of any novel that you have read. (10) (CO4)

Total no. of Pages: 02 Roll no.....

VIII - SEMESTER

B.Tech./B.Des

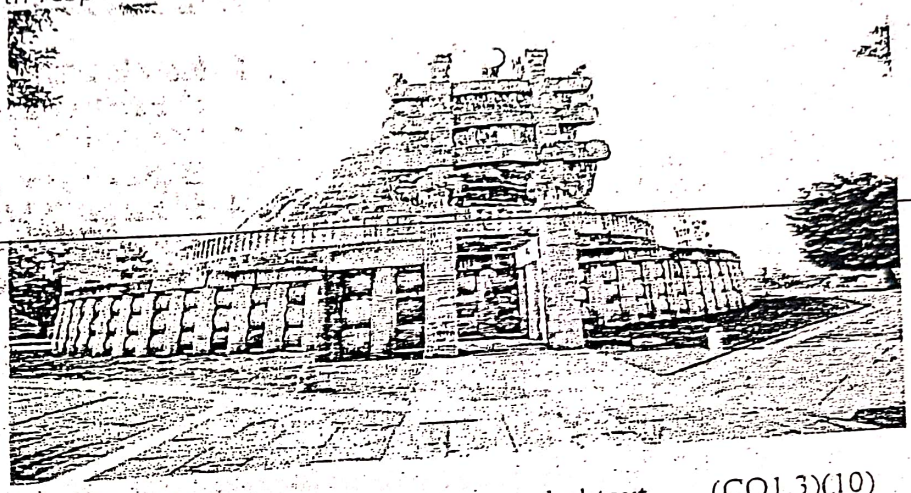
END TERM EXAMINATION *Nov/Dec-2022*

HU315 – Non-Verbal Communication

Time: 03:00 Hours *Max. Marks: 50*

Note :- Answer any 5.
All questions carry equal marks.

1. Define the role of movement and positive gestures in formal stage presentations. Give examples. (CO3,1)(10)
2. Illustrate how cultural symbols and accessorizing could be both boon or bane in non-verbal communication. (CO4,2)(10)
3. How does historical architecture function as non-verbal communicators with generations of people across time, space and countries? Explain with the example of Sanchi Stupa, Madhya Pradesh with respect to its past events and associated narratives. (CO4,2)(10)



4. Write a critical essay on space as non-verbal text. (CO1,3)(10)
5. Analyse 'territoriality' in the context of workplace communication (CO2) (10)
6. Define time as a non-verbal indicator form following perspectives: biological, personal, physical and cultural time. (CO4,2)(10)

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Total no. of Pages : 02 Roll no.....

V SEMESTER

B.Tech

END TERM EXAMINATION *Nov/Dec-2022*

HU-351 MATHEMATICAL ECONOMICS AND ECONOMETRICS

Time: 03:00 Hours *Max. Marks: 50*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

1. a) What do you mean by Mathematical Economics and Econometrics? Explain when an engineering student will use these methods. [CO-3] [5]

b) Given the demand function as p=20-2x, find the price elasticity of demand at p=4 and p=8. [CO-1][2.5]

c) If the demand function for two commodities X_1 and X_2 are as below; [CO1][2.5]

$$X_1 = P_1^{-1.7}P_2^{0.8}$$
$$X_2 = P_1^{0.5}P_2^{-0.2}$$

Find out two commodities X_1 and X_2 are substitute or complimentary goods.

2. a) What do you mean by error term? What does it mean if value of error term in an regression equation is very big? Discuss. [CO-2] [5]

b) What is sampling? You have to conduct a survey of health issues among students who smoke. Which type of sample you will take and why? Discuss. [CO-2][5]

3. a) Discuss economic applications of integrals with examples? [CO2][5]

b) As per the Keynesian theory, if the consumption equation is given by c=40+.8Y. How will you interpret 40 and 0.8? [CO-1][2.5]

c) if the marginal cost function is given by
$F(X) = 2+3\sqrt{x}+5/\sqrt{x}$,
Find total cost function where $F(1) = 21$ [CO1][2.5]

4. a)Explain the significance of Dummy Variables in regression analysis? [CO-2][5]

b) Discuss Dummy Variable Trap. For a study on Consumer preference for Online Marketing, you have divided India in four groups. How many dummy variables you will generate? Discuss. [CO2][5]

5. a) What is the significance of Assumptions in an Econometric Model? Why econometric models are constructed? Discuss. [CO2][5]

b) Suppose that the demand and total cost function facing a monopolist are $P = 12-5x$; $TC = -x^3 + 3x^2$. Determine the change in price due to the imposition of a tax of 20 percent. Find the corresponding profit. Determine the price if government grants subsidy (instead of imposing tax) of one percent per unit of output. [CO1][5]

6. a) Discuss use of Differential Equation in Economics with examples. [CO3] [5]

b) Demand and Supply function for a commodity are given by

$$D = a + bp + c\frac{dp}{dt} \quad (a \text{ and } b>0$$

$$S = \alpha - \beta p + \gamma\frac{dp}{dt} \quad (\alpha \text{ and } \beta > 0)$$

D = Demand and S= Supply; ; P= price at time 't. If the price when $t=0$ is P_0, find the condition of dynamic multiplier. [CO1] [5]

7. Explain any of the two below: [CO1][5X2=10]

a) Problem of Estimation

b) Chi-Square test

c) Normal Distribution

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Total no. of Pages: 1 Roll no.....

V SEMESTER

B.Tech

END TERM EXAMINATION Nov/Dec-2022

HU-353 INTERNATIONAL TRADE

Time: 03:00 Hours Max. Marks: 50

Note: Attempt any 5 questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 What is Conference of Parties? How have the outcomes of COPs (mainly Kyoto Protocol and Paris Agreement) affected the Climate change. Suggest in light of the COP-27 and IPCC working group reports on climate mitigation and adaption.

Q.2 Explain the nexus between Global Value Chain, globalization and International Trade.

Q.3 Explain the dimensions of globalization and impact of globalization on Indian Economy.

Q.4 What is Global Hunger Index. Explain India's rank in the GHI and the reasons for the above ranking.

Q.5 Explain the role of cultural and political environment while expanding in the global market.

Q.6 Briefly describe India's trade composition and structure.

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Total no. of Pages: 01 Roll no.....

VII SEMESTER

B.Tech

END TERM EXAMINATION Nov/Dec-2022

HU-403 ECONOMIC GROWTH

Time: 03:00 Hours Max. Marks: 50

Note: Attempt any 5 questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Explain convergence hypothesis. Discuss its types using suitable diagram.

Q.2 Explain Solow's steady growth rate with depreciation and technological improvement with the help of suitable diagram.

Q.3 Explain how Romer's (endogenous) growth model is different from Solow's growth model.

Q.4 Why Harrod-Domar model is known as razor as model?

Q.5 Explain the role of climate change and sustainability in the economic growth of the economy.

Q.6 Explain the role of globalization and technology in the growth an economy, specially Indian Economy.

Q.7 Explain Total factor productivity and its relevance in Indian economy.

Total no. of Pages:01 Roll no.....

B.Tech , VII - Semester

END TERM EXAMINATION *Nov/Dec-2022*

HU 409 - Soft Skills Development

Time: 03:00 Hours *Max. Marks: 50*

Q1. Analyze the significance of soft skills in workplace management. (CO1)10

Q2. Write 10 points on the topic "Time management and Techniques" with suitable explanation for a PPT mode of presentation. Explain how you can use infographics, animation and statistical data effectively during formal presentations. (CO2,3)10

Q3. It is common knowledge that companies spend a significant amount of money on soft skills training for newly recruited employees. If you were given the responsibility to provide similar training to B.Tech students, what will be your choice of topics, focus area(s) and techniques. (CO4)10

Q4. Create a set of the most common questions asked to you during the interviews that you have given? If given a chance to attempt the same set of questions again, what soft skills would you utilize to answer them better. (CO2)10

Q5. Create your personal inventory for problem solving and decision making. Justify the selection and application of each point from your personal checklist. (CO1, 3)10

Total no. of pages: 1 Roll No.....

7th Semester

B.Tech

End Term Examination Nov/Dec-2022

HU 413 ADVANCED SPOKEN SKILLS

Time: 03.00 Hours Max. Marks: 50

Note: All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q 1. The contents of our speech, and how we deliver it, are based on five important factors. Elaborate on those five factors. (10) (CO-1)

Q 2. How can you overcome stage fright during a presentation? (10) (CO-2)

Q 3. Explain distinct steps of the interview process. (10) (CO-2)

Q 4. Write short notes on any two of the following: (10) (CO-3)

1. Listening skills
2. Group Discussion
3. Pronunciation issues in the English language
4. Mock Interview

Q 5. Give Phonetic Transcription of the following words: (10) (CO-4)

a) Date f) fear
b) Cure g) doubt
c) One h) juice
d) Hurt i) tour
e) Ball j) drama

Total No. of Pages _02_ 276 Roll No. .....

THIRD SEMESTER MBA [odd]

END SEMESTER EXAMINATION Nov.-Dec.,2022

MG301- FUNDAMENTALS OF MANAGEMENT

Time: 3:00 Hours Max. Marks: 50

Note: Attempt any five questions. All questions carry equal marks. Assume suitable missing data, if any.

Q.1a) State and explain five functions of management. [5][CO1]

b) Miss X recently cleared a job interview in a law firm. She was sceptical in taking the job offer and thus before joining, she took feedback from various employees of the law firm in order to take the right decision. She got to know that the firm has good working conditions and basic amenities like retirement benefits, insurance policies etc. However, the firm lacks in offering the challenging job opportunities and projects which helps an individual to grow. With the help of the suitable theory of motivation, explain if Miss X will be motivated to join the law firm? [5][CO1]

Q.2a) Explain and differentiate between profit maximization and wealth maximization approaches to financial management. [5][CO3]

b) Capital Budgeting/Long term investment decisions could be critical for an organization's survival. Explain the statement with suitable examples. [5][CO3]

Q.3a) Explain corporate social responsibility and its broad categories. Provide suitable examples. [5][CO2]

b) Choose any company and explain the dimensions of the business environment that played a role in its success/failure. [5][CO2]

Q.4 a) State and explain with examples the 7 Ps of Marketing Mix. [5][CO4]

b) How does a sales-oriented company differ from a marketing-oriented company? What are the characteristics and implications of marketing orientation? [5][CO4]

Q.5a) Explain data, information, and knowledge. Provide suitable examples. [5][CO5]

b) How can organizations facilitate increased use of knowledge management by their workforce? [5][CO5]

Q.6 a) Describe the seven stages of new product development for introduction of new products in the market. [5][CO4]

b) What are the major functions and key decisions of a finance manager? [5][CO3]

Total Pages: 01 Roll No. .....

SEMESTER 3rd B.Tech.

END TERM EXAMINATION Nov.-2022

PT207 Engineering Design and Analysis

Time: 3:00 Hours Max. Marks: 40

Note : All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 What are the important physical, Mechanical and chemical properties important in polymeric materials. [10][CO2]

Q.2 Name the few important commodity and engineering polymers and write down their specific properties and applications. [10][CO3]

Q.3 Explain the procedure of Izod Impact test. [10][CO5]

Q.4 Explain the procedure of Tensile Testing for polymeric materials. [10][CO4]

Q.4 a) State and explain with examples the 7 Ps of Marketing Mix. [5][CO4]

b) How does a sales-oriented company differ from a marketing-oriented company? What are the characteristics and implications of marketing orientation? [5][CO4]

Q.5a) Explain data, information, and knowledge. Provide suitable examples. [5][CO5]

b) How can organizations facilitate increased use of knowledge management by their workforce? [5][CO5]

Q.6 a) Describe the seven stages of new product development for introduction of new products in the market. [5][CO4]

b) What are the major functions and key decisions of a finance manager? [5][CO3]

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SEMESTER 3rd B.Tech.

END TERM EXAMINATION Nov.-2022

PT207 Engineering Design and Analysis

Time: 3:00 Hours *Max. Marks: 40*

Note : All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 What are the important physical, Mechanical and chemical properties important in polymeric materials. [10][CO2]

Q.2 Name the few important commodity and engineering polymers and write down their specific properties and applications. [10][CO3]

Q.3 Explain the procedure of Izod Impact test. [10][CO5]

Q.4 Explain the procedure of Tensile Testing for polymeric materials. [10][CO4]

VII SEMESTER

Total no. of pages:01 B.Tech

END TERM EXAMINATION Roll no.....

November-2022

PT405 : FIBER TECHNOLOGY

Time 3:00 Hours Max. Marks: 40

Note: All questions are compulsory
Assume suitable Missing data, if any

Q No.			Marks
1	Answer the following in 40-60 words each: (a) Name the parameters affecting diffusion in wet spinning. (b) Why do we preheat the polymer in hopper? (c) What is the relationship between fibre fineness and torsional rigidity of the yarn? (d) Why silk has shinny appearance? (e) What is the role of manifold in melt spinning		5X2
2	a	Discuss the process of drawing with the help of a diagram.	4
	b	What is the reason behind stress induced crystallization?	2
3	a	Sketch the cross-sectional view of cotton. Discuss various properties associated with its structure.	4
	b	Differentiate between stretch like and spun like yarn with appropriate technique involved.	2
4	a	Why wool has high moisture uptake capacity. Explain various bond formations in wool fiber.	4
	b	What do you understand by the Directional Friction effect?	2
5	a	Write the formula to find out equivalent diameter of a single filament. How is it associated with melt draw ratio?	4
	b	Why winder speed is higher than other godet rollers?	2
6	a	Examine the different cross-sectional structure formed in melt spun, dry spun and wet spun filaments.	4
	b	What is die swell?	2

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Total no. of Pages: 02 Roll No.....

VII SEMESTER

B.Tech. POLYMER SCIENCE & CHEMICAL TECHNOLOGY

END TERM EXAMINATION NOV-2022

PT 407 CHEMICAL PROCESS TECHNOLOGY

Time: 3 Hours Max. Marks: 40

Note : Attempt any Five Questions
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1[A] What are the special features of Process Flow Diagram? [4][CO1]

[B] What are the functional roles of heat exchanger? Write its types. [4][CO4]

Q.2[A] Discuss the potential of Paper industries in India from global scenario. [4][CO5]

[B] What are the major oil seeds produced in India? Comment on the Edible oil industries' potential in India. [4][CO5]

Q.3[A] Describe the sulphuric acid manufacture by contact process using the chemical flow diagram. [5][CO1]

[B] Calculate the weights (in tons) of raw materials required for the production of 1000 tons of Urea per day in a plant. [3][CO3]

Q.4[A] Develop the flow chart for ammonia production process. [5][CO2]

[B] Write any Five Indian Detergent manufacturers. [3][CO5]

Q.5[A] Explain with the flow diagram electrolytic process for producing sodium hydroxide and chlorine. [5][CO1]

[B] Calculate the weights (in tons) of raw materials required for the production of 1000 tons of sugar per day in a plant. [3][CO3]

Q.6[A] Which major components are necessary in fertilizers? Discuss their role in overall plant growth. [3][CO4]

[B] Suggest the modifications in paper machine to improve the properties of paper. [3][CO4]

[C] (a) Justify the statement "The temperature is kept below 200°C during hydrogenation of edible oils. [2][CO4]

Total no of pages 02

Roll no.....

B.Tech.[PE]
END TERM EXAMINATION

III SEMESTER
NOV/DEC-2022

PE201_ENGINEERING MATERIALS & METALLURGY

Time: 03 Hours

Max. Marks: 40

Note : ~~All questions are compulsory~~. Solve Any 5 Questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1(a) Explain recovery , recrystallization and grain growth with neat sketch. [4] [CO#1]

(b) Why stainless steel and aluminium is anticorrosive material?. Explain the types of aluminium alloys [4] [CO#2]

Q.2(a) Define creep. Explain creep curve with neat sketch [4] [CO#4]

(b) Explain galvanic cell and its corrosion. [4] [CO#2]

Q.3(a) Draw and explain Iron –Carbon equilibrium diagram [4] [CO#3]

(b) For a 99.65 wt% Fe–0.35 wt% C alloy at a temperature just below the eutectoid, determine the following: [4] [CO#3]
(a) The fractions of total ferrite and cementite phases
(b) The fractions of the proeutectoid ferrite and pearlite
(c) The fraction of eutectoid ferrite

Q.4(a) Differentiate between brittle fracture and ductile fracture. [4] [CO#4]

(b) An MgO component must not fail when a tensile stress of 13.5 MPa is applied. Determine the maximum allowable surface crack length if the surface energy of MgO is 1.0 J/m^2. Modulus of elasticity is 225 GPA. [4] [CO#4]

Q.5(a) Draw powder metallurgy block diagram and explain its advantages , limitations and economics. [4] [CO#6]

(b) Explain annealing , and normalizing heat treatment process in detail with neat sketch. [4] [CO#4]

Q.6(a). Explain fibre reinforced composite their types and applications in detail. [4] [CO#5]

(b) A continuous and aligned fiber-reinforced composite is to be produced consisting of 45 vol% aramid fibers and 55 vol% of a polycarbonate matrix; mechanical characteristics of these two materials are as follows: [4] [CO#5]

	Modulus of elasticity (Gpa)	Tensile strength (Mpa)
Aramid Fibre	131	3600
Polycarbonate	2.4	65

Also, the stress on the polycarbonate matrix when the aramid fibers fail is 35 MPa
For this composite, compute
(a) the longitudinal tensile strength,
(b) the longitudinal modulus of elasticity

Q.7 write short note [8] [CO#3&4]
(a.) TTT Diagram
(b.) Fatigue failure

-: End ;-

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Total no. Of pages : 2 Roll No.

THIRD SEMESTER B.Tech.(PE)

END SEMESTER EXAMINATION NOV 2022

PE 203 - THERMAL ENGINEERING-I

Time : 3 hr Max Marks: 40

Answer any FIVE questions. Assume missing data suitably if any.

Use of steam tables & psychrometric charts permitted.

1.(a) Define dryness fraction of steam and explain briefly the quality of steam. Explain with a neat sketch of throttling and separating calorimeter for measurement of quality of steam.

(b) What do you mean by saturated air? A sling psychrometer reads 38° C DBT and 28° C WBT. Determine the following: (i) partial pressure of water vapour (ii) specific humidity (iii) relative humidity (iv) DPT (v) enthalpy of the mixture and (vi) degree of saturation. (4,4) [CO1]

2(a). Explain the effect of following on Rankine cycle with Ts diagram (i) inlet pressure of steam (ii) inlet temperature of steam (iii) condenser pressure (iv) irreversibility on the system

(b) Steam at 90 bar and 500° C is supplied to HPT in a reheat steam power cycle. The steam is reheated to its initial temperature of steam at a reheat pressure of 20 bar and expands in LPT to a pressure of 0.1 bar. Considering the efficiencies of turbine and pump as 90% and 86%, determine the following (i) reheat pressure of steam (ii) dryness fraction of steam leaving LPT (iii) cycle efficiency and (iv) steam rate. (3, 5) [CO2]

3.(a) Explain the working and construction of a water tube boiler with a neat sketch.

(b) Explain (i) Boiler mountings (ii) Boiler accessories. (4,4) [CO3]

4(a) Derive the expression for critical pressure ratio for maximum discharge of steam through nozzle and the maximum discharge also.

(b) Dry saturated steam enters the convergent divergent nozzle at a pressure of 10 bar and leaves at pressure of 1 bar. Determine the ratio of cross section area at exit to throat for maximum discharge State assumptions made. (4,4) [CO4]

5.(a) Derive the condition for maximum blade efficiency and hence derive the expression for maximum blade efficiency of reaction turbine.

(b) A Delavel impulse turbine receives steam at a velocity of 850 m/s and nozzle is inclined at an angle of 20^0 to the direction of motion of blades. The mean diameter of blade ring is 0.8 m and speed 6000 rpm. Assuming blade friction coefficient of 0.85 and symmetrical blades, determine (i) work done (ii) blade angles at inlet and outlet (iii) blade efficiency and maximum blade efficiency (4,4) [CO5]

6(a) What is the function of steam condenser? Define vaccum and condenser efficiency.

(b) List out the advantages of steam condenser in a steam power plant.

(c) Explain the working of surface condenser with a neat sketch. (2,2,4) [CO6]

7 Write short notes on the following

(i) Max well equations in TD relations

(ii) Velocity compounding of impulse steam turbine

(iii) Regenerative feed water heaters

(3, 2.5, 2.5) [CO1,CO5,CO2]

Total no. of Pages: 02 Roll no.....

THIRD SEMESTER B.Tech. [PE]

ENDD TERM EXAMINATION November-2022

PE205 MANUFACTURING MACHINES

Time: 3:00 Hours Max. Marks: 40

Note : Answer any FIVE questions.
Assume suitable missing data, if any.

1[a] How many ways taper turning is possible in a Centre lathe? A taper pin of length 80 mm has a taper length of 48 mm. The larger diameter of taper is 83 mm and the smaller diameter is 73 mm. Determine (i) Taper in mm/meter and in degrees (ii) The angle to be set on compound slide for turning the taper on lathe (iii) The tail stock set over. 4 [CO#1]

[b] What is the need of a clapper box in a shaper? What is the difference between shaping and planning operations? 4 [CO #1]

2[a] Evaluate the machining parameters for slab milling in which the surface of a brass workpiece is machined by using a 60 mm plain milling cutter, spindle rpm is 375, table speed is 50 cm/min, length of the workpiece is 140 mm, width of cutter is 90 mm, width of the workpiece is 80 mm, depth of cut is 2 mm, helix angle is 30° and the number of cutter teeth as 8. 5 [CO #3]

[b] State the salient features of automatic screw cutting machines and CNC chucker. 3 [CO #2]

3 Give the tooling layout and steps to be followed for the production of a hexagonal bolt by the capstan lathe. 8 [CO #2]

4 Sketch different views of a twist drill and state its various elements and angles. 8 [CO #3]

5 Explain with sketches the following milling operations:
(i) Slab milling
(ii) Gang milling
(iii) T- slot milling
(iv) Form milling [CO

6[a] What are the main types of machine tool drives? Discuss the desirable characteristics of an ideal drive. [CO

[b] Enumerate the machining parameters and related quantities in surface grinding. [CO

7[a] Specify a grinding wheel with the following wheel designation:
45A60L5V33. [CO

[b] Name the gear generating cutting processes. Explain the gear shaping process. [CO

Total No of Pages...Two... *Roll No.....*

Third Semester **B Tech [Prod. & Indl. Engg.]**

End Semester Examination *(November - 2022)*

PE - 207 Engineering Analysis and Design (Modeling and Simulation)

Paper Code **Title of the Subject**

Time: 03 Hrs. **Max Marks. 40**

Note : Question No. 01 is Compulsory.
Attempt four Questions more from the rest of the Question Paper.
In total attempt Five Questions.
Assume missing data, if any.

Q No 1 Differentiate between. **(2x04=08)** **CO 01**

(i) – Beam and Column.

(ii) – Reference and Bibliography.

(iii) – Normal Stress and Principal Stress.

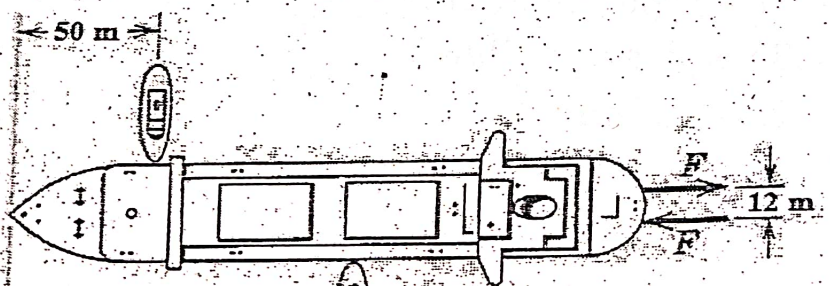
(iv) – Parallel axis and Perpendicular axis theorem.

No 2(a) What are the steps of Engineering Design process? Discuss in brief. **(04)** **CO 04**

No 2(b) Discuss any Case study of the Situation, when the failure would have been caused by some fault in Design, in brief. **(04)** **CO 02**

No 3(a) What are various Equivalent systems of Forces? Explain in brief. **(04)** **CO 03**

No 3(b) Each propeller of the Twin screw ship develops a full speed thrust of 300 kN. In maneuvering the ship one propeller is turning full speed ahead and the other full speed in reverse. What thrust P must each tug exert on the ship to counteract the turning effect of the ship' s propellers? **(04)** **CO 02**



Q No 4(a)	What are the fundamental principles of Ethics for Professional Engineers? Discuss in Brief.	(04)	CO 01
Q No 4(b)	What are the guidelines for writing a good Technical report? Discuss its features in brief.	(04)	CO 04
Q No 5(a)	What is Flexure formula? Explain all the terms of it. A steel wire of 08 mm diameter is bent into a circular arc of 22 m. Determine the maximum stress induced in it. (E = 200 GPa).	(04)	CO 03
Q No 5(b)	What do you understand by Torsional rigidity? Design a Steel shaft, having shear strength as 92 N/mm². The shaft is being operated by a Motor of 960 kw, running at 1600 rpm.	(04)	CO 0
Q No 6(a)	Draw Stress strain diagram of mild steel, showing & explaining different distinct points on it.	(04	CO
Q No 6(b)	A steel bar, which is 50 mm wide, 12 mm thick and 300 mm long is subjected to an axial pull of 84 kN. Find the change in the length, width, thickness and volume of the bar. Take E = 2×10^5 N/mm² & Poisson's ratio = 0.32.	(0	CO
Q No 7(a)	What are the purpose and features of CREO software? Also discuss about its various modules in brief.		C
Q No 7(b)	Write any 4 Commands/Options used in the CREO Parametric Software for converting 2D sketches into 3D. Explain with Examples in brief.		
Q No 8	Write Short Notes on any Two of the following. (i) – Unethical Behavior (ii) – Poster presentation. (iii) – Theories of Failure. (iv) – Design Softwares.		(2

Total No. of Pages _3nos. Roll No. .....

3rd SEMESTER **B.Tech (ME)**

END SEMESTER EXAMINATION NOV. 2022

PE251 Engineering Materials and Metallurgy

Time: 3:00 Hours *Max. Marks : 40*

Note : QNo.1 is compulsory. Answer five questions from rest. Assume suitable missing data, if any.

Q.1 Answer the following questions in brief (**Compulsory question**):-

a) Nickel-based super alloys are used in the structure of aircraft turbine engines. What are the major properties of this metal that make it suitable for this application? CO-4

b) Define Linear density and Planar density for a crystal. Determine the linear density [110] and Planar density (110) for FCC in terms of 'r' atomic radius. CO-1

c) Show that the atomic packing factor for Molybdenum is 0.68. CO-1

d) What is the difference between fracture toughness and stress intensity factor? CO-5

e) Define Resilience and modulus of resilience. CO-1

f) Differentiate hardness and hardenability. CO-4

g) What is critical resolved shear stress? Write an expression for the magnitude of the applied stress required to initiate yielding. CO-1

h) Brief on precipitation hardening of duralumin alloy. CO-3

i) Differentiate edge and screw dislocation. CO-2

j) What is Creep in metals? Brief its different stages with a plot? CO-5

[10X1.5=15]

Q.2 Draw true stress and true strain plot for AISI1020? Write the relationship between engineering stress and true stress. The true stress-true strain behaviour of a rolled steel AISI1020 is given by:

$(\sigma = 737\varepsilon^{0.22})$MPa,

where, σ is true stress and ε is true strain. (a) What is the strain hardening exponent of this steel and what does it signify? (b) What is ultimate tensile strength (UTS) of this steel?. [5] CO-2

Q.3 Construct the hypothetical phase diagram for metals A and B between room temperature 20°C and 700°C given the following information:

• The melting temperature of metal A is 480°C, • The maximum solubility of B in A is 4 wt%, B, which occurs at 420°C, • The solubility of B in A at room temperature is 0 wt% B, • One eutectic occurs at 420°C and 18 wt% B–82 wt% A., • A second eutectic occurs at 475°C and 42 wt% B–58 wt% A, • The intermetallic compound AB exists at a composition of 30 wt% B–70 wt% A, and melts congruently at 525°C,• The melting temperature of metal B is 600°C • The maximum solubility of A in B is 13 wt% A, which occurs at 475°C, • The solubility of A in B at room temperature is 3 wt% A. [5]CO-3

Or

Draw a well labelled Fe-C equilibrium phase diagram. For a 99.65 wt% Fe–0.35 wt% C alloy at a temperature just below the eutectoid, determine the following: (a) The fractions of total ferrite and cementite phases, (b) The fractions of the proeutectoid ferrite and pearlite, (c) The fraction of eutectoid ferrite. [5]CO-3

Q.4 Draw isothermal transformation diagram for an iron–carbon alloy of eutectoid composition and then sketch and label time–temperature paths on this diagram to produce the following microstructures:

(a) 100% coarse pearlite, (b) 50% martensite and 50% austenite, (c) 50% coarse pearlite, 25% bainite, and 25% martensite. Also define the resulting microstructures. [5] CO-4

Q5. Define Paris law for a crack growth.

A high strength steel has a yield strength of 690MPa and a fracture toughness of 165MPa$(m)^{1/2}$. Based on NDT inspection, the smallest flaw size detected was 7.6mm. Assume that the most dangerous crack geometry in the structure is a single edge notch so that $K_{IC}=1.12\sigma\sqrt{(\pi a)}$. The structure is subjected to cyclic fatigue loading in which maximum tensile stress reached is 310MPa and compressive as 170MPa. If the fatigue crack growth for the steel is given by:$[da/dN=2.1X10^{-7}(\Delta K)^{2.25}]$ where 'a' is in m and ΔK is in MPa/$\sqrt{m}$. Estimate the fatigue life of the structure. [5] CO-5

Q6. What is surface hardening treatment? Why is this process employed? Explain in details the solid and liquid carburizing heat treatment processes. Why are post carburizing heat treatments carried out? [5] CO-6

Or

Give classification of composite materials based on the reinforcements. Brief the importance and explain the applications of Metal matrix composites and Carbon-carbon composites in industry. [5] CO-7

Total no. of Pages: 03

Roll no.....

III SEMESTER

B.Tech. [Chemical Engineering]

END TERM EXAMINATION *Nov/Dec-2022*

PE251 **Engineering Materials & Metallurgy**

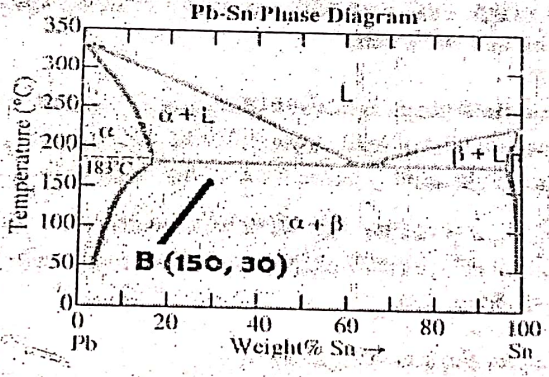
Time: 3:00 Hours *Max. Marks: 40*

Note: All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Mention different types of Bravais lattic s possible in crystalline materials. Show that the atomic packing factor of FCC crystal structure is 0.74.

[Marks 4][CO1]

Q.2 Define binary isomorphous phase system. For the lead-tin alloy in the given figure at point B, calculate the relative amount of each phase present in terms of (a) mass fraction and (b) volume fraction. At 150 ^{0}C, take the densities of Pb and Sn to be 11.23 and 7.24 g/c



[Marks 4][CO2]

Q.3 Define fracture. Differentiate between ductile and brittle fracture mechanisms with neat sketches. A large plate of glass is subjected

to a tensile stress of 50 MPa. If the specific surface energy and modulus of elasticity for this glass are 0.3 N/m and 70 MPa, respectively, determine the maximum length of a surface flaw that is possible without fracture [Marks 4][CO2]

OR

Q.3' Explain salient features of the microstructural aspect of fatigue failure with a neat sketch. What are the factors affecting fatigue failure? [Marks 4][CO2]

Q.4 What are the main classifications of stainless steel? Enumerate austenitic and martensitic stainless steel with composition, phases, and particular applications. [Marks 4][CO3]

Q.5 Define metallic corrosion and name different types of metallic corrosion. Explain intergranular corrosion in steel and how it can be protected. Distinguished between cathodic and anodic protection with suitable examples. [Marks 4][CO3]

Q.6 Define the creep fracture of crystalline materials. Explain one of the important descriptions of creep, using the power-law formula. What are the factors affecting the creep? Describe characteristics of creep-resistant material. [Marks 4][CO3]

OR

Q.6' Enumerate Martempering and Austempering. Explain which mechanical property is enhanced using these heat treatments. [Marks 4][CO4]

Q.7 What is a CCT diagram? Write short notes on critical cooling rate. Why are TTT diagrams usually not applicable to industrial engineering practices? [Marks 4][CO4]

Q.8 Explain annealing and classify it on Iron-Carbon diagram. Define Spherodizing Annealing. What is the main Advantage of Spherodizing. Explain which mechanical property is enhanced using this heat treatment. [Marks 4][CO4]

Q.9 Name the composite manufacturing processes. Describe the fiber-reinforced method with its application. Also, show how the longitudinal and transverse strength of the fiber-reinforced composite is increased. [Marks 4][CO5]

Q.10 What is powder metallurgy? Describe the various steps involved in the production of a self-lubricating bearing component by powder metallurgy. Describe the isostatic compaction method and identify its advantages over conventional powder pressing. [Marks 4][CO6]

OR

Q.10' Describe, using diagrams where appropriate, the mechanisms which occur during the following sintering processes: liquid phase sintering and solid sintering. Also, give an account of the advantages and disadvantages of each sintering process with a suitable example. [Marks 4][CO6]

Total No. of pages ..02 Roll No.....

THIRD SEMESTER
B.Tech. (AE)

END-TERM EXAMINATION Nov-2022

PE-261 QUANTITATIVE TECHNIQUES

Time: 3:00 Hours *Max. Marks: 50*

Note: Answer any five questions. All questions carry equal marks. Assume suitable missing data, if any. Use of statistical tables is allowed.

1. (a) Explain the Box and Whisker plot. Give examples where this can be used. [5](CO # 1)
   (b) List absolute and relative measures of dispersion. How co-efficient of variation is different from standard deviation. [5](CO # 1)

2. A project yields an average cash-flow of Rs. 500 lakhs with a standard deviation of Rs. 60 lakhs. It is assumed that cash-flow follows normal distribution. Calculate the following probabilities:
   i) Cash-flow will be more than Rs. 560 lakhs
   ii) Cash-flow will be less than Rs. 420 lakhs
   iii)Cash-flow will be between Rs. 460 lakhs and Rs. 540 lakhs. [10](CO#2)

3. (a) For a random sample of size 10 from a normal population, the mean is 12.1 and the standard deviation is 3.2. Is it reasonable to suppose that the population mean is 14.5? Test at 5% significance level. (Clearly state the null and alternative hypotheses and assumptions.) [5](CO # 2)
   (Given t_0 .025 at 9 d.f.=2.262; t_0 .05 at 9 d.f.=1.833

   (b) An investigation of the relative merits of two kinds of flashlight batteries showed that a random sample of 100 batteries of brand A lasted on the average 36.5 hours with a standard deviation of 1.8 hours, while a random sample of 80 batteries of brand B lasted on the average 36.8 hours with a standard deviation of 1.5 hours. Use a level of significance of 0.05 to test whether the observed difference between the average life times is significant. [5](CO # 2)

4. A company is manufacturing two different types of products A and B. Each product has to be processed on two machines M1 and M2. Product A requires 2 hours on machine M1 and 1 hours on machine M2. Product B requires 1 hour on machine M1 and 2 hours on machine M2. The available capacity of machine M is 104 hrs and that of machine M2 is 76 hrs. Profit per unit product A is Rs. 6 and that for B is Rs. 11.

(a) Formulate the problem.
(b) Find out the optimal solution by simplex method. [10](CO # 3)

5. Maximize $z = 7x_1 + 9x_2$
Subject to:

$$-x_1 + 3x2 \leq 6$$
$$7x_1 + x_2 \leq 35$$
$$x_2 \leq 7$$
$$x_1, x_2 \geq 0 \text{ and integer}$$

[10](CO # 3)

6. (a) Write short notes on any two topics out of the following: [2.5X2] (CO#1)

[i] Dominance principle
[ii] Minimax and Maximin principle

(b) The payoff matrix for a particular competitive situation is as under.

		B		
		I	II	III
A	I	7	6	3
	II	-2	2	-3
	III	5	9	7

i) Reduce the size of the game to 2x2 matrix by method of dominance.
ii) Determine the optimal strategies and calculate value of the game.

[5](CO # 2)

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Total No. of Pages: 01

Roll No. .....

Fifth Semester
B.Tech.

END TERM EXAMINATION Nov/Dec.-2022

PE 301 CASTING TECHNOLOGY

Time: 3 hours Mark: 40

Note: 1. Attempt any *FIVE* questions.
2. All questions carry equal marks.

1. (a) Explain the process of solidification of a metal with the help of cooling curve. (4)
(b) Explain the important design considerations for casting a component. (4) (CO#1)

2. (a) Explain the different types of cores used in a casting process. (4)
(b) Explain the principles of gating and risering systems in detail. (4) (CO#2)

3. (a) What are the features of a permanent mold casting process? Explain the high pressure die casting process with a neat sketch. (4)
(b) Explain the centrifugal casting process giving its advantages, limitations and applications in industry. (4) (CO#3)

4. (a) Explain the cleaning and finishing techniques employed in a casting process. (4)
(b) What do you understand by the term "foundry automation"? Explain an automatic flaskless molding process with a neat sketch. (4) (CO#4)

5. (a) Explain any two methods of heat treatment of castings. (4)
(b) What defects may occur in a casting? Explain their causes and remedies. (4) (CO#5)

6. Write short notes on any *two* of the following:
(a) Vacuum die casting (4)
(b) Slush casting (4)
(c) Melting furnaces (4)
(CO#3,4)

2297

END TERM EXAMINATION

Sept - 2022

PE-303

Production Planning & Control

Time: 3 Hours MM-40

Note: Attempt any five questions.
All Questions carry equal marks.
Assume suitable missing data, if any.

Q1a) Discuss in detail Production Systems and their Classification with examples.
b)Elaborate KANBAN model and its applications [8] [CO1]

Q2a)What is JIT? How is it useful in Improving the productivity of an industry? Discuss with suitable examples.
b)Elaborate work measurement systems used in industries. How are these useful in merit rating & wage system. [8][CO2]

Q3a) What is Production Planning & Control ? Discuss its various types of characteristics.
3b) What do you understand by Taylor's scientific management ? Discuss in detail.... [8][CO3]

Q4.a)Discuss Statistical Quality Control and Statistical Control limits.
b) Elaborate various control charts for variable data.. [8] [CO4]

Q5 a)Explain in detail principles, functions and objectives of material handling equipments.
.b) Enlist various types of maintenance planning... [8] [CO5]

Q6Write short notes on following::
a)Production scheduling...
.b)Staffing and Training
c)Open and closed loop system.
d) Canned Cycles.
e)Role of computers in PPC
f)Inventory management. [8] [CO4,CO5]

Total no. of Pages: 02

Roll no.....

V & VII SEMESTER

B.Tech

END TERM EXAMINATION

NOV-2022

PE353 Supply Chain Management

Time: 3 Hours *Max. Marks: 50*

Note: Answer any FIVE questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1(a) What are the important decision phases in a supply chain. Explain the significance of each phase. [05][CO1]

(b) Discuss how would you set up a collaboration mechanism for the enterprises in a supply chain? [05][CO1]

Q.2(a) A company needs 600 units per month, the procurement cost is Rs.36 per order, the cost of holding it in stock is Rs.1.20 per unit per year, determine the quantity that should be procured at a time to optimize the cost involved. If the consumption of the above item increases to 40 numbers per day and its actual inventory cost is Rs.0.50 per unit per month, what will be the revised EOQ? [05][CO2]

(b) What do you understand by the term "bullwhip effect" in supply chain management? Discuss its impact on the performance of supply chain with the help of suitable real-life example. [05][CO2]

Q.3(a) Define 'Material Resource Planning'(MRP) and describe the various inputs to MRP system. [05][CO3]

(b) A General Motors Buick plant manufactures several Buick models. The plant can produce 25 cars per quarter for each worker. Workers receive $15,000 per quarter. It costs $7,000 to hire and [05][CO3]

train a new worker and $10,000 to layoff a worker. GM has 480 workers on staff and 2000 cars in inventory from start. Any cars in inventory at the end of a quarter has a holding cost of $1,000. Construct an aggregate plan for the next four quarters using the chase and level strategies and compute their total costs.

Inputs

Quarter	1	2	3	4
Demand, Number of cars	10000	12000	9000	11000

Q.4(a) Discuss factors that affect the decision to outsourcing a supply chain function. [05][CO4]

(b) Explain in detail the different perspective and strategies of procurement. [05][CO4]

Q.5(a) Describe how a company achieves strategic fit between its supply chain strategy and competitive strategy. [05][CO5]

(b) Explain how Wal-Mart has used cross-docking to improve its supply chain efficiency. [05][CO5]

Q.6(a) Briefly describe how operation has evolved from the industrial revolution to globalization. [05][CO6]

(b) "Use of new technologies will help in effective asset utilization in logistics supply chain". Discuss. [05][CO6]

Q.7 Write short notes on

(a) Risk Pooling [05][CO2]

(b) Third party logistics [05][CO5]

300

Total No. of Pages : 02 Roll No.....

B.Tech.

END TERM EXAMINATION **Nov-2022**

PE361 TOTAL QUALITY MANAGEMENT

Time: 3:00 Hours *Max. Marks: 50*

Q1. Write Short-notes on (any five): (CO 1,2,3,4,5,6) (5x2)

(i) Argument against Six-Sigma with example
(ii) ISO 9000 certification
(iii) Bath-tub Curve
(iv) Quality circles
(v) Kaizen
(vi) failure mode and effects analysis (FMEA)
(vii) Process Capability

Q2. (a) What are the Characteristics of Good Sampling Plan? (CO-3)

(b) A single sampling plan is given as N=10,000, n= 100 and c=2;

(i) Compute the approximate probability of acceptance of lots with 1% defective.
(ii) Determine AOQ for above loss, and
(iii) What will be the average inspection in percent. (2+8)

Q3 . A lot is having 2% defective and sampling plant n=90, c=2. Find percentage AOQ, if 15 lots of 3,000 each are shipped to consumer. P_a for defective is 0.731 and AQL at $\alpha = 0.05$ is 0.9%. (5)

Q4. (a) What are the basic elements of reliability? (CO-5)

(b) An aircraft engine consists of three modules having constant failure rates of $\lambda 1 = 0.002$ $\lambda 2 = 0.015$ and $\lambda 3 = 0.0025$ failures per operating hour. What is the reliability function for the engine and what is the MTTF? (2+3)

5 (a) Define Failure Rate and Hazard Function. (b) Derive Reliability function $R(t)$ in terms of hazard rate $h(t)$ (CO-6) (4+6)

Or

A component with specification limit is given as 40.37 ± 0.10 while inspection. The component were taken in sub-group of 5 items; 10 such sub-groups were checked. The $\bar{X}$ and R values were noted as follows:

Subgroup no.	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	34	30.8	35	33	33.8	35.8	34	33.8	31.8	33
R	4	2	5	5	19	4	14	7	9	5

(i) Establish the control limit for $\bar{X}$ and R charts. (ii) Draw the chart and draw the conclusion. (iii) Find the Process capability for sub-group size 5 (Take $A_2 = 0.577$; $D_3 = 0$; $D_4 = 2.115$) (CO-2) (10)

Q6. What are the Deming's fourteen points for implementing Quality Improvement and how they help? (CO-1) (10)

Total No. of Pages: 01 302 Roll No.....

7th Semester
B.Tech.

END TERM EXAMINATION NOV/DEC-2022

PE-413 Robotics and Automation

Time: 3 Hours Max. Marks: 50

Note: Attempt any five(05) questions.
All questions carry equal marks.

1 (a) What do you understand by robot anatomy? Explain it with showing diagram? (CO 1)

(b) Classify robot on the basis of Industrial application? What are non- manufacturing areas of robotic applications? (CO 1)

2 (a) What is an industrial robot? Describe various types of applications of industrial robot? (CO 2)

(b) How are the axes of robot defined? Show with the help of sketches the working volume of various types of robots? (CO 2)

3(a) Briefly discuss about robot program? Distinguish between explicit and implicit programming? (CO 3)

(b) Make a list of robot languages currently in use? Explain the essential features of any higher level robot language? (CO 3)

4(a) Write down different types of drives used in industrial robots? Explain briefly any three of them? (CO 4)

(b) What is control resolution in a robot positioning system? Differentiate between repeatability and accuracy in a robotic manipulator? (CO 4)

5(a) Discuss about the working principle of sensors suitable for detecting the presence of plastic work-pieces? (CO 5)

(b) A robotic vision system is used to aid the robot to pick parts from a conveyor. What information must the vision system acquire from the image to make the robot work intelligently? Make a flow chart of this process. (CO 5)

6(a) Explain the potential safety hazards for the workers of chemical industry? (CO 6)

(b) Briefly discuss about latest development in safety measurement in an industrial robot? (CO 6)

303

END TERM EXAMINATION
Nov- 2022
PE-411
Computer Integrated Design & Manufacturing

Time: 3 Hours

MM-50

Note: Attempt any Five Questions
All Questions carry equal marks.
Assume suitable missing data, if any.

Q1: Discuss in detail following with suitable examples:
a) Numerically Controlled and Computer integrated manufacturing...
b) Computerised Numerically Controlled and its implementation in Turning operations..
c) Direct Numerically Controlled and its types..
d) Computer Aided Manufacturing and its role in automation..
e)Parallel programming. Discuss its advantages and limitations [10][CO1]

Q2: Explain various factors which a production controller should consider to adopt CIDM technology for the first time .How is this technology useful in precision sheet metal processing? [10][CO2]

Q3 a: What is programming used in Computer Aided Manufacturing? Discuss APT in detail with its various types of statements.
3b: Write a program in APT language to machine a cylindrical component on CNC lathe .. Total length of the component is 300mm..Diameters 20mm,30mm, 40 mm at equidistant of 100mm... Turning can be performed in two passes- rough and finish..Material of the component is mild steel.. [10][CO4]

Q4: What do you understand by term Interpolation in relation to CIDM ? Explain Circular Interpolation, Parabolic Interpolation and Linear Interpolation. [10][CO4]

Q5: Discuss Group Technology with examples What is a Canned Cycle? How Canned Cycles are useful in programming of computer integrated manufacturing? [10][CO3]

Q6:Elaborate the term Computer Aided Process Planning ....What are its different types? How is CAPP related to Computer Aided Design and Computer Aided Manufacturing ? Discuss in detail...[10] [CO5]

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Total No. of Pages 02 Roll No.....

SEVENTH SEMESTER

B. Tech.

ENDTERM EXAMINATION *Nov/Dec-2022*

PE417 MATERIALS MANAGEMENT

Time: 3:00 Hours *Max. Marks: 50*

Note : Answer any FIVE questions.
All questions carry equal marks.
Assume suitable missing data, if any.

1 (a) What are the objectives of materials management? Explain them. [5] CO1

(b) What are the reasons of material management? [5] CO1

2 (a) What are the reasons for classification, codification and standardization of materials? [6] CO2

(b) A hardware store procures and sells hardware items. The following information is available: [4] CO5

Expected annual sales – 1000 units
Ordering cost – Rs. 500 per order
Holding cost – 10% of average inventory value

The item can be purchased in the following schedule:

Lot size	Unit price (Rs.)
1 – 999	25.00
1000 and above	23.00

Determine order size.

3 (a) What are the basic assumptions of Wilson EOQ model? [4] CO2

(b) Explain Wilson model and calculate optimum system cost, economic lot size. [6] CO2

4 (a) Explain optimal policy curve for rationalization. [5] CO3
(b) What are the need and rationale of physical verification? [5] CO4

5 (a) What are the factors considered in favour of making? [4] CO4
(b) What are the various vendor rating plans? Explain. [6] CO4

6 Write short notes on any FOUR of the following: [10] CO2
(a) Color coding of ABC analysis
(b) JIT
(c) Advantages of decentralized
(d) Importance of good store-keeping
(e) Cost consideration in making

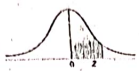
7[a] Describe the Functional organization. What are its limitations? 5[CO#5]

[b] What are the problems during project closure? Why do projects tend to drag along and what can be done by the project manager at this stage? 5[CO#6]

TABLE B.10

The Standardized Normal Distribution

Entry represents area under the standardized normal distribution from the mean to z



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4163	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.49865	.49869	.49874	.49878	.49882	.49886	.49889	.49893	.49897	.49900
3.1	.49903	.49906	.49910	.49913	.49916	.49918	.49921	.49924	.49926	.49929
3.2	.49931	.49934	.49936	.49938	.49940	.49942	.49944	.49946	.49948	.49950
3.3	.49952	.49953	.49955	.49957	.49958	.49960	.49961	.49962	.49964	.49965
3.4	.49966	.49968	.49969	.49970	.49971	.49972	.49973	.49974	.49975	.49976
3.5	.49977	.49978	.49978	.49979	.49980	.49981	.49981	.49982	.49983	.49983
3.6	.49984	.49985	.49985	.49986	.49986	.49987	.49987	.49988	.49988	.49989
3.7	.49989	.49990	.49990	.49990	.49991	.49991	.49992	.49992	.49992	.49992
3.8	.49993	.49993	.49993	.49994	.49994	.49994	.49994	.49995	.49995	.49995
3.9	.49995	.49995	.49996	.49996	.49996	.49996	.49996	.49996	.49997	.49997

Total no. Of Pages: 04 *Roll no.....*

SEVENTH SEMESTER **B.Tech. [PE]**

END TERM EXAMINATION ***November-2022***

PE419 PROJECT MANAGEMENT

Time: 3:00 Hours *Max. Marks: 50*

Note : Answer any FIVE questions.
Use of Statistical Table is Permitted.
Assume suitable missing data, if any.

1[a] Taking an example from the manufacturing sector, identify the typical problems that could be faced by a project manager at different stages of a project. 5[CO#1,2]

[b] ABC company limited proposes to start a new venture for the manufacture of fluorescent bulbs. The estimates of the new venture are as under: 5[CO#2]

Output of bulbs per annum	: 3,00,000 nos
Expected sales revenue per annum	: Rs. 1,50,00,000
Fixed costs	: Rs. 35,00,000
Variable costs	: Rs. 66,00,000

(i) Calculate Break Even Point (BEP)
(ii) If the selling price comes down to Rs 40.00 per unit, find out its effect on BEP.
(iii) If the fixed cost increases to Rs 40,00,000, find out its effect on BEP.
(iv) If the variable cost increases by10% find out its effect on BEP.

2[a] What is Earned Value Analysis? Explain with the help of an example. 5[CO#2,4]

[b] Explain 'Total float', 'Free float' and 'Independent float' of activities and their significance in management decisions. 5[CO#4]

3[a] Differentiate between CPM and PERT. 3[CO#4]

[b] The data associated with a project are shown in the following table:- 7[CO#2,4]

Activity	Optimistic Time (weeks)	Most likely Time (weeks)	Pessimistic Time (weeks)
1-2	5	8	10
1-3	18	20	22
1-4	26	33	40
2-5	16	18	20
2-6	15	20	25
3-6	6	9	12
4-7	7	10	12
5-7	7	8	9
6-7	3	4	5

(i) Draw the project network.
(ii) Expected completion time and variance of each activity.
(iii) The probability of expected completion time of the project if the original scheduled time of completing the project is 41.5 weeks.
(iv) The duration of the project that will have 95% chance of being completed.

4[a] What are the limitations of Gantt chart? 2[CO#2]

[b] The data associated with a project are shown in the following table:- 8[CO#4]

Activity	Predecessors	Duration
A	-	14
B	A	4
C	B	2
D	C	1
E	A	2
F	E	3
G	E	2
H	E	4
I	H,L	3
J	K	12
K	D,F,G	4
L	J	2
M	H,L	2

(i) Draw the network diagram for this project.
(ii) Find the critical path as well as the project completion time.
(iii) For each non-critical activities, calculate the total float, float and independent float.

5[a] Explain the terms Project crashing and Resource levelling. 3 [CO#3]

[b] The data on normal time, crash time, normal cost and crash cost of all the activities are given in the following table:- 7[CO#3]

Activity	Normal time (days)	Normal cost (Rs.)	Crash time (days)	Crash cost (Rs.)
1-2	5	1,000	4	1,200
1-3	7	2,100	5	2,300
2-4	3	1,500	2	1,700
3-4	2	1,300	2	1,300
3-5	6	1,200	4	1,400
4-6	5	2,000	4	2,500
5-6	3	1,500	2	1,700

The Indirect cost is Rs. 300 per day. Establish the time cost relationship and determine the optimal project completion time and cost.

6[a] How and why do interpersonal conflicts arise in projects? 3[CO#6]

[b] A project with the following activity, durations and manpower requirement is given. Draw the network diagram. Analyse the project from point of view of resource to bring out the necessary steps involved in the analysis and smoothing of resources. 7[CO#3]

Activity	Duration(weeks)	Manpower required
1-2	2	4
2-3	3	3
2-4	4	3
3-5	2	5
4-6	4	3
4-7	3	4
5-8	6	3
6-8	6	6
7-9	5	2
8-10	4	2
9-10	4	9

Total no. of Pages 03 Roll no.....

3rd SEMESTER

B.Tech (Common for Minor students)

END TERM EXAMINATION Nov-2022

IT201 Data Structures

Time: 3:00 Hours *Max. Marks: 40*

Note: All questions are compulsory. Kindly check the paper code before start your exam.
All questions carry equal marks. Assume suitable missing data, if any.
[M]: Marks allocated to the question. [CO#]: Course Outcome number.

Q. No.	Question Description	[M] [CO#]
Q.1	(a) Implement a Min priority queue in C/C++ using a heap. Show all the functions elaborately.	[4] [CO1]
	(b) Write a routine/algorithm to find, count and remove duplicate elements in a queue. Give some applications of queues.	[3] [CO1]
	(c) Write a C/C++ program to find the missing number in sorted integer array of 1 to 100.	[3] [CO1]
Q.2	(a) Write the screen display output for the following code on the given linked list. Justify your answer. *Linked list: 25->21->30->24->15->6*	[3] [CO2]

```
void fun (struct node* start)
{
  if(start==NULL)
    return;
  printf(" %d ", start->data);
  if(start->next! =NULL)
    fun(start->next->next);
  printf(" %d ", start->data);
}
```

(b) What will be the maximum number of keys that a B-Tree of order M and level L may have (derive expression). [2] [CO3]

(c) Write a program in C/C++ to interchange the value of the first element with the last element, second element with second last element, so on and so forth of a doubly linked list. [5] [CO2]

Q3. (a) Consider the In-order and Pre-order traversal of the binary tree. [2+1+2] [CO3]

In-order: 10, +, 20, /, 5, *, 15, %, 7, -, 3
Pre-order: *, +, 10, /, 20, 5, -, %, 15, 7, 3

i. Construct the expression tree from the above mentioned In-order and Pre-order expression.
ii. Find the postfix/Post-order expression from the tree constructed in part i.
iii. Perform stepwise evaluation of above postfix expression using stack.

(b) Define *B-Tree* of order *m*. Consider the following sequence of nodes and show the growth of the *B-Tree* of order 5. [2+3] [CO3]

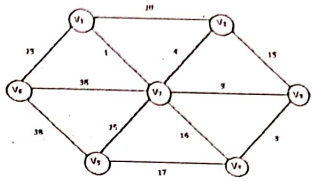
A, I, W, L, P, X, C, J, D, M, T, B, Q, E, H, S, K, N

After constructing the B-Tree, delete the following sequence: W, I, D, M, and T from B-Tree. Show all necessary steps.

OR

(b) Create an AVL tree. Insert following elements into AVL Tree: 20, 15, 40, 60, 30, 35, 65, 75, 10, 5, 8, 12, 11, and 13. Further, delete following elements from the constructed AVL Tree: 40, 35, 15, and 60. Show all necessary steps.

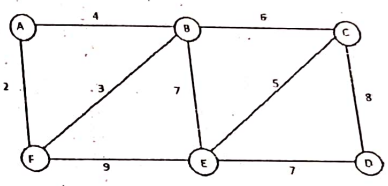
Q4. (a) Find out the minimum cost spanning tree by using Kruskal's Algorithm of the graph shown below: [5] [CO4]



Show all necessary steps of your solution.

OR

(a) Find minimum cost spanning tree by using Prim's Algorithm of the graph shown below:



Show all necessary steps of your solution.

(b) Define Hashing. Discuss the various methods to generate the various type of Hash Functions. [3] [CO4]

OR

(b) Write an algorithm for creating a heap of size i by adding a key to a heap of size (i – 1) where i >=1.

(c) Highlights the advantages and disadvantages of heap sort. [2] [CO4]

End

Total no. of Pages:2 Roll no.....

III SEMESTER

B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

IT203 **Object Oriented Programming**

Time: 03:00 Hours *Max. Marks: 40*

Note : Answer the questions with relevant code.
All questions are compulsory. Internal choices between parts are indicated using OR.
Assume suitable missing data, if any.

Q.1 Answer the following questions: [2x6=12]

a) I/O streams in Java [CO5]

b) What is the need for generic programming? [CO4]

c) What are applets? Discuss their use. [CO7]

d) Which operators cannot be overloaded? Demonstrate overloading of ! operator via C++ code. [CO3]

e) Compare public, protected and private visibility modes. [CO6]

f) What are the major components of STL? Discuss briefly. [CO6]

Q.2 a) What is the difference between structures in C and C++? Support your answer with help of examples. [3][CO1]

OR

Explain the features of object-oriented programming with suitable code and examples. [3][CO1]

b) What are the different types of constructors? Which constructors are present in the class by default? How does a child class constructor pass arguments to base class constructor? Explain with examples. [4][CO2]

Q.3 a) How can you create dynamic objects? Demonstrate with code. What are the advantages of creating dynamic objects? [3][CO2]

OR

What are friend functions? Create two classes Square and Rectangle with 2 data members. Both have a friend function CompareArea that prints which shape has greater area based on the dimensions entered by user for respective objects. [3][CO2]

b) What are abstract classes? Describe the difference in inheritance behaviour achieved through pure virtual function, ordinary virtual function and non-virtual function. [4][CO3]

Q.4 a) What is the need of exception handling? How can we catch all types of exception? Write a C++ code for exception handling that prints "Arithmatic Exception caught" when a negative number is input for integer variable x. [3][CO4]

OR

Write a C++ code to show the use of function template and class template. [3][CO4]

b) What is typecasting and its types? Write a code to show typecasting of one object type to another object type. [4][CO5]

OR

Why is Java secure? What is byte code and why is Java called a platform-independent language? What is widening and narrowing of data types in Java? [4][CO5]

Q.5 a) What is polymorphism? Explain its types with the help of suitable code. [3][CO6]

OR

Write a C++ code to overload new and delete operators. [3][CO6]

b) What is multithreading? What are the two ways of achieving multithreading in Java? Show synchronization of threads with the help of code. [4][CO7]

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Total no. of Pages: 02

Roll no.....

3rd SEMESTER

B. Tech (IT)

END TERM EXAMINATION *Nov/Dec-2022*

IT 205 Discrete Structure

Time: 03:00 Hours *Max. Marks: 50*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (a) (i)How many symmetric and reflexive relations are possible from a set A containing 'n' elements? [3] [CO1]

(ii) Show that the propositions $p \rightarrow q$ and $\neg p \vee q$ are logically equivalent. [2] [CO1]

(b) Explain Boolean Function? What is the simplified sum of product form for the Boolean expression:

$$(A + B' + C')(A + B' + C)(A + B + C')$$

[5] [CO2]

Q.2 (a) Calculate the Time complexity of Quick sort algorithm in term of recurrence relation. Sort the list X= {42, 28, 90,2, 56. 39, 12, 87} using quick sort. [5] [CO4]

(b) Using principal of mathematical induction prove that $\sqrt{n} < \frac{1}{\sqrt{n}} + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \ldots + \frac{1}{\sqrt{n}}$ for all natural numbers n>= 2. [5] [CO3]

Q.3 (a) (i) A teacher gives a multiple-choice quiz that has 5 questions, each with 4 possible answers: a, b, c, d What is the minimum number of students that must be in the class in order to guarantee that at least 4 answer sheets will be identical? (Use Pigeon hole principle).

[3] [CO4]

(ii) Let R be a relation on the set A = (1, 2, 3, 4} 3 such that aRb if and only if a + b>5. Check if R is reflexive, transitive. [2] [CO3]

(b) Define Equivalence Relation. If R and S be two equivalence relation in a set A, then prove that RUS is also an equivalence relation in A. Also give suitable example. [5] [CO3]

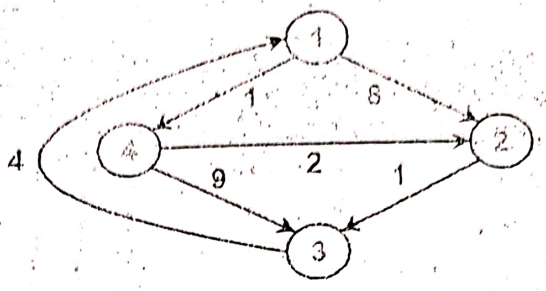
Q.4 (a) Let x = {1,3,5,7,15,21,35,105} and R be the relation'/'(divides) on the set x then x is the Poset. Draw the Hasse diagram of the given Poset. Determine the following:

(i) LUB of 3 and 7

(ii) GLB of 15 and 35.

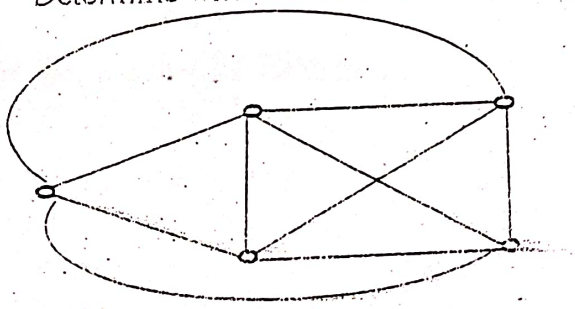
(iii) Greatest and Least element of x. [5][CO5]

(b) Consider the following directed weighted graph-



Using Floyd Warshall Algorithm, find the shortest path distance between every pair of vertices. [5][CO5]

Q.5 (a) Determine whether the following graph is:



(i) Hamiltonian, if yes, find the Hamiltonian cycle.

(ii) Eulerian, if yes, find the Euler cycle. [5][CO5]

(b) Explain the following with suitable example:

(i) Connected Graph

(ii) Planar Graph

(iii) Vertex colouring of graph

(iv) Rooted Tree

(v) Bipartite Graph

[5][CO6]

Total No. of Pages-3 Roll No.

THIRD SEMESTER **B.Tech. [IT]**

END TERM EXAMINATION Nov. /Dec. 2022

IT-207- ENGINEERING ANALYSIS AND DESIGN (MODELLING & SIMULATION)

Time: 3:00 Hours *Max.Marks:50*

Note: Attempt total *FIVE* questions & All questions carry EQUAL marks.
Question No.1 is compulsory to attempt.
Assume suitable missing data, if any.

Q1 [CO 1-5]

[a] Identify the difference between verification and validation of a model.

[b] When to use simulation? And also outline at least three the benefits of simulation.

[c] Compare and contrast the modeling process with the software life cycle: Analysis, design, implementation, testing, documentation, and maintenance.

[d] What is IID process and discuss its importance in respect of random number generation?

[e] What is the Simulation language? Discuss the different kinds of simulation language.

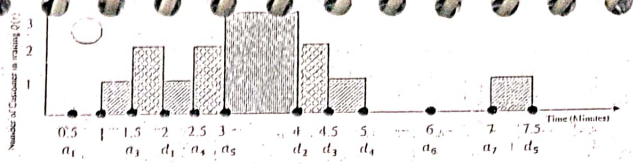
Q2 [CO-2]

[a] What are the components of the system? Consider 'Library of the university' as a system, identify its components. Also, develop workflow mechanism of hostel using various program subroutines.

[b] What is discrete event simulation model? Describe the time advance mechanism of discrete event simulation model.

Q3 [CO 3]

[a] Consider a single server queuing model for which the possible time path of realization is as given in below figure, where $a_1, a_2, a_3, a_4, a_5, a_6, a_7$ and d_1, d_2, d_3, d_4, d_5 are the arrival and departure instances of the customers. Determine the followings:-



I. Expected average delay in queue of the customers.

II. Expected time average number of customer in queue.

III. Expected non utilization of server and plot of utilization of server using concept of busy function.

[b] A customers calls arrive at a software support center with exponentially distributed inter arrival times with an average time between arrivals of 15 minutes. What is the probability that 5 customers will arrive between 1 and 2:30 p.m.?

Q4 [CO3]

Consider a discrete random variable X with range $R_X = \{1, 2, 3, \ldots\}$ and probability mass function of X is given by $P_X(k) = \frac{1}{2^k}$ *for* $k = 1, 2, 3 \ldots$

Determine the followings:

[a] Cumulative Distribution Function of X and sketch the distribution.

[b] $P(2 < X \leq 5)$

[c] $P(X > 4)$

[d] A fair coin is tossed 4 times. Let X denote the number of heads showing up. Find the distribution of X. Also find its Mean, Variance and Standard Deviation.

Q5 [CO 4]

A network manager operates one server during 9:00 AM to 5:00 PM for giving service to the customers. In the current context, consideration is being given to the addition of the second server for the service. The demand for a server follows the distribution as given in the table:

Time Between demand (Minutes)	15	20	25	30	35
Probability	0.14	0.22	0.43	0.17	0.04

The distribution of time to complete service by the server is as follows:

Service Time (Minutes)	5	15	25	35	45
Probability	0.12	0.35	0.43	0.06	0.04

Simulate five individual days of operation of the current system and the system with an additional server. Compare the two systems with respect to the waiting time of the customers and any other measures that might shed light on the situation.

Q6 [CO 5]

A news dealer buys papers for 33 cents each and sells them for 50 cents each. Newspapers not sold at the end of the day are sold as scrap for 5 cents each. Newspapers can be purchased in bundles of 10. The ordered quantity Q is the only policy decision. Q is fixed since ending inventory is always zero due to scrapping leftover papers. There are 3 types of news days: "good", "fair", "poor", but the news dealer cannot predict which type will occur on any given day. The following tables gives the distribution of newspapers demanded by the type of day.

The distribution for type of News day is given as below –

Type	Good	Fair	Poor
Probability	0.35	0.45	0.2

The distribution of demand

Demand	Demand probabilities		
	Good	Fair	Poor
40	0.03	0.10	0.44
50	0.05	0.18	0.22
60	0.15	0.40	0.16
70	0.20	0.20	0.12
80	0.35	0.08	0.06
90	0.15	0.04	0.00
100	0.07	0.00	0.00

Simulate the purchase of 70 newspapers per day for 20 days and compute the profit of the news dealer. Random numbers for Type of News day: 94, 77, 49, 45, 43, 32, 49, 00, 16, 24, 31, 14, 41, 61, 85, 08, 15, 97, 52, 78
Random numbers for Demand: 80, 20, 15, 88, 98, 64, 86, 73, 24, 60, 60, 29, 18, 90, 93, 73, 21, 45, 76, 96.

CO: Course Outcome

Total no. of Pages 02

Roll no.....

Vth SEMESTER

B.Tech

END TERM EXAMINATION Nov-2022

IT301 Theory of Computation

Time: 3 Hours Max. Marks: 50

Note : Attempt All question.
All questions carry equal marks.
Assume suitable missing data, if any.

Q1. For the context-free language (CFL) L= { $a^n b^m c^m$ | n≥1, m≥ 1} do the following: [2+4+4] [CO4]

a) Design the context-free grammar (CFG): G= (V, T, S, P) for this language.
b) Convert the CFG to the Chomsky Normal Form.
c) Construct the Push Down Automata (PDA) for the language.

Q2. a). Explain any three of the following with example: [2+2+2][CO1]

i. What do you mean by distinguishable and indistinguishable in finite state automata?
ii. What do you understand by the Halting problem?
iii. What is recursive and recursively enumerable languages in terms of the "halting" operation of the Turing machine.
iv. What is decidable and undecidable problem.
v. Explain in brief about the Kleen's Theorem.

b) For each of the given problems for a given Turing machine M and a string w, check whether these are decidable or undecidable. Justify your answer with brief explanation. [4][CO6]

i. Given an integer k and Turing machine M accepts a string w with in k steps.
ii. Determine whether M on giving input w moves its head to the left ever.

Q3. a) What is Pumping Lemma for Context Free Language. Prove that the given language is not CFL. [1+4][CO2]

$L' = \{ a^n b^m a^n b^{n+m} \mid n, m \geq 0 \}$

OR

a) Consider the below grammar and check that given grammar is ambiguous and also show possible parse trees, leftmost derivation and rightmost derivation for the string aab. [5] [CO2]

$$S \rightarrow aS \mid aSbS \mid \varepsilon$$

b) Design Moore machine for input from $(0+1+2)^*$ that print the residue mod 5 of the input treated as ternary (base 3, with digits 0,1,2) number. [5][CO3]

Q4. a) What is Universal Turing Machine? Design a Turing Machine M (state diagram; state table) to recognise the language $L=\{a^{n+m}\, b^n\, c^m \mid n, m \geq 1\}$. Trace the string aabc through the Turing Machine. [6] [CO5]

OR

a) Construct a Turing Machine for the multiplication of two numbers. Show the transition function and transition diagram with tape explanation. Show the multiplication of 2 and 3 using the designed Turing Machine. [6] [CO5]

b) Write a Regular Expression and Construct a Finite Automata (FA) accepting the set of strings over $\Sigma = \{0,1\}$ having 101 or 110 as a sub-string. [4] [CO1]

OR

b) Explain the post correspondence problem. Let A = {1, 110, 0111} and B = {111, 001, 11} and alphabet $\Sigma = \{0,1\}$. Solve this Post correspondence problem. [4] [CO1]

Q5. a) Convert the given context free grammar into a Chomsky Normal Form. Show all the steps of null production and unit production removal [5][CO2]

$$S \rightarrow ASA \mid aB$$
$$A \rightarrow B \mid S$$
$$B \rightarrow b \mid \varepsilon$$

b) What is two stack push down automata. Design a two stack push down automata for the given language. [5][CO4]

$$L = \{a^n b^n c^n d^n \mid n \geq 0\}$$

Total No. of Pages: 02 Roll No.....

V SEMESTER
B.Tech.(IT)
END-TERM EXAMINATION Nov/Dec- 2022
IT303 – Computer Networks

Time- 03:00 Hours Max. Marks: 40

Note: Attempt any Five questions.
Each question is 08 marks.
Assume suitable missing data, if any.

Q.1[a] Differentiate between Connection-oriented and Connection-less services.

[b] Define the terms static, adaptive and hierarchical routing. How does Link state routing overcome the shortcomings of Distance Vector Routing? (CO3)[2+6 marks]

Q.2[a] Compare open as closed loop congestion by giving one technique for each.

[c] How does the optimality principle enable routing? (CO3)[6+2 marks]

Q.3[a] Explain the mechanism of sending and receiving e-mails(with attachments) and associated protocols SMTP, POP amd IMAP.

[b] FTP uses TCP and not UDP, Justify. (CO5)[6+2 marks]

Q.4[a] Compare the UDP and TCP protocols through their header formats.

[b] What issues would be caused if a TCP/IP network using the Nagel's Algorithm stopped using it? (CO3)[4+4 marks]

Q.5[a] Explain in detail how sliding window protocol is used for transport layer flow, why does it differ from flow control at layer 2 by including congestion control?

[b] What is the significance of pseudo header and concept of "Port" at the transport layer? (CO4)[6+2 marks]

Q.6[a] What is the Network ID, subnet mask, broadcast address, First Usable IP and Last Usable IP on the subnet that a node 192.186.1.15/27 belongs to? If the given block was to be divided among four subnets determine the First and Last Usable IP of each subnet.

[b] Show using the above network as example advantage or disadvantage of CIDR over Classful addressing. (CO4)[6+2 marks]

Q.7 Write Short notes on (any two):

a] IEEE-802.3 LAN Standard

b] HTTP

c] Hubs, switches and routers (CO5)[4+4 marks]

Total No. of Pages: 02 Roll No.

FIFTH SEMESTER **B.Tech. (All)**

END SEMESTER EXAMINATION Nov/Dec-2022

IT-307 PATTERN RECOGNITION

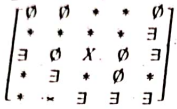
Time: 03:00 Hours *Max. Marks: 40*

Note: All questions carry equal marks.
Attempt any FIVE questions
Assume suitable missing data, if any.

Q.1 **[CO1]**

[a] What is the goal of Pattern Recognition? State the components involved in it? Also mention some of the real-world applications of Pattern Recognition **[4]**

[b] Consider a pattern as given in below figure, which consist of the various objects belongs to different classes. Classify an unknown pixel 'X' as given in Fig. 1 using Naïve Bayes classifier.



Q.2 **[CO2]**

[a] Give difference between Classification & Clustering? How clustering is used in custom ensemble techniques? **[4]**

[b] Explain the working of K-means & Hierarchical clustering? What are the advantages of DBSCAN clustering technique? **[4]**

Q.3 **[CO2]**

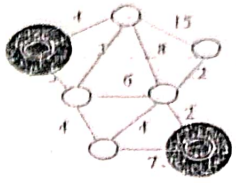
[a] What are the key differences between Regression KNN model and classification KNN model? **[2]**

[b] What is the role of Normal Distribution in Pattern Recognition? Using Normal distribution curve find the probability that randomly selected adult female has height greater then 170 cm, if the heights of adult females are normally distributed with a mean of 160 cm and standard deviation of 8 cm. *(P(z<1.25) =0.8943)* **[6]**

Q.4 **[CO3]**

[a] Give framework for feature selection? State and explain (i) Forward Selection, (ii) Backward Elimination & (iii) Recursive Feature elimination techniques used in feature selection search? **[4]**

[b] Describe how branch and bound algorithm is used in feature selection technique?



Using branch and bound algorithm find out the most optimal path between two circles (shown in figure). **[4]**

Q.5 **[CO4]**

[a] Given the data in Table, reduce the dimension from 2 to 1 using the Principal Component Analysis (PCA) algorithm. **[4]**

Feature	Example 1	Example 2	Example 3	Example 4
X1	4	8	13	7
X2	11	4	5	14

[b] Explain the concept of P-value and Hypothesis testing using an appropriate example? Define Null value hypothesis? Give the possible range of P-values for Very strong, strong, mild & No evidence against null value hypothesis? **[4]**

Q.6 **[CO4]**

[a] Consider two matrices $R = \begin{bmatrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix}$ and $S = \begin{bmatrix} 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{bmatrix}$ Obtain fuzzy relation Max-Min and Max-Product Composition T as composition to fuzzy relation? **[4]**

[b] Two retrieval systems, X and Y, are being compared. Both are given the same query, applied to a collection of 1500 documents. System X returns 400 documents, of which 40 are relevant to the query. System Y returns 30 documents, of which 15 are relevant to the query. With the whole collection, there are 50 documents relevant to the query. Tabulate the results for each system, and compute the precision and recall for both X and Y. **[4]**

CO: Course Outcome

Total no. of Pages 01 Roll no.....

5th SEMESTER B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

IT321 Malware Analysis

Time: 3 Hours *Max. Marks: 40*

Note: Attempt all the questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Answer the following in brief:
i. Differentiate between Backdoors and Rootkits with an example of each. [2]
ii. Differentiate between Runtime and Dynamic Linking. [2]
iii. What is Virtual Machine Monitor? [2]
iv. What are Software Breakpoints? [2]
[CO1,CO2,CO4,CO5,CO6]

Q.2 a. Design detailed procedure for extracting strings from executables files and discuss role packing in it. [4]
b. Design Signature based analysis procedure for Basic Static Analysis [CO1,CO2][4]

Q.3 a. List and explain the various PE file sections in brief. What are the significance of Imports and Exports found in a PE file? [4]
b. Design procedure to View/Modify Windows registry in detail? [CO2,CO3] [4]

Q.4 a. What is Dynamic Taint Analysis. Discuss the TaintDroid Framework Architecture in detail with the help of a diagram. [4]
b. What is the difference between a Virus and a Trojan Horse? Give some examples of significant malwares in the past, and how did they affect the target systems after their introduction. [CO6,CO5][4]

Q.5 a. Elaborate the usage of HookAnalyzer. Also discuss the usage of "Tracing" as a debugging technique. [CO4] [4]

or

Design a procedure for executable analysis using Exeinfo. [4]
b. How is Mobile Security different from PC security? Elaborate. Also discuss the motivation behind leaking mobile device information. [4]

or

Discuss architecture of mobile device operation system with two examples. [CO6] [4]

Total No. of Pages: 02 Roll No.....

V & VII SEMESTER
B.Tech.

END TERM EXAMINATION NOV/DEC-2022

IT 325 Secure Coding

Time: 3 Hours Max. Marks: 50

Note : All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a) Explain the process of modifying the instruction pointer with the help of example in order for an attacker to succeed in executing the arbitrary code. [5]

b) Explain the use of atexit() and longjmp() functions using example code? [5]

Q.2 Write short notes on the following C dynamic memory management errors with the help of example. [5X2 = 10]

a) Initialization Errors

b) Failing to check return value

c) Dereferencing null or invalid pointers

d) Referencing Freed memory

e) Memory Leaks

Q.3 a) Write all the memory allocation and deallocation functions in C++, and explain their usage? Further explain how memory allocation and deallocation functions with in C++ and between C++ and C can be improperly paired and what impact can they have on our code if improperly paired? Explain with the help of example. [5]

b) How Doug Lea's Memory Allocator works w.r.t managing the heap and providing standard memory management functionality?

Further explain how buffer overflow on heap occurs, using the ulink technique for the below mentioned code? [5]

```
#include <stdlib.h>
#include <string.h>
int main(int argc, char *argv[]) {
char *first, *second, *third;
first = malloc(666);
second = malloc(12);
third = malloc(12);
strcpy(first, argv[1]);
free(first);
free(second);
free(third);
return(0);
}
```

Q.4 Comment appropriately on following w.r.t integer security with the help of example.

a) Testing of wraparound in unsigned integer [2]

b) Buffer Overflow w.r.t signed integer. [2]

c) Buffer Overflow w.r.t character to integer conversion [2]

d) Integer Conversion Rank and Promotions [4]

Q.5 a) What is code injection and what is arc injection explain with the help of example. [5]

b) Explain common three string manipulation errors in detail with the help of examples [5]

Total no. of Pages: 2 Roll no.....

VII SEMESTER
B. Tech.

END TERM EXAMINATION Nov-2022

IT405 DATA WAREHOUSING & DATA MINING

Time: 3:00 Hours Max. Marks: 40

Note : All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

1) A database has following five transactions. Let min sup = 60% and min conf = 80%. Find all frequent itemsets using Apriori algorithm.

TID	items bought
T100	{M, O, N, K, E, Y}
T200	{D, O, N, K, E, Y}
T300	{M, A, K, E}
T400	{M, U, C, K, Y}
T500	{C, O, O, K, I, E}

[5] [CO #3]

2) What is frequent pattern mining? State any five criteria based on which frequent pattern mining can be classified. [5] [CO #3]

3) Given data set D, the number of attributes n, and the number of training tuples |D|. Calculate the worst-case computational complexity of the decision tree algorithm for the given specifications with proper justification. [5] [CO #4]

4) Why it is important to evaluate the accuracy of a classifier or predictor? Explain common techniques for assessing accuracy based on randomly sampled partitions of the given data. [5] [CO #4]

5) Define cluster analysis in data mining. Explain the different types of data with suitable examples in cluster analysis. [5] [CO #5]

6) Why k-Means and k-Medoids are considered as classical partitioning methods? Describe their salient features along with differences and similarities in both the methods. [5] [CO #5]

7) Junk e-mail is one of the most annoying things in Web-based business or personal communications. Design an effective scheme (which may consist of a set of methods) that can be used to filter out junk e-mail effectively and discuss how such methods should be evolved along with time. [5] [CO #6]

8) What are the differences between visual data mining and data visualization? Data visualization may suffer from the data abundance problem. For example, it is not easy to visually discover interesting properties of network connections if a social network is huge, with complex and dense connections. Propose a data mining method that may help people see through the network topology to the interesting features of the social network. [5] [CO #6]

Total no. of Pages: 02 Roll no.....

SEVENTH SEMESTER

B.Tech.

END TERM EXAMINATION Nov/Dec-2022

IT407 INFORMATION AND NETWORK SECURITY

Time: 03:00 Hours Max. Marks: 50

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a) Explain the term cryptology, cryptography, and cryptanalysis. What are the various types of cryptanalysis attacks? [4][CO1][CO2]

b) Use the Hill cipher to encipher the message "NUMBER THEORY ROCKSX" and decipher the encrypted message by using the same key: [6][CO1]

$$K = \begin{bmatrix} 5 & 11 \\ 1 & 22 \end{bmatrix}$$

Q.2 a) Use the Chinese Remainder Theorem to find an x such that: [5][CO3]

$$2x \equiv 6 \pmod{14}$$
$$3x \equiv 9 \pmod{15}$$
$$5x \equiv 20 \pmod{60}$$

b) Encrypt and Decrypt the message block using RSA with the following parameters: M = 88, p = 17, q = 11, e = 7, d = ?. In the RSA public-key encryption scheme, each user has a public key e and a private key d. Suppose Bob leaks his private key. Rather than generating a new modulus, he decides to generate new public key and a new private key. Is this safe? [3+2][CO3]

Or

b) Consider a Diffie-Hellman scheme with a common prime q = 1 and a primitive root $\alpha = 7$. [1+1+1+2][CO3]

i) Show that 7 is a primitive root of 13.

ii) If Alice has a public key $Y_A = 5$, what is Alice's private k X_A?

iii) If Bob has a public key $Y_B = 12$, what is Bob's private key X_B ?

iv) What is the secret key K ?

Q.3 (a) Explain how the message digest is generated using Secure Hashing Algorithm 512 (SHA-512). Between MD5 and SHA which is the most secure encryption hash and why? [3+2][CO4]

(b) What are the various primary component of Public key infrastructure. Explain the working of PKI and limitation of PKI. [5][CO4]

Or

What is Digital Signature Standard(DSS) with the proof of Digital Signature Standards. [10][CO4]

Q.4 (a) Explain the requirements and features of secure electronic transaction. [3][CO5]

(b) What are the functionality of S/MIME. [4][CO5]

(c) What is Kerberos. Difference between Kerberos version 4 and version 5. [3][CO5]

Or

Explain the X.509 Certificate Formats with obtaining a user's certificate and certificate revocation list. [10][CO5]

Q.5 (a) With the neat diagram, explain IP Sec ESP format. [5][CO6]

(b) Explain the design principal of firewall and its types. Explain the dual homed host firewall. [5][CO6]

Or

What is master-secret and pre-master-secret. What is the purpose of pre-master secret in SSL/TLS. [10][CO5]

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Total no. of Pages:2 Roll no.....

5th/7th SEMESTER

B.Tech

END TERM EXAMINATION *Nov/Dec-2022*

IT 411 **Digital Image Processing**

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions are compulsory. Choices in parts are indicated using OR. Assume suitable missing data, if any.

Q.1 Answer the following questions: [2x6=12]

a) What is image interpolation and why do we need it? Briefly explain types of interpolation. [CO1]

b) Explain any 4 properties of DFT. [CO2]

c) What is ringing effect? How does it impact edges? [CO3]

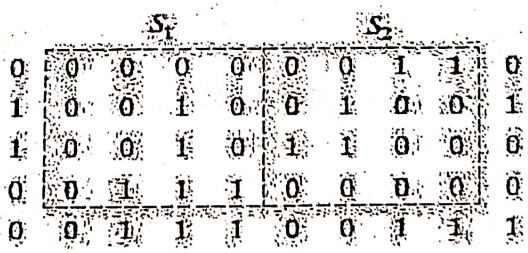
d) Write any 4 noise probability density functions. [CO4]

e) Briefly explain grayscale image dilation and erosion. [CO5]

f) Comment on performance of inverse filtering in general. [CO4]

Q.2 a) Considering two image subsets S1 and S2 given below, with V={1}, determine whether the two subsets are: [3][CO1]

i) 4-adjacent ii) 8- adjacent iii) m-adjacent



b) What is image sharpening? Show that subtracting the Laplacian from an image is proportional to unsharp masking. [4][CO2]

OR

Calculate 4-point DFT of a sample 4x4 image given below using kernel. [4][CO2]

3-28

1	2	3	4
1	1	1	3
2	2	2	2
2	2	2	2

Q.3 a) What is histogram specification? When is histogram specification preferred over histogram equalization? Why is histogram equalization of a digital image not uniform? [3][CO3]

OR

Describe various piece-wise linear transformation functions. Also discuss the scenarios where you would use them. [3][CO3]

b) How can you perform image smoothing in frequency domain? Briefly discuss different filters for image smoothing. What is the ringing effect? [4][CO3]

OR

Describe different Sharpening filters in frequency domain. Which low-pass filter has least or no ringing effect? Why? [4][CO3]

Q.4 a) What are the different techniques for estimation of image degradation function? [3][CO4]

OR

What is color image processing? What are the different types of color models? [3][CO4]

b) Explain the following morphological processes with suitable example: [4][CO5]

i) Opening ii) Closing

iii) Boundary Extraction iv) Pruning

Q.5 a) What is thresholding? Discuss Otsu's algorithm for optimum thresholding with steps. [3][CO6]

b) What is region growing, region splitting & merging? [4][CO6]

OR

What is morphological watershed? How does it help in segmentation? Explain in detail. [4][CO6]

Total No. of Pages _02__ Roll No. .....

_Seventh__ SEMESTER B.Tech [IT]

END SEMESTER EXAMINATION Nov-2022

IT-425 NATURAL LANGUAGE PROCESSING

Time: 3:00 Hours Max. Marks : 50

Note : Answer all questions. There is a choice in the first question
Assume suitable missing data, if any.

Q.1 (i) Construct Recursive Transition Network (RTN) for the grammar.

(ii) Write feature structures for all the words in the lexicon.

1. S→NP VP
2. VP→V
3. VP→Aux VP
4. NP→Det N
5. NP→Det Adj N
6. VP→V NP
7. NP→N

N→boys
Det→the|a
Aux→ have
Adj→small
V→eaten|laughed

(iii) Unify the feature structures on RHS of production 1 to get the feature structure for S (in the LHS), for the test sentence: the boys laughed. (4+3+3)

OR

(i) Construct Augmented Transition Network (ATN) for the given grammar.

(ii) Parse the sentence: the small boys have eaten after doing appropriate agreement checks as the network is traversed. (4+6)

(CO#2 & CO#5)

Q.2 Describe in detail the working of a modern neural network based model for NLP. Explain how words are converted to numerical values in this model. (10)

(CO#3 & CO#6)

Q.3 For the given training corpus:

> the man went to market to get some fruits. the girl did not go to school. the teacher went to school, and the boy went to school and not to the market.

a) Find the perplexity for bigram and trigram language models. Justify which language model would you recommend for this corpus? (First insert starting and ending tokens for each sentence, after removing punctuation, and then solve)

b) Predict the next two words in the incomplete sentence below, using bigram language modelling: *the girl went to .....* (6+4)

(CO#4)

Q.4 a) Explain using an example of how probabilistic CFG, can help to disambiguate the interpretation of the sentence "I made her duck". Create your own grammar and lexicon for this example.

b) Construct an HMM to generate the sentence "I made her duck" taking into account all ambiguous interpretations of parts of speech. (5+5)

(CO#4)

Q. 5 a) Construct a Finite State Transducer for lemmatization of the word grateful/gratefully/gratefulness to the root word GRATEFUL+SUFFIX (5)

b) Describe the role of attention in transformers for NLP. (5)

(CO#1& CO#6)

Total No. of Pages: 2 Roll No.....

SEVENTH SEMESTER B. Tech.

END SEMESTER EXAMINATION November-2022

IT427 INTRUSION DETECTION AND INFORMATION WARFARE

Time: 3 Hours Max. Marks: 50

Note: Attempt all questions. Assume suitable missing data, if any.

Q1. (a) What is a PGP certificate and what is it used for? Explain Trust model in PGP with the help of an example. [CO[3]][5]

(b) How Email security can be achieved? Explain SMIME. Also, discuss how it acts as an enhancement to MIME? [CO [3]][5]

Or

(b) Differentiate User level Sandboxing and Kernel level Sandboxing. Also discuss the applications and usage of Sandboxing. [CO [3]][5]

Q2.(a) What is Entity Authentication? Different b/w Message and Entity Authentication? [CO [4]][5]

Or

(a) What are zero knowledge proofs? Explain mathematically and diagrammatically Guillou-Quisquater Protocol. [CO [4]][5]

(b) Different b/w Static and Dynamic analysis? What is a Virus Trusted Scanner ? [CO [4]][5]

Q3. (a) What is Kerberos and what is its main purpose? Explain the relationship between three servers of Kerberos. [CO [5]][5]

(b) What are worms? Different b/w worms vs Virus vs Trojan Horse ? What is the purpose of Worms ? [CO [5]][5]

Q4(a) What is host based and network based IDS? Explain both in detail. What do you mean by rules with reference to SNORT? [CO [1]][5]

(b) Explain intrusion detection system and its functionality and explain the principle of IDS? [CO [1]][5]

Q5.(a) Difference b/w Misuse intrusion detection techniques VS Anomaly Intrusion detection Techniques? [CO [2]][5]

(b) Explain signature based Intrusion detection system [CO [2]][5]

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Total no. of Pages: 01 Roll no.....

V/ VII Semester

B.Tech.

END TERM EXAMINATION Nov/Dec.-2022

IT429 Cyber-Laws

Time: 3 Hours *Max. Marks: 50*

Note: All questions are compulsory.

Q.1 A) Differentiate between Defamation and Cyber-Defamation. [CO2][5]
B) What do you mean by Internet infringement? Explain with example [CO2][5]

Q.2 Differentiate between electronic contracts and digital signature. [CO3][10]

Q.3 Define the following terms:
a) Duty of care [CO3][2]
b) Civil rights [CO3][2]
c) Tax [CO3][2]
d) Evidence [CO3][2]
e) Procedural issues [CO3][2]

Q.4 Give a thorough analysis between the general laws and cyber laws with proper examples. [CO4][10]

Q.5 Frame criminal liabilities in Phishing and Website Spoofing. [CO1][10]

OR

Q.6 What is Internet of Things (IoT) security? Define its problem intervention strategies. [CO1][10]

Total no. of pages: 02 ३३५- Roll No.....

VII SEMESTER

B.Tech.

END TERM EXAMINATION **Nov-2022**

IT-431 Information Security and Audit

Time: 3 Hours *Max. Marks: 50*

Note: Q.1 is compulsory; attempt any *four* from remaining questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Answer the following questions in brief:

i. Differentiate between Active and Passive attacks.

ii. Discuss what steganography is, with the help of an example.

iii. What is the significance of Digital Signatures in a secure communication?

iv. Discuss the Kerberos system and its components.

v. What are Security Audits? Why are they important in IT organisations? [5x2][CO1,CO2,CO3,CO4,CO5]

Q.2 a. Encrypt "WEAREDISCOVEREDSAVEYOURSELF" with Vigenère cipher using key "deceptive", and with Rail-Fence cipher with depth-2.

b. What is the difference between symmetric and asymmetric encryption techniques? Explain with an example of each. [2x5][CO1,CO2]

Q.3 a. Using 'RSA' public key cryptosystem, if $p=3$, $q=11$, and $d=7$, find the value of e and encrypt the number "19".

b. What is PGP program? What are the services provided by PGP and discuss its Authentication algorithm properly? [2x5][CO2,CO3]

Q.4 a. Discuss the ways in which Security Associations are combined and implemented. Also differentiate between Transport and Tunnel mode of communications between two parties.

b. Explain the overall operation of SSL/TLS Record Protocol in detail.

[2x5][CO3,CO4]

Q.5 a. Explain in detail the two types of Gateways associated to Firewalls. Also explain what are Trusted Computer Systems.

b. Explain the five responsibilities of an Auditor in Security Audits

[2x5][CO4,CO5]

Q.6 a. Explain in detail the different types of Security Audits that can be conducted in any IT organisations.

b. What is Public-Key Cryptography? Discuss the essential elements of Public-Key Cryptosystems with the help of a diagram.

[2x5][CO5,CO1]

Total no. of Pages: 3 *Roll no.....*

VII SEMESTER

B.Tech.

END TERM EXAMINATION ***Nov/Dec-2022***

IT433 Multi-Modal Data Processing

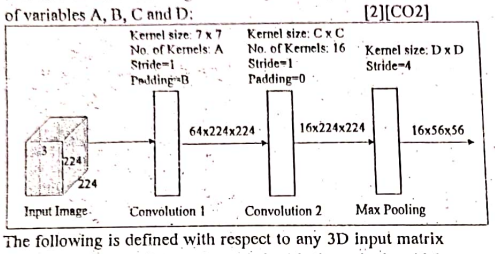
Time: 03:00 Hours *Max. Marks: 40*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

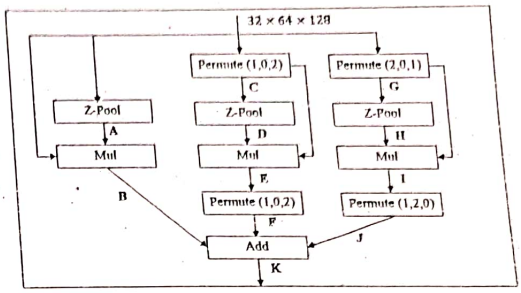
1. Answer the following questions:
   i) What is regularization and which problem does it solve? [2][CO2]
   ii) Explain the different types of deep learning optimizers. Mention their strengths and weaknesses: [6][CO2]
2. Answer the following questions:
   i) What is tokenization in NLP? Mention and briefly describe different methods of tokenization. [2][CO5]
   ii) Explain the advantages and disadvantages of Recurrent Neural Network (RNN) and Long-Short Term Memory (LSTM). How does the LSTM improve the RNN? [3][CO5]
   iii) Explain various types of regularization techniques. [3][CO2]
3. Answer the following questions:
   i) Explain multi-modal data analysis specifying its challenges and applications. [2][CO1]
   ii) Define Unsupervised Learning mentioning its types, importance and challenges. [2][CO3]
   iii) Explain self-attention and write down the steps to calculate it. Explain Vision Transformers? [4][CO6]
4. Answer the following questions:
   i) What is attention mechanism in deep learning? [2][CO5]
   ii) Explain global vs local attention. [2][CO5]
   iii) Explain soft vs hard attention'. [2][CO5]
   iv) Explain autoencoders and its types. [2][CO4]

5. Answer the following questions:

i) The neural network drawn below contains two convolutional and one max pool layer. The shape of a matrix is in the form $channel \times height \times width$. The size of input image is $3 \times 224 \times 224$. Based on the given configurations, find the value of variables A, B, C and D: [2][CO2]



ii) The following is defined with respect to any 3D input matrix of shape $a \times b \times c$. 'Dimension number' is the order in which dimensions occur. So a is dimension 0, b is dimension 1 and c is dimension 2. 'Permute' function changes the order of matrix dimension. Permute(0,2,1) changes the matrix shape from $a \times b \times c$ to $a \times c \times b$. 'Z-Pool' operation performs MaxPooling across the first dimension of input. So a matrix of shape $a \times b \times c$ becomes $1 \times b \times c$ after Z-Pool operation. 'MUL' operation is element-wise multiplication of two matrices across the first dimension. For example 'MUL' operation on two matrices of size $a \times b \times c$ and $1 \times b \times c$ gives output of shape $a \times b \times c$. 'ADD' operation performs element wise addition of matrices of same size. In the diagram given below, the input matrix has a shape of $32 \times 64 \times 128$. Determine the shape of matrices at points A,B,C,D,E,F,G,H,I,J,K. [6][CO2]



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Total No. of Pages : 02

III Semester END SEMESTER EXAMINATION B.Tech.

PAPER CODE - MC 203 Nov./Dec.-2022

TITLE OF PAPER - MATHEMATICS - III

TIME: 03 HRS MAX. MARKS: 40

Note: Attempt any FIVE questions. Each question carry equal marks.

Assume suitable missing data, if any.

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1. (a) State limit comparison test for improper integrals. Hence, check $\int_1^\infty e^{-x}x^p\,dx$, $p \in \mathbb{R}$ for convergence. [4] CO-1

   (b) Show that $\int_0^\infty \frac{\sin x}{x}dx$ is conditionally convergent. [4] CO-2

2. (a) Show that $u(x,y) = e^{x^2-y^2}\cos 2xy$ is harmonic in an appropriate domain D. Find its harmonic conjugate v and find analytic function $f(z) = u + iv$ satisfying $f(0) = 1$. [4] CO-3

   (b) Define Schwarz-Christoffel transformation and use it to construct a conformal mapping from the upper half-plane onto the polygonal region defined by $u \geq 0$, $-1 \leq v \leq 1$. [4] CO-3

3. (a) Evaluate $\int_C \bar{z}\,dz$, where C is parametrized by $z(t) = 3t + it^2$, $-1 \leq t \leq 4$. [4] CO-4

   (b) Expand $f(z) = \frac{1}{z(z-1)}$ in Laurent series valid for $1 < |z-2| < 2$. [4] CO-3

4. (a) Find z-transform of n^2 and inverse z-transform of $\frac{2z}{(z-1)(z^2-1)}$. [4] CO-6

   (b) Solve the following using z-transform [4] CO-6

   $y_{n+2} + 4y_{n+1} + 3y_n = 3^n$ such that $y_0 = 0$ and $y_1 = 1$.

5. (a) Show that $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta} = \frac{2\pi}{\sqrt{3}}$. [4] CO-5

(b) Find the image of $|z-2i|=2$ under the transformation $w=\frac{1}{z}$. [4] CO-3

6. (a) Use Cauchy's integral formula to evaluate $\oint_C \frac{e^{2z}}{(z+1)^4}\,dz$, where C is the circle $|z|=2$. [4] CO-4

(b) Find the Cauchy Principal Value for the integral $\int_1^4 \frac{dx}{(x-2)^3}$. [4] CO-2

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3rd SEMESTER Roll No._____

B.Tech Mathematics and Computing (MCE)

END SEMESTER EXAMINATION NOV 2022

Course Code: MC – 205 Course Title :Probability and Statistics

Time : 3 hrs Max. Marks: 40

Note: Attempt any 5 Questions. Use of statistical table is allowed.

1 (a) The Nicotine content in *milligram* of two samples of tobacco were found to be as following; [4] [CO4]

Sample A :	24	27	26	21	25	
Sample B :	27	30	28	31	22	36

Using F-test at $\alpha = 0.1$ decide the claim that two samples come from the normal populations of equal variance.

(b) Write expression for Karl-Pearson coefficient of correlation and show that it lies in $[-1,1]$. Does shifting of origin to an arbitrary point change the value of correlation coefficient. [4] [CO2]

2 (a) If the life time of a certain type of battery is Normally distributed with mean of 5 years and a standard deviation of 1 year. The manufacturer is willing to guarantee the battery for 4 years, What percentage of the batteries will have to be replaced under the guarantee? [4] [CO3]

(b) In an experiment to determine the relationship between the current flowing in an electrical circuit and the voltage applied , the result obtained are [4] [CO4]

Current(mA) :	5	11	15	19	24	28	33
Applied voltage(V) :	2	4	6	8	10	12	14

Find the equation of regression line of Voltage on current. Find the current at 15V.

3 (a) What is called "unbiased estimate" of population parameter. Prove that the mean of the sample is unbiased. Find the expression for 95% confidence interval for population mean. [4] [CO3]

(b) A cigarette manufacturing firm claims that its brand A out sells brand B by 8%. If it is found that 42 out of 200 smokers prefer brand A; and 18 out of 100 smokers prefers brand B. Test at 5% level of significance, whether the 8% difference is a valid claim. [4] [CO3]

4. (a) The response time in millisecond was determined by three different types of circuits in an electronic calculator shown the following result

Circuit type	Response				
1	19	22	20	18	25
2	20	21	33	27	40
3	16	15	18	26	17

Apply ANOVA to test the hypothesis at 0.01 level of significance that circuits have the same average response time.

(b) Ten individuals were chosen at random from a normal population and their height were found to be in inches as 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. Apply *'t' test* at $\alpha = 0.05$ to test the hypothesis that the mean height of the population is 66 inches.

5 (a) Define moment generating function for a random variable X. Also find the m.g.f. for a Normally distributed random variate X.

(b) A manufacturer claims that his measuring instrument has variability measured by the S.D. $\sigma = 2$. During a test the measurement recorded are 4.1, 5.2, and 10.2. Decide using Chi Square test whether these data confirm his claim at $\alpha = 0.05$? Construct a 90% confidence interval to estimate the true population variance.

6 (a) In a book of 520 pages, 390 typographical errors occur. Assuming Poisson law for the number of errors per page, find the probability that a random sample of 5 pages will contain no error.

(b) If on the average three trucks arrive per hour to be uploaded at a warehouse, using exponential distribution find the probabilities that the time between the arrival of successive trucks will be

(i) Less than 10 minutes

(ii) At least 50 minutes

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Total No. of Pages: 02 Roll No. :_____

THIRD SEMESTER B.Tech.[MC]

END TERM EXAMINATION Nov.-2022

MC 207 Engineering Analysis and Design

(Differential Equations and Applications)

Time: 3:00 Hours *Max. Marks: 40*

Note : Attempt any five questions. Assume suitable missing data, if any. Any type of calculator is not permitted.

Q.1 (a) Find the general solution of the differential linear system

$\frac{dx}{dt} = 4x - y, \quad \frac{dy}{dt} = x + y,$ by matrix method. [4][CO1]

(b) Find the integral surface of the differential equation

$(x-y)y^2p + (y-x)x^2q = (x^2+y^2)z$, which passes through the curve $xz = l^3, \ y = 0.$ [4][CO3]

Q.2 (a) Consider the autonomous linear system

$\frac{dx}{dt} = -x + 3y, \quad \frac{dy}{dt} = 2x - 2y$

Find the general solution and determine the nature and stability of the critical point with sketching a rough phase diagram. [4][CO2]

(b) Form the partial differential equation of

(i) $z = xy + f(x^2 + y^2 + z^2)$

(ii) all spheres of radius 'd' units having their centres in the xy-plane [4][CO3]

Q.3 (a) Find the eigenvalues and eigen functions, if any, of the boundary values problem $y'' + 2\mu y' + \mu^2 y = 0, \ y(0) = 0, \ y(1) = 0.$ [4][CO2]

(b) Using Charpit's method, find the complete integral of

$xp + 3yq - 2z + 2x^2q^2 = 0.$ [4] [CO3]

(P.T.O.)

Q.4 (a) Classify the following partial differential equations.

(i) $u_{xx} + 2(1+x)u_{xy} + 2x\,u_{yy} = 0$,

(ii) $u_{xx} + 2x\,u_{yy} = 0$, [1, 1][CO4]

(b) Solve the following partial differential equations.

(i) $(D^2 + DD' - 6D'^2)z = x^2 \sin(x+y)$,

(ii) $x^2\frac{\partial^2 z}{\partial x^2} + 2xy\frac{\partial^2 z}{\partial x \partial y} - x\frac{\partial z}{\partial x} = \frac{x^3}{y^2}$ [3, 3][CO4]

Q.5 (a) Use method of separation of variables, find the all possible solutions of $u_{xx} + u_{yy} = 0$. Also, use the suitable solution to solve further subject to boundary conditions (i) $u(0, y) = \sin y$, and (ii) $u(\infty, y) = 0$. [2, 2][CO 5]

(b) The ends A and B of a rod of length 'l'cm long have the temperature 40^0C and 90^0C, until steady state prevail. The temperature at A is suddenly raised to 90^0C and at the same time that at B is reduced to 40^0C. Find the temperature distribution in the rod after time t. [4][CO6]

Q.6 (a) Solve the wave equation $u_{tt} = c^2 u_{xx}$, $0 < x < l$, subject to the conditions $u(0, t) = 0 = u(l, t)$, $u(x, 0) = f(x)$, and $\frac{\partial u}{\partial t}(x, 0) = g(x)$, $0 < x < l$. [4][CO6]

(b) Use the method of separation of variables to solve

$\frac{\partial u}{\partial x} - 2\frac{\partial u}{\partial y} = u$, $u(x, 0) = 3e^{-5x} + 2e^{-3x}$ [4][CO5]

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Total no. of Pages: 02

Roll no.....

B.Tech.-III SEMESTER

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END TERM EXAMINATION

Dec-2023

COURSE CODE: MC251

COURSE TITLE: APPLIED MATHEMATICS

Time: 03:00 Hours

Max. Marks: 50

Note : All questions are compulsory. All questions carry equal marks. Assume suitable missing data, if any.

Q.1 In a bolt factory, machines there are four machines A, B, C and D manufacture bolts 20%, 15%, 25% and 40% of the total respectively. Of their outputs 5%, 4%, 3% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective.

(a) Find the probability that it was manufactured by machine A.

(b) Find the probability that it was manufactured by machine D.

[10][CO-1]

Q.2 (a) A lot containing 4 good components and 3 defective components is sampled by an inspector by taking a sample of 3 components. Find the expected value of the number of good components in the sample.

(b) A consignment of 10 similar PCs contains 4 defective PCs. If an institution makes a random purchase of 3 PCs from this consignment, find the probability distribution for the number of defective PCs purchased.

[10][CO-2]

Q.3 A manufacturer produces 100 fuses that are packed in a box. If 0.5% of the fuses produced are defective. What percent of the boxes will contain:

(a) no defective fuse. (b) 2 or more defective fuses.

[10][CO-3]

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Q.4 Apply (a) Newton-Raphson method, (b) method of false position to obtain a root of the equation $x^3 - 3x - 5 = 0$ upto 3 iterations. [10][CO-4]

Q.5 (a) Solve the following system of equations using Jacobi iteration method upto 3 iterations.

$8x - 3y + 2z = 20$, $6x + 3y + 12z = 35$, $4x + 11y - z = 33$.

(b) Solve by LU- Decomposition method the following system of equations

$2x + y + 4z = 12$, $8x - 3y + 2z = 20$, $4x + 11y - z = 33$. [10][CO-5]

c. Name one utility, which can be used for communication amongst the processes?

OR

Consider a simple program implementing the command sleep 100. Which of the following is an accurate ordered list of system calls invoked by the shell from the time the user enters this command to the time the shell comes back and asks the user for the next input?

(a) wait-exec-fork

(b) exec-wait-fork

(c) fork-exec-wait

(d) wait-fork-exec

Total no. of Pages: 04 *Roll no.....*

Fifth SEMESTER

B.Tech.

END TERM EXAMINATION ***Nov/Dec-2022***

MC301 Operating System

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q1. Do any three **CO1 – (2+2+2)**

a. Why can't one process access variables of another process? If it tries to do, what will happen?

b. When an OS switches processes, how does the process gets its values in CPU's registers?

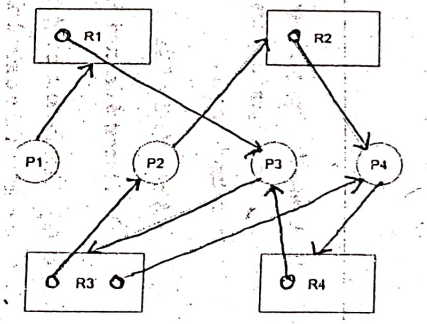
c. How does OS know about which processes are currently available for context switching?

d. What are the advantage and disadvantages of a multiprocessor system?

Q2. **CO4 – (2+2)**

a. Explain the four necessary conditions for the deadlock to occur.

b. Justify if the following graph contains deadlock or not.



Q3. CO3 – (2+1+4)

a. Differentiate between Paging and Segmentation.

b. What are the components of access time of a hard disk?

c. Consider a system with paging-based memory management, whose architecture allows for a 4GB virtual address space for processes. The size of logical pages and physical frames is 4KB. The system has 8GB of physical RAM. The system allows a maximum of 1K (=1024) processes to run concurrently. Assuming the OS uses hierarchical paging, calculate the maximum memory space required to store the page tables of all processes in the system. Assume that each page table entry requires an additional 10 bits (beyond the frame number) to store various flags. Assume page table entries are rounded up to the nearest byte. Consider the memory required for both outer and inner page tables in your calculations.

OR

A computer keeps its page tables in memory. Memory access time is 100 nanoseconds (ns).

i. What is the effective access time (i.e. reading a word in memory) with no caching and a two-level page table?

ii. Consider the above scenario but with a TLB having a cache hit rate of 98%. If the TLB takes 20 ns to access, what is the effective access time of this setup when considering this TLB?

Q4. CO3 – (4+4)

a. A computer system uses paged virtual memory. The page size is 1000 bytes. There is space for only three pages. Calculate the number of page faults for the sequence of address accesses given below, under the page replacement policy – Least Recently Used and First Come First Out.

7100, 1001, 2001, 2002, 1002, 7101, 4001, 7102, 1003, 2003

b. Explain the following

a. Linked list allocation of file

b. Direct Memory Access

Q5. CO2 – (2+2+2+4)

a. Explain why care must be taken while choosing Round Robin time quantum.

b. Explain why Round Robin scheduling is suitable for an interactive Operating system while FCFS or Shortest remaining time first are not.

c. Identify five objectives of a good scheduling algorithm; assume that the operating system is aimed primarily at interactive operation (as opposed to batch or real-time operation).

d. Show that the following algorithm satisfies the Critical section problem for 3 cooperating processes. The common data structures - boolean waiting[n] and boolean lock are initialized to false.

```
do {
   waiting[i] = true;
   key = true;
   while (waiting[i] && key)
      key = test_and_set(&lock);
   waiting[i] = false;

      /* critical section */

   j = (i + 1) % n;
   while ((j != i) && !waiting[j])
      j = (j + 1) % n;

   if (j == i)
      lock = false;
   else
      waiting[j] = false;

      /* remainder section */
} while (true);
```

Q6. CO5 – (2+2+1)

a. Describe the relation in per process open file table and system wide open file table.

b. Which function calls are used in Linux to create new processes? After creation, what is the state of the creator process and that of created process?

OR

What would happen if you executed the following piece of code:

```
main()
{
    While(1)
    fork();
}
```

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Total No. of Pages 2

FIFTH SEMESTER **B.Tech. Mathematics & Computing**

END SEMESTER EXAMINATION, Nov 2022

MC 303 Stochastic Processes

Time: 3:00 Hours *Max. Marks: 40*

Note: Answer all question by selecting any two parts from each questions. All questions carry equal marks. Assume suitable missing data, if any.

1(a) Describe a random walk with two reflecting barriers. Give example. Derive its limiting distribution and discuss the cases $p <, >, = q$, where the letters have their usual meanings.

(b) Describe (i) Brownian motion, (ii) Stationary process, by considering a suitable example in each case.

(c) Describe Bernoulli process. Derive its probability distribution. Is it a Markov Process? Prove your claim. Find the mean and variance of the number of trials between two successive trials. [CO 1, 2]

2(a) Define transient and recurrent states giving an example of each type. Find the condition that a specific state *i* is transient or recurrent.

(b) Design a communication source with transition probability matrix of your choice (except unit matrix) which can generate one of the three possible messages 0, 1 and 2. In case the initial probability distribution is equally likely, find the probability that 0 sent initially is received as 0 after three stages.

(c) Define the n-step transition probabilities of a Markov chain. Derive Chapman-Kolmogorov equation. Describe its an application? [CO 2, 3]

3(a) Describe pure death process. Derive its differential-difference equation and find the probability distribution of the number of departures at time t.

(b) Derive the steady-state solution for the Birth and Death process.

(c) Earthquakes occur in a given region in accordance with a Poisson process with a rate of 5 per year. (i) What is the probability that there will be at least two earthquakes in the first half of 2023 ? (ii) Assuming that the event in part (i) has already occurred, then what is the probability that there will be no earthquake in the remaining half of 2023? [CO 3,4]

4(a) How does a renewal process differ from a Poisson process? What is renewal equation? Solve it using Laplace transform.

(b) Find the expected number of renewals by time t when the inter-renewal time between two successive renewals is independently distributed as standard normal.

(c) Assume a suitable distribution for the recurrence time between two successive renewals, find the distribution function for the waiting time until the *n*th renewal and expected number of renewals till time *t*.

[CO 2,3,4]

5(a) What is the Erlang loss model in queues? If the call arrival rate is 2 per minute and on the average if a subscriber occupies a line for 3 minutes, then in case of a 7 lines telephone exchange find, (i) probability of customer loss, (ii) mean number of busy lines.

(b) Design a practical situation which results in a specific queuing model. Check for the existence of its steady state solution. If the system is in working mode from 9 AM to 5 PM, find, (i) expected number of idle periods and the mean duration of each idle period, (ii) expected number of customers served between 9 AM to 5 PM.

(c) Describe M/M/1 model. Find the distribution of the mean waiting time in the system and its mean and variance of the waiting time. [CO 4, 5]

Total no. of Pages: 03

Roll no.....

Fifth SEMESTER

B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

MC305 Operations Research

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q1 Table -1 represents the transport cost of supplied commodities from the factories to the requirements at the distribution centers. Table -2 represents transport cost of commodities from each factory to same or other factories. Table 3 represents the transportation cost of commodities from each distribution center to same and other distribution centers Table-4 represents transportation costs from each distribution center to factories Find the optimal shipping schedule for transshipment problem

Table 1

	Distribution center			
Factory	A	B	C	supply
1	11	13	25	150
2	13	15	35	300
Requirement	150	150	150	

Table 2

	To factory 1	To factory 2
From factory 1	0	75
From factory 2	11	0

Table 3

	A	B	C
A	0	33	11
B	11	0	13
C	75	13	0

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Table 4

	To Factory 1	To factory 2
From A	13	25
From B	35	13
From C	55	65

Q2. Solve the below mentioned integer programming problem by using the cutting plane method or branch and bound method

Maximize $Z = 5x_1 + 7x_2$

Subject to $-2x_1 + 3x_2 \leq 6$

$6x_1 + x_2 \leq 30$

$x_1, x_2 \geq 0$ & *integers*

Q3 Products 1, 2, 3, 4 and 5 to be processed on a machine. The set up costs in Rupees per change depends in the product presently on the machine and the set up to be made and are given by the following data

$C_{12} = 16,\ C_{13} = 4,\ C_{14} = 12,\ C_{23} = 6,\ C_{34} = 5,\ C_{25} = 8,\ C_{35} = 8,\ C_{45} = 20,$ $C_{ij} = C_{ji}$, and $C_{ii} = \infty$

For all values of i and $j$not given in the data. Find the optimum sequence of products in orderto minimize the total set up cost

Q4. A project involves 7 activities, and their time estimates are listed in the following Table-5. The activities are identified by their beginning (i) and ending (j) node numbers.

(a)Draw the network diagram of the activities in the project.

(b) Find the expected duration and variance for each activities. What is the expected project length?

(c)Calculate the variance and standard deviation of the project length. What is the probability that the project will be completed at least earlier than the expected time

Given $Prob(Z \leq -1.33) = 0.5 - 04082$

Table 5

Activity i-j	Estimated Duration (Weeks)		
	Optimistic	Most likely	Pessimistic
1- 2	1	1	7
1- 3	1	4	7
1- 4	2	2	8
2- 5	1	1	1
3- 5	2	5	14
4- 6	2	5	8
5- 6	3	6	15

Q5. Solve the following LP Problem

\Maximize $Z = -x_1 + 3x_2 - 2x_3$

Subject to $3x_1 - x_2 + 2x_3 \leq 7$

$-2x_1 + 4x_2 \leq 12$

$-4x_1 + 3x_2 + 8x_3 \leq 10$

$x_1,\ x_2,\ x_3 \geq 0$

Discuss the following changes in the optimal solution

(a)Determine the range for discrete in the coefficients a_{13} *and* a_{23} consistent with the Optimal solution of the given LP problem.

Total No. of Pages: 03

Roll No.....

Vth SEMESTER

B.TECH. [MCE]

END-TERM EXAMINATION

(Nov/Dec - 2022)

MC 307 OBJECT ORIENTED PROGRAMMING

Time: 03 Hours

Max. Marks: 40

Note: **Attempt any five questions.**
All the questions are of 8 marks each.
Assume suitable missing data, if any.

Q.1. (a). (i) Is Multiple Inheritance allowed in JAVA? if not, what can be used as a substitute to resolve this issue. [2 marks][CO3]

(ii) Define Nesting method in C++ in brief. [2 marks] [CO1]

(b). Give an exemplary code to explain the concept of "Class Template with Multiple parameters in C++". Create a class template for two generic types of classes namely "int" and "float". [4 marks][CO3]

Q.2. (a) How do you use objects as function arguments in C++. Write a program to illustrate the working of objects as function arguments. Create a program, innovate variables for hours and minutes, a member function "sum()" , which is invoked by an object T3, with the objects T1 and T2 as arguments where T1 and T2 are time in hours-minutes. [6 marks][CO2]

(b) List the different types of inheritance in C++ and explain any two of them. [2 marks][CO1]

Q.3. (a) Create a class "FLOAT" in C++ that contains one float data member. Overload "*" and "/" arithmetic operators so that they operate on the objects of class "FLOAT". Use friend function for any one of the operators.

[4 Marks][CO3]

(b) Write a Program demonstrating rethrowing an exception in C++.

[4 Marks][CO5]

Q.4. (a) Write the differences and similarities between Abstract classes and Interfaces.

[3 marks] [CO1]

(b) Create a class "Lion" with member functions such as MakesNoise() and run() methods, create a class "Human" which inherits this "Lion" class and implements "Mammal" interface with methods such as eat() and sleep(). Test your program by creating objects in JAVA.

[5 Marks][CO4]

Q.5. (a) Write a program in JAVA using the help of multiple threads to print "Good Morning" and "Welcome" concurrently by using the runnable Interface method.

[4 marks][CO4]

(b) Define Access Modifiers in JAVA? The table given below depicts how the access control mechanism in JAVA works when variables are defined with different access modifiers. Fill the table (given on the next page) with "✓" in the corresponding box if it can be accessed through the corresponding section.

[4 Marks][CO6]

Modifier stated for a variable	Can be accessed within same Class	Can be accessed within same Package	Can be accessed within same Subclass	Can be accessed through World
Public				
Protected				
Default				
Private				

Q.6. Create a class "Candidate", an interface "Assistant" and another interface "Worker" in JAVA, innovate methods and variables yourself such as name, age, BringFiles(), Compileproject() etc. for all the above three and using their help depict the working of Dynamic method Dispatch by creating a Subclass "Employee" which implements any one of the above three, i.e., create a new object of the subclass using the reference of any one of the above three. Also, highlight which methods will be accessible on using a particular reference and which methods will not be accessible.

[8 marks][CO4]

**********END**********

Total No. of Pages: 2
5th SEMESTER
END SEMESTER EXAMINATION

Roll No.....
B. Tech.
(Nov-Dec 2022)

MC 315: Modern Algebra

Time: 3:00 Hours

Max. Marks: 50

Note: All Questions are compulsory. Assume suitable missing data, if any.

Q1. a) Show that the set Q^+ of all positive rational numbers is an Abelian group under the binary operation * defined by $a*b=\frac{ab}{3}$, where ab is the ordinary multiplication of two positive rational numbers a and b. [5] [CO1]

b) Let G be a group with elements $a \neq e$ and $b \neq e$ such that $a^3 = e$ and $aba^{-1} = b^2$, then find the order of element b. [5] [CO1]

Q2. a) Verify Caley's Theorem for the cyclic group G of order 3. What is the corresponding permutation group isomorphic to G?

OR

Show that the cyclic subgroup of S_3 generated by (1 2) is not normal in S_3. [5] [CO2]

b) Let G be group and $\phi: G \to G$ be the mapping defined by $\phi(x) = gxg^{-1}$, for some fixed $g \in G$. Show that ϕ is an isomorphism. [5] [CO2]

Q3. a) Show that the homomorphic image of a commutative ring is commutative, but the converse need not be true. [5] [CO3]

b) Let $R = M_2(\mathbb{R})$ and $S = \left\{ \begin{pmatrix} x & x \\ x & x \end{pmatrix} : x \in \mathbb{R} \right\}$, where $\mathbb{R}$ is the set of real numbers, then show that S is a subring of R and has a unity different from the unity of R. [5] [CO3]

Q4. a) Show that in a Boolean ring R, every prime ideal $P \neq R$ is maximal.

OR

Show that the sum of two subrings may not be a subring again. [5] [CO3]

b) Find gcd and lcm of $\bar{6}$ and $\bar{8}$ in Z_{12}, if it exists. [5] [CO4]

Q5. a) Show that the field Q of rational numbers with $d(a) = 1$ for all $a(\neq 0) \in Q$ is a Euclidean domain. However, Q with $d(a) = |a|$ for all $a \neq 0 \in Q$ is **not** a Euclidean domain. [5] [CO4]

b) Prove that the integral domain $Z[\sqrt{-3}] = \{a + b\sqrt{-3} : a, b \in Z\}$ is not a unique factorization domain.
(*Hint: consider the element 2 of* $Z[\sqrt{-3}]$) [5] [CO4]

- END –

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Total No. of Pages: 02 Roll No:.....

FIFTH SEMESTER B.Tech [Elective]

END SEMESTER EXAMINATION NOV. 2022

MC317, Numerical Methods for ODE

Time: 3.0 Hours Max. Marks: 40

Note: *Attempt ANY 8 questions. All questions carry equal marks. Assume suitable missing data, if any.*

1. Discuss the second order finite difference scheme for the 1-D elliptic equation as given below:
$$y(x)'' + 3y(x)' + 6y(x) = x; \quad y'(0) = 1, y(1) = 0$$
with five mesh points and solve. [CO-3]
2. Solve $y' = 1 + xy^2$, $y(0) = 1$ and find the value of $y(.3)$ using modified Euler's method with $h = .1$. [CO-2]
3. Discuss Routh - Hurwitz criterion for the equation
$$f(s) = s^3 + as^2 + bs + c$$
and find the condition for stability. [CO-3]
4. Define stiff ordinary differential equation with an example. [CO-5]
5. Discuss diagonally dominant matrix with an example and its advantages [CO-5]
6. Discuss A-stability and L-stability for stiff ODE with an example. [CO-4]
7. Discuss Zero-stability of linear multi-step methods with an example. [CO-4]
8. Solve the following IVP using fourth order Runge-Kutta method
$$y' = y - x; \quad y(0) = 1.5$$
and find $y(.4)$ with $h = 0.2$. [CO-2]

9. Define absolute stability for the ODE

$$y'(t) = \lambda y(t).$$

[CO-2]

10. Discuss single-step and multi-step methods for solving first order ODE $y'(x) = f(x, y),\ y(0) = y_0$. [CO-1]

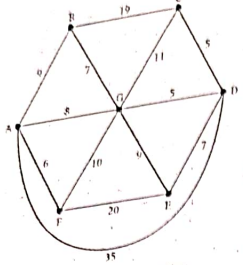


Figure 4: Chinese Postman Problem

b) Prove that the following set of instant insanity cubes have no solution. [5][CO5]

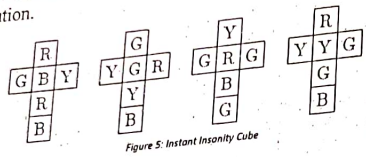


Figure 5: Instant Insanity Cube

c) Find the maximum flow using Ford Fulkerson Algorithm showing each step for the network given in the figure below. [5][CO2]

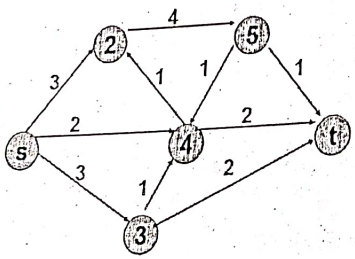


Figure 6: Ford-Fulkerson Algorithm

Total no. of Pages: 04

Roll no.....

B.Tech. (MC)

7th SEMESTER

Nov-2022

END TERM EXAMINATION

MC 405 Graph Theory

Time: 03:00 Hours

Max. Marks: 40

Note : Q1-6 are compulsory. Attempt any two parts in Q 7. Assume suitable missing data, if any.

Q.1 Prove or Disprove the statement: 'Every tree has at most one perfect matching'. [5][CO1]

Q.2

a) Suppose that in a group of 5 people: A, B, C, D and E the following pairs of people are acquainted with each other.

- A and C
- A and D
- B and C
- C and D
- C and E

Draw a graph G to represent this situation and find an adjacency matrix for G. [2][CO1]

b) The degrees of the vertices of a certain tree T of order 13 are 1, 2 and 5. If T has exactly three vertices of degree 2, how many end-vertices does it have? [3][CO1]

Q.3

a) How many cycles can exist in an electric circuit with 10 connections and 7 nodes? Explain. [1][CO4]

b) In the given graph, how many intermediate vertices are required to travel from node '1' to node '3' at a minimum cost using Floyd Warshall Algorithm. [4][CO3]

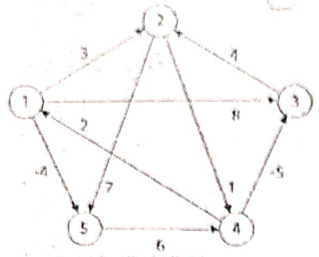


Figure 1: Floyd-Warshal Algorithm

Q.4

a) Describe major difference between Prim's and Kruskal's algorithm. Use Prim's algorithm to find Minimal spanning tree for the graph below. [3][CO4]

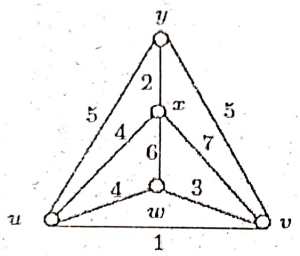


Figure 2: Prim's Algorithm

b) Find the maximum matching for the bipartite graph given below using the Ford-Fulkerson Algorithm. [2][CO4]

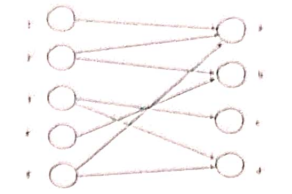


Figure 3: Maximum Bipartite Matching

Q.5

a) In a computer lab, 50 computer and 75 cables are there. How many ways can we connect to have the strongest connectivity? [3][CO4]

b) Eight faculty members, denoted by *f1, f2, . . . , f8*, have been invited to a workshop to discuss seven topics of interest. It is decided that it would be more efficient to divide these faculty members into seven committees of three each, namely *P={f1, f2, f3}, Q={f2, f3, f4}, R={f4, f5, f6}, S={f5, f6, f7}, T={f1, f7, f8}, U={f1, f5, f7}, V={f2, f5, f8}*. If each committee must meet during one of the time period: *9 - 10 am, 10 - 11 am, 11am - 12 noon, 2 - 3 pm, 3 - 4 pm, 4 - 5pm*, then what is the minimum number of time periods needed for all seven committees to meet? [2][CO4]

Q.6

a) Prove that every tree with at least two vertices is 2-chromatic. Is the converse true? Explain. [3][CO2]

b) How many cut vertices are there in a tree with 20 vertices and 9 leaves. [2][CO2]

Q.7 Attempt <u>ANY TWO</u> parts.

a) Find the length of an optimal Chinese postman route in the graph below by showing all the steps in the algorithm. Write down one possible route. [5][CO3]

Total no. of Pages: 2

Roll No.....

VII SEMESTER

B.Tech.

END TERM EXAMINATION

Nov/Dec-2022

MC407 CRYPTOGRAPHY AND NETWORK SECURITY

Time: 03:00 Hours

Max. Marks: 50

Note:
- Attempt any five questions.
- All questions carry equal marks.
- Assume suitable missing data, if any.

1(a) Let the ciphertext "FKMFIO" be obtained using the Hill Cipher ($C = KP \bmod 26$) with the key $K = \begin{pmatrix} 2 & 3 \\ 3 & 6 \end{pmatrix}$. Find the corresponding plaintext. [5Marks] [CO1]

1(b) Explain the DES function in detail. [5 Marks] [CO2]

2(a) Find the value of $12^{-1} mod\ 77$ using Euler's theorem. [5 Marks] [CO2]

2(b) In RSA, if $e = 13$ and $n = 100$, can we encrypt the message "HOW ARE YOU" using 0 to 25 for letters and 26 for space and decrypt the ciphertext obtained? Justify your answer. [5 Marks] [CO2]

3(a) Consider the elliptic curve $y^2 = x^3 + x + 1$ over Z_{23}. Let $P = (3,10)$ and $Q = (9,7)$. Find $P + Q$ and $2P$. [5 Marks] [CO2]

3(b) What is Kerberos? How it provides authentication service? [5 Marks] [CO3]

4(a) In RSA Digital Signature Scheme, let $p = 809, q = 751,$ and $d = 23$. Calculate the public key e, then sign and verify a message with $M_1 = 100$. [5 Marks] [CO3]

4(b) Explain criterions for a cryptographic hash function in detail. [5 Marks] [CO3]

5(a) Compare the compression function of SHA-512 without the last operation (final adding) with a Feistel cipher of 80 rounds. Show the similarities and differences.

[5 Marks] [CO3]

5(b) What types of a packet should be sent in PGP to provide the following security services.

i. Confidentiality
ii. Message Integrity
iii. Authentication
iv. Nonrepudiation
v. Combination of i & ii

[5 Marks] [CO3]

6(a) Distinguish between two modes of IPSec. Briefly explain ESP and list the security services it provides.

[5 Marks] [CO4]

6(b) Compare and contrast the handshake protocols in SSL and TLS.

[5 Marks] [CO4]

~END~

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Total No. of Page: 02 Roll No. .....

END SEMESTER EXAMINATION NOVEMBER-2022

MC-409 MATHEMATICAL MODELING AND SIMULATIONS

Time: 3: 00 hours Max. Marks: 40

Note: 1. Attempt any five questions.
2. Assume missing data if any.
3. Each question carries equal marks.

1) Consider the American system of two lakes: Lake Erie feeding into Lake Ontario. What is of interest is how the pollution concentrations change in the lakes over time. Assume that the volume in each lake to remain constant and that Lake Erie is the only source of pollution for Lake Ontario.

i) Write down a differential equation describing the concentration of pollution in each of the two lakes, using the variable V for volume, F for flow, c(t) for concentration at time t and subscript 1 for Lake Erie and 2 for Lake Ontario.

ii) Suppose that only unpolluted water flows into Lake Erie. How dose this change the proposed model?

iii) Solve the system of equations to get expressions for pollution concentrations, $c_1(t)$ and $c_2(t)$.

iv) Compare the effects of $c_1(0)$ and $c_1(0)$ ōn the solution of $c_1(t)$ over time.

[CO 2,3]

2)

a) A battle is modelled by $x' = -4y, x(0) = 70$

$$y' = -x, y(0) = 50$$

i) Write the solution in parametric form.

ii) Who wins and when? State the loses at each side.

b) Show that the model represented by

$$\frac{dx}{dt} = x(4 - x - y), \frac{dy}{dt} = y(15 - 5x - 3y), x, y \geq 0$$

P.T.O

has a position of equilibrium, this position is stable and two species can coexist.

3) [CO 3,4]

a) For the transmission of an infectious disease, develop and solve a susceptible – infected – recovered model after writing compartmental model, assumptions and word equations.

b) Find the equilibrium points and their stability for

$$x(n+1) = x^2(n) + 3x(n)$$ [CO 1,5]

4) Obtain the natural cubic spline approximation for the function defined by the data

x	0	1	1.5	2.25
$g(x)$	2.0000	4.4366	6.7134	13.9130

Hence find an estimate of $g(0.66)$ and $g(1.75)$. [CO 5]

5) A drug is administered once every four hours. Let D(n) be the amount of the drug in the blood system at the n^{th} interval. The body eliminates a certain fraction p of the drug during each interval. If the amount administered is D_0, find D(n) and $lim_{n\to\infty} D(n)$. [CO 2,3]

6)

a) Solve the recurrence relation $a_n = a_{n-1} + 2,\ n \geq 2$ subject to the initial condition $a_1 = 3$.

b) Find the solution of $x(n+1) = 2x(n) + 3^n,\ x(1) = 0.5$. [CO 5]

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Total No. of Pages: 03 *Roll No.:.....*

VII SEMESTER

B.Tech.

END TERM EXAMINATION Nov/Dec-2022

MC411 Data Warehousing and Data Mining

Time: 3 Hours Max. Marks: 50

Note: Answer any five questions. (Assume suitable missing data, if any. Write point answer relevant to the question asked.)

1)

a) Most frequent pattern mining algorithms consider only distinct items in a transaction. However, multiple occurrences of an item in the same shopping basket, such as four cakes and three jugs of milk, can be important in transactional data analysis. How can one mine frequent itemsets efficiently considering multiple occurrences of items? Propose modifications to the well-known algorithms, such as Apriori and FP-growth, to adapt to such a situation.

(4) [CO4, CO5]

b) Suppose that a data warehouse for Big-University consists of the following four dimensions: student, course, semester, and instructor, and two measures count and avg grade. When at the lowest conceptual level (e.g., for a given student, course, semester, and instructor combination), the avg grade measure stores the actual course grade of the student. At higher conceptual levels, avg grade stores the average grade for the given combination.

(i) Draw a snowflake schema diagram for the data warehouse.

(ii) Starting with the base cuboid [student, course, semester, instructor], what specific OLAP operations (e.g., roll-up from semester to year) should one perform in order to list the average grade of CS courses for each Big-University student.

(iii) If each dimension has five levels (including all), such as "student < major < status < university < all", how many cuboids will this cube contain (including the base and apex cuboids)?

(6) [CO2, CO3]

2)

a) Describe three challenges to data mining regarding data mining methodology and user interaction issues. (3) [CO1]

b) Write short notes on Multiclass classification and Multi-label Classification with real world example. Discuss the challenges of developing such classification model. (4) [CO2]

c) Enumerate at least three caveats of error backpropagation in context of neural network. (3) [CO6]

3)

a) Explain basic concepts of fuzzy c-means along with its objective function. Derive the fuzzy partition matrix and cluster centroid for fuzzy c-means. Also, find the membership value using the derived formula when (i) fuzzifier factor tends to value one (ii) fuzzifier factor tends to infinity. 6) [CO5]

b) Why Precision and Recall are good performance measure over Accuracy? Calculate Accuracy, Precision, Recall and F-score for the following confusion matrix.

Classes	yes	no	Total
yes	90	210	300
no	140	9560	9700
Total	230	9770	10,000

Actual class

	Predicted class	
	yes	no
yes	TP	FN
no	FP	TN
Total	P'	N'

(4) [CO6, CO7]

4)

a) Discuss privacy, security, and social impacts of Data Mining technologies with a suitable example of your choice. (5) [CO1, CO2]

b) Discuss the advantages of density-based clustering over k-mean clustering approach using a suitable example. Mention two methods to find out optimal number of clusters present in a dataset. (3 + 2) [CO6, CO7]

5)

a) Explain the basic principle of Decision Tree Classifiers. Write short notes on Information Gain, Gain ratio and Gini Index. What advantages Gain ratio and Gini Index have over Information gain? (7) [CO2, CO5]

b) Briefly discuss the Naïve Bayes classification. Write down the disadvantages of Naïve Bayes Classification Approach. (3) [CO4]

6)

a) Explain perceptron learning model with an example. What are the drawbacks of perceptron learning model. How these can be addressed by multi-layer perceptron classification model? (5) [CO2, CO6]

b) Briefly describe the use of activation function in neural network. Write down the formula of any two activation functions that can be used in neural network classification model. Obtain the first order derivative of any one of activation functions (Represent derivation in terms of original activation function). (5) [CO2, CO3]

**********All The Best**********

(b). Given the following grammar with two productions:

S → AS / b

A → SA / a

Determine whether the above grammar can be parsed by

(i) LL(1) parser ?

(ii) SLR (1) parser ? [4 marks][CO3]

Q.6. (a). Differentiate between quadruples, triples, and indirect triples for representing 3-Address codes. [6 marks][CO5]

(b). Construct the minimal DFA over the input set Σ=(a,b) for the language containing strings whose third symbol from RHS is "a".

[4 marks][CO2]

**********END**********

Total No. of Pages: 04 Roll No.....

VII SEMESTER

B.TECH. [MCE]

END-TERM EXAMINATION (Nov/Dec 2022)

MC 413 COMPILER DESIGN

Time: 03 Hours **Max. Marks: 50**

Note: **Attempt any five questions.**
All the questions are of 10 marks each.
Assume suitable missing data, if any.

Q.1. (a). Explain, with the help of examples, the following loop optimization techniques:

(i). Frequency Reduction

(ii). Loop Unrolling

(iii). Loop Jamming [6 marks][CO1]

(b). Write the regular expression over the input set Σ=(a,b) for the language containing strings in which no two a's come together (i.e., not containing "aa" as substring). [4 marks][CO2]

Q.2. (a). Given any binary representation including the decimal point, (say 11.01, 100.11, 100.1001, etc.), construct a grammar and define the semantic rules associated with every production of the grammar that evaluates the corresponding decimal value of that binary number including the fraction part. [6 marks][CO4]

(b). Construct Directed Acyclic Graph for the following 3-Address Code:

```
a = b + c
d = a * a
b = d + a
c = d * b
e = c + b
a = e + e
```

[4 marks][CO6]

Q.3. (a). Convert the following program into 3-Address codes:

```
while ( a < c && b > d)
{
    if (a > d or b > c)
        c ++;
    else
    {
        while( a <= d)
            a = a + b;
    }
}
```

Hence, identify the number of leaders and number of basic blocks in the flow graph of the generated 3-Address Code. [6 marks][CO6]

(b). Explain, with examples, Shift-Reduce conflicts and Reduce-Reduce conflicts in LR(0) grammar. [4 marks][CO3]

Q.4. (a). Given any input expression which includes any combination of two operators: + and *. The input expression also includes = operator, for instance, the input expressions can be x = a + b * c, y = c* d * e + f, etc. Construct a grammar and define the semantic rules associated with every production of the grammar that converts the input expression to its corresponding 3-Adddress codes statements. [6 marks][CO4]

(b). Given the following grammar with semantic rules:

S → MA	{ print("2"); }
M → 1	{ print(" "); }
A → DE	{ print("1"); }
D → 2	{ print(" "); }
E → EA	{ print(" "); }
E → 3	{ print(" "); }
A → SY	{ print("4"); }
S → 4	{ print(" "); }
Y → ε	{ print(" "); }

Suppose the input string is "1234" that is to be generated from the above grammar. What will be the output from the above semantic rules if we apply Bottom Up parsing to generate the input "1234" ? Will the output change if we apply Top Down parsing to generate the string "1234" ? [4 marks][CO4]

Q.5. (a) Given the following grammar with two productions:

S → AaAb / BbBa
A → ε
B → ε

Construct the canonical collection of LR(1) items and the parsing table if we apply LALR(1) parser on the above grammar. [6 marks][CO3]

Total No. of Pages 2
THIRD SEMESTER
END SEM EXAMINATION

Roll No. ....
B.Tech.(ME)
Nov,2022

ME-201 MECHANICS OF SOLIDS

Time: 3 hrs

Max Marks : 40

Note: Answer any five questions.
All questions carry equal marks.
Assume suitably any missing data.

1(a). Two wires are connected to a rigid bar. The wire on the left is of copper alloy having diameter 5 mm and Young's modulus 140 GPa. The aluminum-alloy wire on the right has diameter 7 mm and Young's modulus 70 GPa. (i) If a weight $W = 500$ kg is applied as shown, how much will it displace due to stretch in the wires? (ii) Where should the weight be located such that the bar would remain horizontal? (Fig. 1)

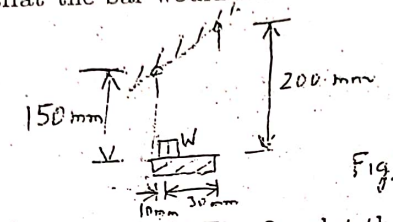


Fig. 1

4[CO-1]

1(b). For the structure shown in Fig. 2, plot the axial force, shear force and bending moment diagrams.

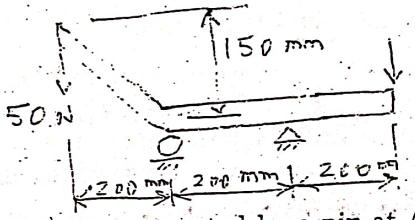


Fig 2

4[CO-1]

2. The rectangular beam ABC is supported by a pin at A and the cable CD. Determine the largest vertical force P that can be applied at B if the normal stress in the beam is limited to 120 MPa. Find deflection of point B. (Fig. 3)

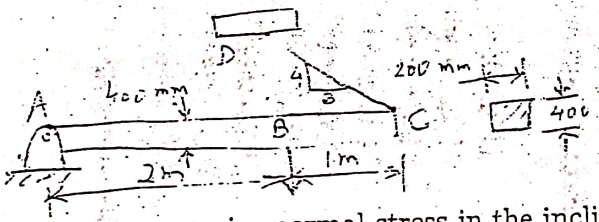
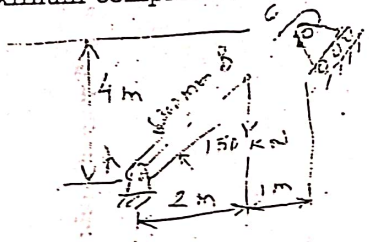


Fig 3

4[CO-2]

3(a). Find the maximum compressive normal stress in the inclined beam ABC. (Fig. 4)



Cross-section is 50mm × 100 mm.
Fig 4

4[CO-2]

3(b). A 20 mm round shaft 500 mm long is built in at one end subjected to a torque T at the free end, as shown in Fig. 5. If a linear gage placed on the surface at 45° with the

horizontal reads a strain of 4×10^{-3} mm/mm when the torque is applied, what would be the angle of twist of the shaft? Let E=180 GPa and G=70 GPa.

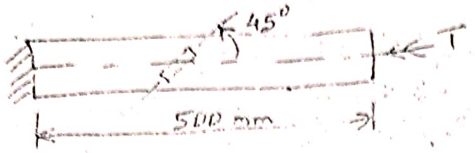


Fig 5

4 [CO-3]

4(a). The 25 mm thick reactangular bar is subjected to the axial load of 10 kN. If the bar is joined by a weld, which makes an angle of 60° with the horizontal, determine the shear stress parallel to the weld and the normal stress perpendicular to the weld. (Fig. 6)

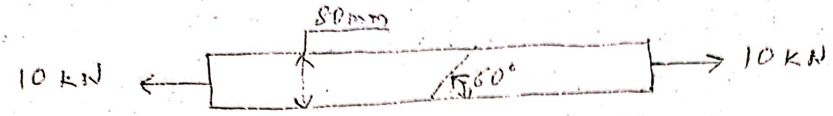


Fig 6

4 [CO-3]

4(b). The state of stress at a point in a member is shown on the element in Fig. 7. Determine the stress components acting on the plane AB.

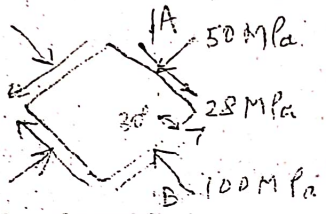


Fig 7

4 [CO-2]

5(a). A thin ring is heated in oil 150°C above room temperature. In this condition, the ring just slips on a solid cylinder, as shown in the Fig. 8. Assuming the cylinder to be completely rigid, (i) determine the circumferential stress that develops in the ring upon cooling, and (ii) determine what bearing pressure develops between the ring and the cylinder. Let $\alpha = 20 \times 10^{-6}$ deg C^{-1} and $E = 70$ GPa.

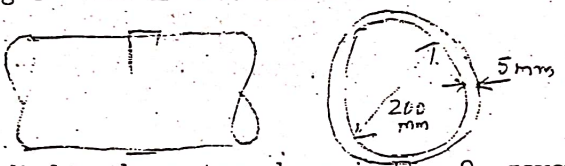


Fig 8

4 [CO-2]

5(b). What force F can be applied to the system shown in Fig. 9 , governed by the 25x16 mm aluminum-alloy bar AB? The factor of safety on the Euler buckling load is to be 2.5. Assume the ends are pinned.. E=70 GPa.

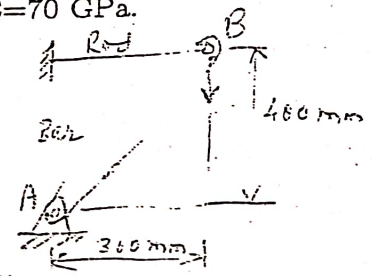


Fig 9

4 [CO-3]

6. Write short notes on any two:
(i) Theory of bending
(ii) Theory of torsion
(iii) Theories of failure

8 [CO-2]

3710

Total pages: 2 Roll No. _____

3rd SEMESTER B.Tech. (Mechanical Engg.)

END TERM EXAMINATION Nov-Dec-2022

COURSE CODE: ME 203 COURSE TITLE: Thermal Engg. - I

Time: 3 Hours Max. Marks: 40

Note : Answer any FIVE questions in full. Assume suitable missing data, if any. Use of steam tables and Mollier charts (steam charts) are allowed to solve problems.

Q.1 (a) Setup the following relation for the change in internal energy of a substance from the measured values of temperature and volume.

$$du = c_v dt + \left(\frac{\beta T}{\alpha} - p\right) dv$$

Proceed from that to show that internal energy of an ideal gas is independent of pressure and volume and is a function of temperature only. [5 marks][CO#1]

(b) Air consists of 76% nitrogen and 23% oxygen. Total pressure of air is 2 bar. Take molecular weight of nitrogen as 28 kg/kmol and that of oxygen as 32 kg/kmol. Find partial pressure of each of the constituent in mixture of 1 kg air. [3 marks][CO#1]

Q.2 (a) Briefly explain with diagrams, types of feed water heaters used in regenerative Rankine cycle with advantages and disadvantages. [3 marks][CO#2]

(b) A steam power plant operates on an ideal reheat Rankine cycle. The steam from boiler at 150 bar and 500°C expands through the high pressure turbine. It is reheated at constant pressure of 40 bar to 500°C and expands through the low pressure turbine to a condenser pressure of 0.1 bar. Calculate (i) quality of steam entering condenser, (ii) thermal efficiency of the cycle, (iv) steam rate and (v) draw h-s diagram. [5 marks][CO#2]

Q.3 (a) In a boiler trial, the following data are obtained:
Environment temperature = 25°C, temperature of feed water = 55°C, mass of steam = 14000 kg/hour, steam pressure = 13 bar, steam

temperature = 250 °C, coal consumption
of coal = 35000 kJ/kg, temperature of flue gases leaving boiler = 310 °C,
partial pressure of steam = 0.08 bar; specific heat of air and dry flue gas =
1.02 kJ/kgK, specific heat of super heated steam = 2.1 kJ/kgK,
analysis of flue gas by volume: CO_2 = 9.4%, O_2 = 1.1%, N_2 = 79.5%,
percentage composition of coal by mass: C = 83.4%, H_2 = 4.8%, Ash =
10%, moisture = 1.8% . Calculate and make complete heat balance sheet
on 1 kg of coal basis and on percentage basis. [5 marks][CO#3]

(b) Differentiate between natural and artificial draught systems in boiler.
[3 marks][CO#3]

Q.4 (a) Derive the expression for mass flow rate of steam through nozzle.
[3 marks][CO#4]

(b) Steam enters a convergent-divergent nozzle at 900 kg/hour, 10 bar and 250°C. It expands to a exit pressure of 8 bar. There is friction loss in the divergent section of the nozzle and is considered as 0.2 of isentropic enthalpy drop. Calculate throat and exit areas in m^2. Draw the h-s diagram. [5 marks][CO#4]

Q.5 With the help of velocity diagrams, drive the expression for blade efficiency and the condition for maximum blade efficiency for a single stage impulse turbine. [8 marks][CO#5]

OR

In an impulse turbine, steam enters at a velocity of 700 m/s, nozzle angle is 30°, mean blade speed is 300 m/s. The absolute velocity of steam at the exit is along the axis of turbine. Take blade angles are equal. Mass flow rate of steam is 10 kg/s. Determine (i) work done in kW, (ii) blade efficiency, (iii) axial thrust, (iv) stage efficiency if nozzle efficiency is 90 % (v) draw velocity diagrams [8 marks][CO#5

Q.6 (a) Differentiate between jet and surface condensers with their advantages and disadvantages. Draw the diagrams.. [4 marks][CO#6

(b) Discuss with diagrams, the working of a natural draft cross flow cooling tower.. [4 marks][CO#

Total no. of pages: 2 *Roll No.*_____

THIRD SEMESTER B. Tech (ME)

END SEMESTER EXAMINATION NOVEMBER- 2022

ME-207 ENGINEERING ANALYSIS AND DESIGN

Time: 3 Hours Max. Marks: 40

Note: Attempt any five questions.
Each question carries equal marks.
Use of statistical table is permitted.
Assume missing data , if any

1 (a) What do you understand by skewness and kurtosis? Describe different measures of skewness and kurtosis. [CO1]

(b) Calculate first four moments for the following frequency distribution about the mean. Also comment upon nature of frequency distribution. [CO3]

X	-4	-3	-2	-1	0	1	2	3	4
f	3	4	5	7	12	7	5	4	3

2 (a) Define Bernoulli trials. Find mean and variance of Binomial distribution. [CO1]

(b) The probability that a patient recovers from a rare blood disease is 0.4. if 15 people are known to have contracted this disease, what is the probability that (i) at least 10 survive (b) from 3 to 8 survive (c) exactly 5 survive [CO2]

3 (a) Define distribution function of a random variable. State its important properties. [CO1]

(b) The density function of a random variable X is given by [CO3]

$f(x) = a+bx^2$ for $0 \le x \le 1$ otherwise 0

If $E(X) = 3/5$, find a,b.

4 (a) what do you understand by theory of failure? Describe maximum principal stress theory. [CO1]

(b) A machine is subjected to following stresses: $\sigma_x = 60$ MPa, $\sigma_y = 45$ MPa, $\tau_{xy} = 30$ MPa. Find the factor of safety if it is made of C45 steel having yield stress 353 MPa, using maximum principal stress theory. [CO3]

5 (a) Find initial basic feasible solution of the following transportation by Vogel's approximation method. [CO4]

Factory/warehouse	W1	W2	W3	W4	Capacity
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Demand	5	8	7	14	

(b) Four different jobs can be done on four different machines. The matrix below gives the cost in rupees of producing job i on machine j. [CO4]

Jobs/Machines	M1	M2	M3	M4
J1	5	7	11	6
J2	8	5	9	6
J3	4	7	10	7
J4	10	4	8	3

6. Write short notes on any four of the following: [CO1]

(a) Poisson distribution
(b) Normal distribution
(c) System modeling
(d) Computer Aided Engineering Analysis
(e) Report writing
(f) Engineering ethics

Total No. of Pages 02

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Roll No. .....

Third SEMESTER

B.Tech.

END SEMESTER EXAMINATION Nov-2022

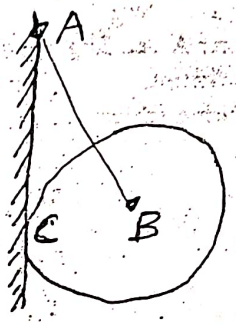
ME251 ENGINEERING MECHANICS

Time: 3:00 Hours Max. Marks: 50

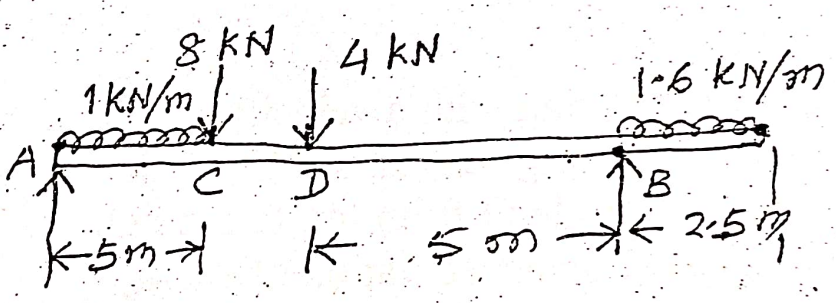
Note: Answer any five questions. Assume suitable missing data, if any.

Q1. (a) The resultant of two forces when they act at right angle is 10N, where as when they act at an angle of 60°, the resultant is $\sqrt{148}$. Determine the magnitude of the two forces. [5] [CO1]

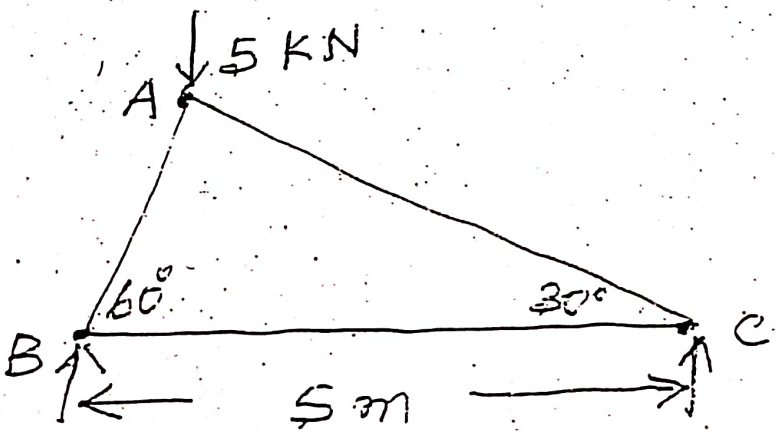
(b) A circular roller of weight 1000N and radius of 20cm hangs by a tie rod AB=40cm and rests against a smooth vertical wall at C. Determine the tension in the tie rod and reaction Rc at point C. [5] [CO1]



Q2. (a) An overhanging beam carries the loads as shown in fig. Calculate t reactions at both ends. [5][CO

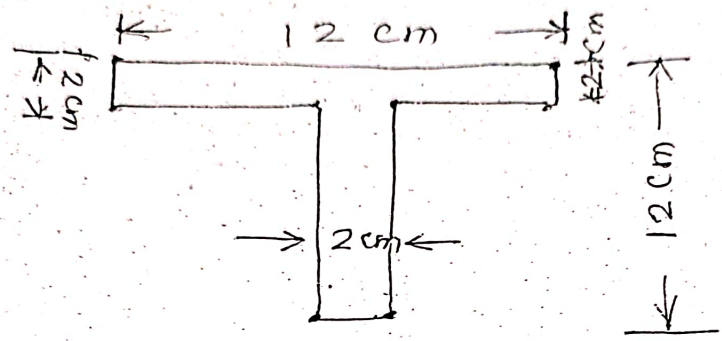


(b) Find the forces in the members AB, AC and BC of the truss shown in th [5][C



Q3. (a) A body of weight 450N is pulled on an inclined plane by a force of 300N. The inclination of the plane is 30° to the horizontal and the force is applied parallel to the inclined plane. Determine the coefficient of friction. [5][CO3]
(b) A body of weight 150N is placed on a rough horizontal plane. If the coefficient of friction between the body and the horizontal plane is 0.4. Determiner the horizontal force required to just slide the body on the plane. [5][CO3]

Q4. (a) Derive an expression for the moment of inertia of the rectangular section ABCD having width b and depth d about the X-X horizontal axis passing through the centre of gravity of the rectangular section. [5][CO4]
(b) Find the centre of gravity of the T- section as shown in the figure. [5][CO4]



Q5. (a) Derive expressions for relationship between: [5][CO5]
(i) Linear velocity and angular velocity
(ii) Linear acceleration and angular accelerations
(b) A wheel rotating about a fixed axis at 30 rpm is uniformly accelerated for 50 seconds during which time it makes 40 revolutions. Find angular velocity at the end of this interval. [5][CO5]

Q6. (a) A bullet of mass m moving with a velocity u is fired into a body of mass M which is suspended by a string length, L. The bullet gets embedded in the body and swings through an angle Θ from top to a height h. Derive expressions for velocity of the bullet based on conservation of energy. [5][CO6]
(b) A mass of 20kg is dropped through a height of 5cm on a spring of stiffness k=100N/cm. Working from the first principle. Find the maximum displacement of the spring in cm. [5][CO6]

Total no. of pages: 03 Roll No.....

III SEMESTER

B.Tech.[Production & Industrial Engineering]

END TERM EXAMINATION *November-2022*

ME261 KINEMATICS AND DYNAMICS OF MACHINES

Time: 3:00 Hours *Max. Marks : 40*

Note:	Answer Five questions. All questions carry equal marks. Assume suitable missing data, if any.

1. Draw velocity and acceleration diagram for the mechanism given in Fig.1 below, all the dimensions are in metres. The crank rotates with 450 rpm CCW and makes 30° with the IDC. Also determine the velocity and acceleration of slider C with respect to another slider N. [8][CO-1]

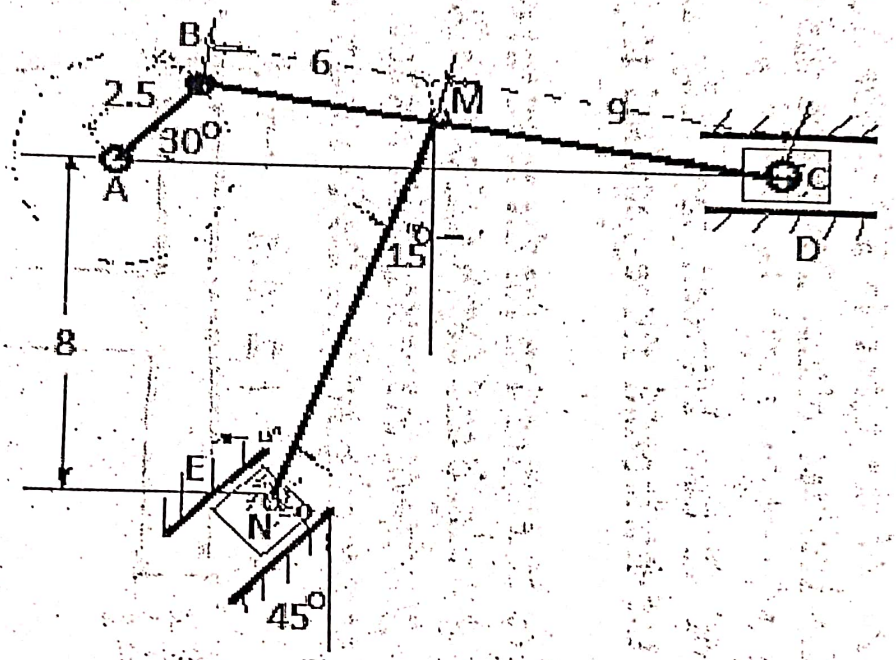


Fig.1

2 Attempt the following:

[a] Define and describe the law of steering and its importance for power transmission through gear wheels.

[b] Compare the function and properties of knife edge, roller and flat face followers [4x2=8][CO-1,2]

3 Attempt the following:

[a] Describe underdamped, overdamped and critical damped vibrations with the help of neat sketch and expressions.

[b] Derive the expressions and discuss the effect of whirling of the shaft. [4x2=8][CO-3]

4 Fig.2 shows an epicyclic gear train. Pinion A has 20 teeth and is rigidly fixed to the motor shaft. The wheel B has 32 teeth and gears with A, and also with annular fixed, wheel D. Pinion C has 20 teeth and is integral with B (C,B being a compound gear wheel). Gear C meshes with annular wheel E, which is keyed to the machine shaft. The arm rotates about the same shaft on which A is fixed and carries the compound wheel B, C. If the motor runs at 1000 r.p.m., find the speed of the machine shaft. Find the torque exerted on the machine shaft if the motor develops a torque of 120 Nm. [8][CO-4]

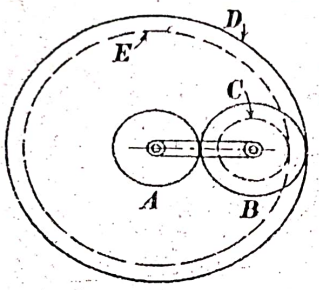


Fig. 2

5 [a]With the help of neat sketch describe the turning moment diagram for two stroke and four stroke I.C Engine. For the same power output for middle range of I.C Engine, compare the requirement of mass moment of inertia for the both two stroke and four stroke I.C Engine.

[b] Describe Tractive force, swaying couple and hammer blow with all the necessary condition in 2-cylinder, 90° crank, inline, uncoupled locomotive engine. [4x2=8][CO-5]

6 [a] Discuss the stabilization of naval ship during rolling, pitching and steering.

[b] Describe the hunting of the governor and stage of failure during the process of hunting. [4x2=8][CO-6]

7 Attempt any two of the following:

[a] Describe longitudinal, transverse and torsional vibrations

[b] Derive law of gearing.

[c] Differentiate between dynamic and static balancing [4x2=8][CO-3,4,5]

8 Attempt any two of following:

[a] Define and inter relate the different pitch for gear and its importance in transmission of power through gearing of wheels.

[b] Differentiate between function of flywheel and mechanical governor.

[c] Discuss the stabilization of 4-wheel vehicle regarding gyroscopic couple and include the effect of motion of engine also. [4x2=8][CO-5,6]

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Total No. of Pages- 2

Roll No. .....

Vth SEMESTER

B.Tech. [Mech.]

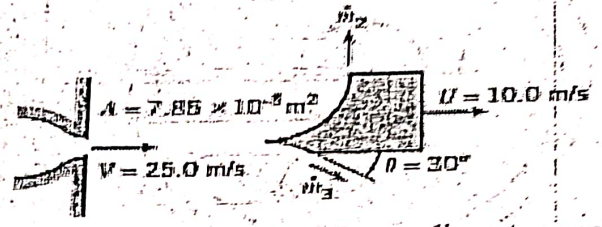
END SEMESTER EXAMINATION NOV.-2022

ME301 Fluid Systems

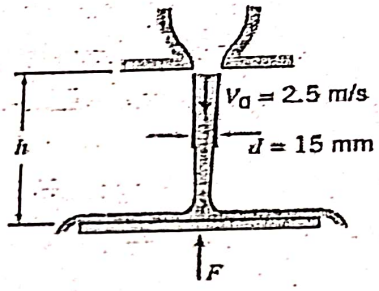
Time: 3:00 Hours Max. Marks : 40

Note: Answer all question. All questions carry equal marks. Assume suitable missing data, if any.

Q.1[a] A plane jet of water strikes a splitter vane and divides into two flat streams, as shown. Find the mass flow rate ratio, ($\dot{m}_2/\dot{m}_3$) to produce zero net vertical force on the splitter vane. If there is a resistive force of 16 N applied to the splitter vane, find the steady speed U of the vane. (CO1)



[b] A uniform jet of water leaves a 15-mm-diameter nozzle and flows directly downward. The jet speed at the nozzle exit plane is 2.5 m/s. The jet impinges on a horizontal disk and flows radially outward in a flat sheet. Obtain a general expression for the velocity the liquid stream would reach at the level of the disk. Develop an expression for the force required to hold the disk stationary, neglecting the mass of the disk and water sheet. Evaluate for h = 3 m. (CO1)



Q.2

[a] A Francis turbine works under a total head of 25 m. The outer and inner diameters of the runner are 0.70 m and 0.35 m respectively. The vane tip is radial at the inlet and the flow leaves the turbine radially. The inlet guidevane angle is 12°. Calculate the speed of the runner and the vane angle at the exit, if the velocity of flow is constant at 4.0 m/s. Assume the hydraulic efficiency as 0.90. (CO2)

[b] A Pelton wheels operate with a jet of 150 mm diameter under the head of 500 m. Its mean runner diameter is 2.25m and it rotates with a speed of 375 rpm. The angle of bucket tip at outlet as 15°, coefficient of velocity is 0.98, mechanical loses equal to 3% of power supplied and the reduction in relative velocity of water passing through bucket is 15%. Find (i) the force of jet on the bucket, (ii) the power developed, (iii) bucket efficiency and (iv) the overall efficiency. (CO2)

Q.3[a] A centrifugal pump impeller is 40 cm in outer diameter and 2.5 cm wide at the exit. Its blade angle at the outlet is 30°. When run at a speed of 1500 rpm, the flow rate though the pump is 80 liters/s. (i) Calculate the radial, relative and absolute velocities at the impeller exit. (ii) If there is no inlet whirl, what would be the theoretical head added to the water by the impeller? (CO3)

[b] A single acting reciprocating pump having a cylinder diameter of 150 mm and stroke of 300 mm is used to raise the water through a height of 20 m. Its crank rotates at 60 rpm. Find the theoretical power required to run the pump and the theoretical discharge. If actual discharge is 5 litres/s, find the percentage slip. If delivery pipe is 100 mm in diameter and is 15 m long, find the acceleration head at the beginning of the stroke. (CO4)

Q.4

[a] Explain how to deal nonlinearity in CFD with suitable example. (CO5)

[b] Following the steps to convert the differential equation into a difference equation, solve $\frac{du}{dx} + u = x^2$ $0 \le x \le 1$ $u(0)=2$ for $N = 4$ and compare to the exact solution

$$u_{exact} = x^2 - 2x + 2$$ (CO5)

Q.5 [a] Write notes on the following. (CO6)

(i) Surge tank and water hammer

(ii) Advantages of air vessels in reciprocating pump (CO6)

[b]

Derive an expression for condition of maximum fluid power transmissior through pipe.

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Total No. of Pages 02 Roll No. .....

FIFTH SEMESTER B.Tech. [ME]

END SEMESTER EXAMINATION Nov. 2022

ME303 DYNAMICS OF MACHINES

Time: 3:00 Hours Max. Marks: 40

Note: Answer any five questions. Assume suitable missing data, if any.

Q.1a. Discuss about the Gyroscopic effect on a ship with suitable diagram. [4][CO1]

b. Each road wheel of a motor cycle has a mass moment of inertia of 1.5 kg-m^2. The rotating parts of the engine of the motor cycle have a mass moment of inertia of 0.30 kg-m^2. The speed of the engine is 6 times the speed of the wheels and is in the same sense. The mass of the motor cycle with its rider is 300 kg and its centre of gravity is 0.6 m above the ground level. Find the angle of heel if the cycle is travelling at 60 km / h and is taking a turn of 45 m radius. The wheel diameter is 0.6 m. [4][CO3]

Q.2a. The turning moment diagram for the engine is drawn to the following scales:
Turning moment, 1 mm = 1000 N-m and crank angle, 1 mm = 6°.The areas above and below the mean turning moment line taken in order are : 530, 330, 380, 470, 180,360, 350 and 280 mm2.The mean speed of the engine is 150 r.p.m. and the total fluctuation of speed must not exceed 3.5% of mean speed. Determine the diameter and mass of the flywheel rim, assuming that the total energy of the flywheel to be 15/14 that of rim. The peripheral velocity of the flywheel is 15 m/s. Find also the suitable cross-sectional area of the rim of the flywheel. Take density of the material of the rim as 7200 kg/m^3. [4][CO5]

b. With a suitable sketch explain the functioning of a punching machine. [4][CO2]

Q.3a. The upper arms of a Porter governor are pivoted on the axis of rotation and the lower arms are pivoted to the sleeve at a distance of 30 mm from the axis of rotation. The length of each arm is 300 mm and the mass of each ball is 6 kg. If the equilibrium speed is 200 r.p.m. when the radius of rotation is 200 mm, find the required mass on the sleeve. If the friction is equivalent to a force of 40 N at the sleeve, find the coefficient of insensitiveness at 200 mm radius. [4][CO4]

b. Discuss about the following.
Sensitiveness of the Governor
Isochronism in Governors
Hunting of a Governor
Stability of a Governor. [4][CO1]

Q. 4a. Explain Variation in tractive effort and Swaying Couple of a two cylinder engine. [4][CO3]

b. The reciprocating masses of the first three cylinders of a four cylinder engine are 4.1, 6.2 and 7.4 tonnes respectively. The centre lines of the three cylinders are 5.2 m, 3.2 m and 1.2 m from the fourth cylinder. If the cranks for all the cylinders are equal, determine the reciprocating mass of the fourth cylinder and the angular position of the cranks such that the system is completely balanced for the primary force and couple. If the cranks are 0.8 m long, the connecting rods 3.8 m, and the speed of the engine 375 r.p.m. ; find the maximum unbalanced secondary force and the crank angle at which it occurs. [4][CO4]

Q.5a. A shaft 1.5 m long is supported in flexible bearings at the ends and carries two wheels each of 50kg mass. One wheel is situated at the centre of the shaft and the other at a distance of 0.4 m from the centre towards right. The shaft is hollow of external diameter 75 mm and inner diameter 37.5 mm. The density of the shaft material is 8000 kg/m3. The Young's modulus for the shaft material is 200 GN/m^2. Find the frequency of transverse vibration. [4][CO3]

b. A mass of 85 kg is supported on springs which deflect 18 mm under the weight of the mass. The vibrations of the mass are constrained to be linear and vertical and are damped by a dashpot which reduces the amplitude to one quarter of its initial value in two complete oscillations. Find : 1. The magnitude of the damping force at unit speed, and 2. the periodic time of damped vibration. [4][CO4]

Q.6a. Draw a flow chart describing the relationship between operating conditions and type of wear. [4][CO2]

b. Explain Stribeck curve used to determine coefficient of friction under different rotational speeds. [4][CO1]

NO OF PAGES:2 ROLL NO.

DELHI TECHNOLOGICAL UNIVERSITY

END SEMESTER EXAMINATION NOV-DEC 2022

SUB CODE: ME 305 DESIGN OF MACHINE ELEMENTS

MAX MARKS:40 TIME: 3 hrs.

I. ANSWER ANY FIVE QUESTIONS.

II. ASSUME SUITABLE MISSING DATA, IF ANY.

III. DESIGN DATA BOOK IS PERMITTED.

1. Discuss about the limits fits and tolerances in detail with suitable examples and figures. [CO1]8
2. Two mild steel rods 40 mm diameter are to be connected by a cotter joint. The thickness of the cotter is 12 mm. Calculate the dimensions of the joint, if the maximum permissible stresses are: 46 MPa in tension ; 35 MPa in shear and 70 MPa in crushing. Draw two views of the cotter joint. [CO3]8
3. Design and draw a screw jack for lifting a safe load of 150 kN through a maximum lift of 350 mm.The elastic strength of the material of the screw may be taken as 240 MPa in compression and 160 MPa in shear. The nut is to be made of phosphor bronze for which the elastic strengths in tension, compression and shear are respectively 130, 115 and 100 MPa. Bearing pressure between the threads of the screw and the nut may be taken as 18 N/mm2. Safe crushing stress for the material of the body is 100 MPa. Coefficient of friction for the screw as well as collar may be taken as 0.15. [C02]8
4. A semi-elliptical laminated spring 900 mm long and 55 mm wide is held together at the centre by a band 50 mm wide. If the thickness of each leaf is 5 mm, find the number of leaves required to carry a load of 4500 N. Assume a maximum working stress of 490 MPa.If the two of these leaves extend the full length of the spring, find the deflection of the spring. The Young's modulus for the spring material may be taken as 210 kN/mm^2. [CO4]8

5. Determine the diameter of hollow shaft having inside diameter 0.5 times the outside diameter. The permissible shear stress is limited to 200 MPa. The shaft carries a 900 mm diameter cast iron pulley. This pulley is driven by another pulley mounted on the shaft placed below it. The belt ends are parallel and vertical. The ratio of tensions in the belt is 3. The pulley on the hollow shaft weighs 800 N and overhangs the nearest bearing by 250 mm. The pulley is to transmit 35 kW at 400 r.p.m. [CO5]8

6. A pair of 20° full-depth involute tooth spur gears is to transmit 30 kW at a speed of 250 r.p.m. of the pinion. The velocity ratio is 1 : 4. The pinion is made of cast steel having an allowable static stress, σo = 100 MPa, while the gear is made of cast iron having allowable static stress, σo = 55 MPa. The pinion has 20 teeth and its face width is 12.5 times the module. Determine the module, face width and pitch diameters of both the pinion and gear from the standpoint of strength only taking velocity factor into consideration. The tooth form factor may be assumed. [CO4]8

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Total no. of Pages: 02 Roll no.....

Fifth Semester

B.Tech.

END SEMESTER EXAMINATION November 2022

ME351 POWER PLANT ENGINEERING

Time: 3:00 Hours Max. Marks: 50

Note: Attempt any *five* Questions.
Assume suitable missing data, if any.

1. (a) Enumerate the sources of energy used for power plants? Also explain the difference between the renewable and non-renewable sources of energy. (5) (CO1)
(b) Give the classification of coal. What is proximate and ultimate analysis of coal? What do you mean by coking and non-coking of coal? (5) (CO1)

2. (a) Discuss the present energy scenario of India in comparison with world. (5) (CO2)
(b) What are the principal types of fuels used in power generation? How quality of coal is ascertained from the analysis. (5) (CO2)

3. (a) What is inplant coal handling? Draw a neat diagram of inplant coal handling and indicate the name of equipment used at different stage. (5) (CO2)
(b) What is circulation of boiler? What is the difference between natural circulation and forced circulation. (5) (CO2)

4. (a) What are once through boiler and how it is different with other high pressure boilers. (5) (CO4)
   (b) What are the different components of a nuclear power plant? Explain the working of nuclear power plant. What are the different fuel in such a power plant? (5) (CO42)
5. (a) What is HP dosing? Name the chemical used for this and write which type of silica cann not be used to remove in a DM plant. (5) (CO2)
   (b) Discuss briefly with schematic diagram, integration of gas turbine plant with steam power plant. Explain the working of hydroelectric power plant, write expression of different efficiencies and overall efficiency of plant. (5) (CO5)
6. (a) Discuss briefly the importance of instrumentation in power stations. (5) (CO6)
   (b) Discuss short note on priming, foaming and carryover. (5) (CO2)

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Total no. of Pages: 02 Roll no.....

Vth SEMESTER

B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

ME353a Renewable Sources of Energy

Time: 03:00 Hours *Max. Marks: 50*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Critically evaluate the present scenario of Indian energy sector in the light of our developmental goals and policies, highlighting the role of renewable energy in our power planning? [10][CO#01]

OR

Q.1a Define solar irriadnce, solar constant, extra-terrestrial and Terrestrial radiation. What is the standard value of solar constant? [5][CO#1]

Q.1b What are the reasons for variation in solar radiation reaching the earth than received at the outside of the atmosphere? [5][CO#1]

Q.2a A P-type silicon has effective density of states in the balance band as 10×10^{22} cm^3 and imperative from the third group with convection concentration of 10×10^{19} per cm is added. if the band gap for silicon is 1.1 electron volt, find the closeness of the farmi level with balance band at the temperature of 27 Kelvin. [5][CO#2]

Q.2b What is the principle of solar photovoltaic power generation? What are the main elements of PV system? [5][CO#2]

Q.3. Enumerate the different main applications of solar energy. Describe a hot water supply system with neat sketch. [10][CO#3]

SS 7

OR

Q.3 Explain the packed bed heat energy storage system with neat sketch. [10][CO#3]

Q.4 Present a comparative analysis on Fuel Cell Technologies *vis-a-vis* other prominent green energy technologies available for automobile applications? [10][CO#4]

OR

Q.4 What are the factors affecting the performance of a biogas digester? Explain each briefly. [10][CO:4]

Q.5a A deep ocean wave of 2:5m peak to pick appears at a period of 10sec. Find the wavelength, phase velocity and power associated with the wave. At this power rate, what is the average annual wave energy in MWh/m? [5][CO:5]

Q5b. What is the minimum tidal range required for a practical tidal plant? How much it is the potential in tidal? [5][CO:5]

Total No. of Pages: 01

Roll No.....

5th Semester
B.Tech.

END TERM EXAMINATION

NOV/DEC-2022

ME-361 Industrial Engineering

Time: 3 Hours

Max. Marks: 50

Note: Attempt any five(05) questions.
All questions carry equal marks.

1(a) State objectives of Industrial Engineering. Explain system approach to industrial engineering with suitable example. (CO 1)

(b) What are the factors influencing the productivity? (CO 1)

2 (a) What is synthetic motion study? Give details of arriving at rating performance. (CO 2)

(b) The worker in an engineering company is expected to work for 420 min in a shift of 8 hrs. The remaining time is allowing for rest and personal needs etc. (CO 2)

(i) Determine the standard time per piece of a job whose normal time is 4 min

(ii) Calculate the number of pieces produced per day

(iii) If the worker produced 100 pieces in his shift what is his efficiency.

3(a) What are the major objectives of Production planning and control? How PPC help an industry to enhance its performance? (CO 3)

(b) With proper illustration explain the how Gantt charts are employed tracking the progress of activities in an industry? (CO 3)

4(a) State important objectives of Quality control. Which duties are generally assigned to Quality control Department? (CO 4)

(b) What is the purpose of control charts? Explain how this purpose achieved in manufacturing? (CO 4)

5(a) Define Maintainability and availability and compare it with reliability. (CO 5)

(b) Define the term reliability. What are the different configurations related to system reliability? Give a detailed description of any two with the help of an example. (CO 5)

6(a) List different equipments used for material handling between fixed points over a fixed path. (CO 6)

(b) Explain briefly (CO 6)

- Economic order quantity
- Safety stock level

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Total No. of Pages: 2 *Roll No. .....*

VII SEMESTER
B.Tech.

END SEMESTER EXAMINATION ***Nov-2022***

ME 407 Refrigeration & Air Conditioning

Time: 3 Hours *Max. Marks: 40*

Note: 1. Attempt all questions by selecting any two parts from each question
2. Assume suitable missing data, if any.

1	(a)	Differentiate between air refrigeration and vapor refrigeration system.	[4][CO2]
	(b)	Describe with a sketch a boot-strap cycle of air refrigeration system.	[4][CO2]
	(c)	Derive an expression for determining C.O.P. of air refrigeration cycle.	[4][CO2]
2	(a)	Discuss the multi compressor with intercooler system in vapour compression refrigeration system.	[4][CO3]
	(b)	Explain the effect of the flashing and subcooling in the vapour compression Refrigeration system with the help of P-h and T-S chart.	[4][CO3]
	(c)	Describe Cascade refrigeration system and also give its advantages.	[4][CO3]
3	(a)	What are Eco-friendly refrigerants specifying their advantages and disadvantages with regards to cost/use/availability.	[4][CO2]
	(b)	Classify the various refrigerants specifying their nomenclature.	[4][CO1]

(c) Compare steam jet ejector refrigeration and vapor refrigeration systems. [4][CO2]

4 (a) 15 m^3/min of air having inlet condition 38°C DBT and 20% RH is passed through an adiabatic humidifier having humidification efficiency of 90%. Determine the following: [4][CO3]

(i) Outlet condition of air

(ii) Amount of water vapour added to the air per minute.

(b) Discuss in detail the various factors affecting human comfort [4][CO4]

(c) State the factors that determine the load estimation for comfort conditioning. Explain in detail. [4][CO5]

5 (a) Define the term effective temperature and explain its significance in the design of air conditioning system. [4][CO4]

(b) What modifications are necessary to convert a domestic air conditioner meant for summer cooling for use in winter as well? Discuss. [4][CO5]

(c) Discuss various duct design methods, specifying their advantages and disadvantages. [4][CO4]

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Total No of Pages...Two.....
Seventh Semester
End Semester Examination
ME-409
Paper Code
Time: 03 Hrs.

Roll No.....
B Tech [Mech. Engg.]
(November – 2022)
Mechatronics and Control
Title of the Subject
Max Marks. 40

Note : In total attempt Five Questions.
Question No. 1 is Compulsory.
Attempt four Questions more from the rest of the Question Paper.
Assume missing data, if any.

Q No 1 Differentiate between. (2x4=08) CO1

(a) – Hysteresis and Dead Band

(b) – Analogue and Digital signal

(c) – Finite and Infinite position valves

(d) – SPST and DPDT switches

Q No 2(a) Describe any two sensors used for pressure measurement. Also mention their principle and working in brief. (4) CO

Q No 2(b) What are various dynamic characteristics of Sensors? Discuss in brief. (4) CO1

Q No 3(a) What is Signal Conditioning? Also mention various types of Signal conditioning processes in brief. (4) CO

Q No 3(b) What is Digital Logic? What are various Logic gates used in Mechatronic systems? (4) CO

Q No 4(a) Describe various types of Hydraulic and Pneumatic actuation systems in brief. (4) CO

Q No 4(b) What are different type of motors used in Electrical Actuation system? Mention their principle of operation and applications in brief. (4) C

Q No 5(a) What do you understand by Drift? Also explain its types in brief. (4) CO3

Q No 5(b) A Platinum resistance thermometer is calibrated in an environment at a temperature of 15°C and has the following Resistance/Temperature characteristics. (4) CO2

Measurement with Calibrated Platinum Resistance Thermometer

Resistance (Ω)	0	3	6	9	12	15	18	21	24
Temperature (°C)	0	16	32	48	64	80	96	112	128

Two other similar Platinum resistance thermometer A and B have been used in an environment at a temperature of 50°C and the following Resistance/Temperature characteristic were measured.

Measurement with Platinum Resistance Thermometer A

Resistance (Ω)	2	5	8	11	14	17	20	23	26
Temperature (°C)	0	16	32	48	64	80	96	112	128

Measurement with Platinum Resistance Thermometer B

Resistance (Ω)	2	6	10	14	18	22	26	30	34
Temperature (°C)	0	16	32	48	64	80	96	112	128

Determine the Drifts present, if any, in Platinum Resistance Thermometers A and B with change in temperature (Calibrated), along with the respective values of Drift.

Q No 6(a) Differentiate between Electrorheological and Magnetorheological fluids and explain what is their roll in Mechatronic systems? (4) CO

Q No 6(b) How Piezoelectric materials are being used in Actuation systems of the Mechatronic systems? Explaining its Mechanism, mention some examples. (4) C

Q No 7(a) What roll Microprocessors and Microcontrollers play in developing Mechatronic systems? Also explain their types in brief. C

Q No 7(b) What do you understand by PID Controllers? Explain their role in Mechatronics in brief C

Q No 8 Write short note on any two of the following. (2x

(a) – Shape Memory Alloy (b) – Encoders and Resolvers

(c) – PLC (d) – Valve symbols

Total No. of Page: 3

Roll No.....

VII SEMESTER

End Semester Examination

Nov.2022

ME 411 - IC Engines

Time: 3:00 Hours

Max. Marks: 50

Note: Answer any five questions.
All questions carry equal marks

Q.1(a) Define and explain ignition lag in a spark ignition, 4 stroke gasoline engines. Discuss the effects of the following variables on ignition lag. [6,4][CO1,2]

i) Air fuel ratio
ii) Electrode gap
iii) Types of fuel

(b) What are the basic requirements of a good combustion chamber of a spark Ignition engine. Discuss the materials used for piston and cylinder.

Q.2(a) Factors tending to increase knock in SI engines tend to reduce knock in CI engines - Justify the above statement in light of the differences in nature of two phenomena and indicate the methods to reduce knock in SI engines. [6,4][CO2,3]

(b) How 'air swirl' of CI engines is different from 'turbulence' in SI engines? Discuss the effects of turbulence on flame velocity in SI engines.

Q.3(a) Graphically explain how power, efficiency and exhaust emission of CO, HC & NOx vary with the variation of air fuel ratio in a gasoline engine.Sketch and explain fuel consumption loop curve in SI engines. [6,4][CO3]

(b) In a spark ignited gasoline engine, 'rich mixture is required for idling and for maximum power" – Explain the reasons.

Q.4(a) A four stroke diesel engine of 4000cc capacity develops 15kW per m^3 of free air inducted per minute. When running at 3000rpm, it has a volumetric efficiency of 80 percent referred to free air condition of 1.013 bar and 300K. It is proposed to boost the power of the engine by supercharging by a blower (driven mechanically from the engine) of pressure ratio 1.7, an isometric efficiency of 75 percent. Assuming that at the end of the induction the cylinders contain a volume of charge equal to the swept volume, at the pressure and temperature of the delivery from the blower. Estimate the increase in break power from the engine assume overall mechanical efficiency as 80 percent. [8,2][CO2,3]

(b) What are the limitations of supercharging for
i) SI engine
ii) CI engine

Q.5(a) Compare important physico-chemical and combustion properties of ethanol and gasoline from point of view of using them in SI engines. Also discuss the modifications required in an existing gasoline engine if E-85 is to be used. [6,4][CO2]

(b) Discuss basic functions of lubricant in an engine. With the help of a suitable sketch explain wet sump lubrication system in a 6-cylinder compression ignition engine.

Q.6(a) What is multipoint fuel injection (MPFI) system? With a suitable sketch explain the working of MPFI. What are the advantages and disadvantages of MPFI over a carburettor? [5,5][CO2,3]

(b) "Bio-diesel can be produced from vegetable oil, animal fat etc."- Explain how it is produced from vegetable oil. With the help of a neat sketch show the variation of brake thermal efficiency with the variation of BMEP when different blends of biodiesel and diesel is used in a CI engines.

Q.7 Write short notes on the following [5,5][CO2]
i) Combustion phenomenon in CI engines
ii) Use of Compressed Natural Gas (CNG) in SI engines

Total No. of Page: 2

Roll No.....

Semester

M. Tech Thermal Engineering

Total No. of Pages -3 Roll No. .....

VIITH SEMESTER B.Tech.

END SEMESTER EXAMINATION NOV 2022

ME415 PROJECT MANAGEMENT

Time: 3:00 Hours Max. Marks: 50

Note: Answer ANY FIVE questions
Assume suitable missing data, if any.

Q.1 Discuss the principals of project team management and evaluate the significance of team operating rules? (10) [CO:4]

Q.2 Critically evaluate the strategic implications of project termination in the light of different project termination possibilities? (10) [CO:5]

Q.3 Discuss the significance of project team leader on the team performance and highlight the role of human resource management on the successful completion of a project? (10) [CO:5]

Q.4 Write a short note on **ANY TWO** of the following:

a. Project contracts

b. Work breakdown structure

c. Project Manager Key responsibilities (5x2 =10) [CO:1,2]

Q.5.A project composed of 7 activities whose time estimates are listed in the table below. Activities are identified by their beginning (i) and ending (j) node numbers. (10) [CO:3]

Activity (i-j)	Estimated duration (in weeks)		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

(a) Draw the project network and identify all the paths through it.

(b) Find the expected duration and variance for each activity. What is the expected project length?

(c) Calculate the variance and standard deviation of the project length. What is the probability that project will complete at-lest 4 weeks earlier than expected time.

(d) If project due date is 19 weeks, what is the probability of not meeting due date.

Given:

Z	0.5	0.67	1.00	1.33	2.00
P	0.3085	0.2514	0.1587	0.0918	0.0228

Q.6. A small marketing project consists of the jobs in the table given below. (10) [CO:3]

Activity (i-j)	Normal time (days)	Normal cost (Rs)	Crash time (days)	Crash cost (Rs)
1-2	8	1700	6	2100
2-3	16	1400	11	2100
3-5	14	1700	9	2300
1-4	12	2300	9	2900
4-5	16	800	14	2000
5-6	12	2000	8	4000

(a) Draw the activity network of the project

(b) Find the EST, EFT, LST, LFT and total float for each activity

(c) Determine the least cost 43 days schedule.

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Total no. of pages :2 Roll No._____

SEVENTH SEMESTER B.Tech (Mechl)

END SEMESTER EXAMINATION

Nov 2022

ME-419 ROBOTICS AND AUTOMATION

Time : 03 Hrs. *Max. Marks: 50*

Note: Attempt any FIVE questions. Assume missing data , if any

Q.1. a. Define d.o.f. of robot. Explain with neat figure, 3-d.o.f. of arm &body and 3-d.o.f. of wrist of a robot -06-[CO 1,4]

b.Define (i) accuracy (ii) precision (iii) Spatial resolution (iv) repeatability of a robotic system -04-[CO 1,3]

Q.2.a. State the need of Denavit – Hartenberg convention. Explain step by step procedure and homogeneous transformation matrix of D-H convention. -08-[CO 2,5]

b. Write the general form of transformation matrix and state the meaning of elements of the matrix -02-[CO 2]

Q3.a. Explain with neat diagrams, the concept of Joint-space and Cartesian-space movements of two d.o.f robot. -04-[CO 2,6]

b.It is desired to have the first joint of a six-axis robot go from initial angle of 15° to final angle of 90° in 8 secs. Using cubic polynomial, calculate joint angles at 2,4,and 6 secs. Plot the position v/s time, velocity v/s time and acceleration v/s time graphs. -06-[CO 2,6]

Q.4.Explain with neat sketches the working of following sensors:

i. Linear and rotary encoders
ii. Skin like tactile sensors
iii. Ultrasonic proximity sensors
iv. Force and Torque sensors -10-[CO 5,6]

Q.5.a.Explain Lagrangian Mechanics for determining Force and Torque equations while dealing with dynamic behaviour of the robot. -05-[CO 2,4,5]

b. Derive the matrix representing the R-P-Y orientation change of a robot wrist. -05-[CO 1,3]

Q.6.a. What are the different types of actuators used in robots? Explain with example. -4-[CO 4]

b. Define work volume of a robot. Draw and explain different types of work volume related to various physical configuration of robots. State the types of joints and the types of motions involved in these configurations. -6-[CO 1,3,4]

Q.7. Write short notes on:

i. Articulated joint robot configuration

ii. Fifth order polynomial trajectory planning

iii. Lead through programming

iv. Potential safety hazards and remedy in Robots while in use

v. Robotic vision as sensor -10-[CO 1,3,4,5]

Total no. of Pages: 02 Roll no.....

VII SEMESTER

B.Tech. (Mechanical Engineering)

END TERM EXAMINATION Nov/Dec-2022

ME423 Advanced Manufacturing Process

Time: 3 Hours Max. Marks: 50

Note: All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Differentiate between conventional and advanced manufacturing processes. Draw a schematic to outline and categorize the basic advanced manufacturing processes. [Marks 5][CO1]

Q.2 Explain the material removal mechanism in AJM with a neat sketch. Discuss AJM process parameters effect on the metal removal rate with neat graphs. Mention some typical applications of AJM in engineering. [Marks 5][CO2]

Q.3 Explain the different types of torch design used in PAM. Discuss the factors that influence the quality of the cut in PAM and applications of PAM. [Marks 5][CO3]

OR

Q.3' Explain the working principle and specific applications in micro-fabrication/machining of Excimer lasers and Copper vapour laser. [Marks 5][CO3]

Q.4 Explain the functions and desirable properties of dielectric fluid that is used in the EDM process. During an EDM drilling operation in a 30 mm square hole in a carbon steel plate of 20 mm thickness. Brass as the tool and kerosene as the dielectric is used. The resistance and the capacitance in the relaxation circuit are 100 Ω and 20 μF respectively. The supply voltage is 250 Volts and the gap is maintained at such a value that the discharge takes place at 150 Volts. Estimate the time required to complete the drilling operation. (Given $Q = 27.4\ W^{1.54}$, where, Q is the removal rate or steel in $mm^{3/min}$ and W is the power input in KW) [Marks 5][CO4]

Q.5 Prove that in RC-based relaxation circuit for an EDM operation, the discharging voltage for maximum transfer of power should be 72% of the output voltage of the source. Also, discuss the effect of

charging resistance, gap setting, and capacitance on the rate of metal removal with neat graphs. [Marks 5][CO4]

Q.6 Explain the mechanism and condition of steady-state hole penetration in LBM. A laser beam with a power intensity of 10^5 W/mm^2 is used to drill micro holes in a tungsten sheet of 1.0 mm thickness. The drill diameter is 200 µm. If 3x 10 joules/cm^3 are required to vaporize tungsten, estimate the time required to drill a through hole. The efficiency may be taken to be 5%.[Marks 5][CO4]

Q.7 Explain the metal removal mechanism in ECM process. Discuss the different types of potential drops on electrodes in ECM. Explain the parameters controlling the MRR in ECM. [Marks 5][CO5]

OR

Q.7' In ECM process, the surface finish is adversely affected by sporadic breakdown of the anodic film, explain. Give an application of ECM process where other advanced manufacturing processes are failed. [Marks 5][CO5]

Q.8 What do you mean by the self-adjusting feature in ECM? In ECM operation of pure iron, a gap of 2mm is to be kept. Determine the feed rate in mm/min, if the supply voltage is 7.83 V, the total overvoltage is 2.5 V and the resistivity of the electrolyte is 50 Ω-mm. [Marks 5][CO5]

Q.9 Explain the metal removal mechanism of focused beam machining with a neat sketch. Why Gallium is most commonly used in FIB as an Ion source. Describe the FIB milling process used for nanomanufacturing with a suitable example. [Marks 5][CO6]

Q.10 Discuss the working principles of combined-based ECM hybrid processes and their specific applications & advantages over ECM. [Marks 5][CO6]

OR

Q.10' To get the nano finish of a flat steel workpiece and the internal surface of a titanium alloy tube, select the best-advanced manufacturing process, explain its procedure and its limitation [Marks 5][CO6]

Total No. of Pages.02 *Roll No. .....*

FIFTH/SEVENTH SEMESTER

B.Tech. (ME)

END-TERM EXAMINATION *Nov/Dec-2022*

ME-435 OPTIMIZATION TECHNIQUES

Time: 3:00 Hours *Max. Marks: 50*

Note: Answer any *FIVE* questions. All questions carry equal marks. Assume suitable missing data, if any.

1. a) Find the extremum point(s) and their nature for the function

$$Z = x^2+y^2+z^2$$

Subject to constraint

$$4x+y^2+2z = 14$$

Solve this using the Lagrange multiplier method. [5](CO#2)

b) Obtain the optimal point of U and check its nature, where

$$U=x^2+y^2+z^2+x-2z-xy$$ [5](CO#2)

2. a) Establish the KKT conditions for the problem given below.

Minimize, $Z = (x-8)^2+(y-6)^2$

Subject to constraint:

$$x+2y > 9$$ [5] (CO#3)

b) List various region elimination techniques for single variable unconstrained optimization. Explain the procedure of Dichotomous search method. [5] (CO#1)

3. The following function represents a physical system engineers might need to consider for an industrial flow process. Let x represents the flow rate of dye into the coloring process of cotton fabric. Based on this rate, the reaction differs with other substances as evidenced by given step function which is defined as: [10] (CO#4)

$$f(x) = \begin{cases} 2 + 2x - x^2 ; 0 < x \leq 1.5 \\ -x + \frac{17}{4} ; 1.5 < x \leq 4 ; \end{cases}$$

The company want to find the flow rate x that maximizes the reaction of other substances f(x). Through experimentation the engineers have found that the process is sensitive to within about 0.020 of actual value of x. They also found that the flow is either off (x=0) or on (x>0). The process will not allow for turbulent flow that occurs above x=4 for this process. Use Golden section search method to solve this problem.

4. a) Define the various terms used in dynamic programming and describe the procedure to solve a discrete optimization problem. [5] (CO#1)

b) Use dynamic programming to solve the following problem: [5] (CO#3)
Minimize $Z = x^2 + y^2 + z^2$
Subject to the constraint
$xyz = 6$ and $x, y, z \geq 0$.

5. Solve the following all-integer programming problem using the branch and bound method: [10] (CO#4)
Maximize $z = 7x_1 + 9x_2$
Subject to:
$$-x_1 + 3x_2 \leq 6$$
$$7x_1 + x_2 \leq 35$$
$$x_2 \leq 7$$
$x_1, x_2 \geq 0$ and integer

6. Write short note on any two from the various Intelligent Techniques of optimization. [10] (CO#1)

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Total no. of Pages:

Roll no.....

B.Tech – II Semester

END TERM EXAMINATION *Nov/Dec-2022*

CH-201 Chemical Engineering Process Calculations

Time: 03:00 Hours *Max. Marks: 50*

Note : All questions are compulsory.
Use pencil to draw diagram (s)
Assume suitable missing data, if any.

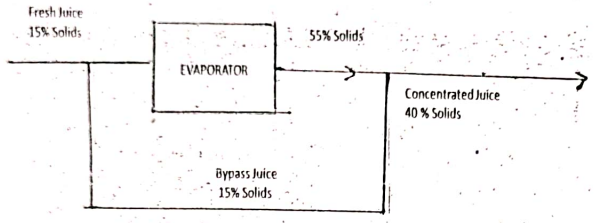
Q.1 A limestone has the following composition:
$CaCO_3$=93%, $MgCO_3$=6% and Insoluble=1%
Calculate: (a). How many kg of CaO will be obtained from 2000 kg of limestone?
(b). Kg of CO_2 available per kg of limestone?
(c). Kg of the limestone required for the manufacture of 1000 kg of CaO?
[4][CO-1]

Q.2 In the extraction of oil from the seeds, 40% oil is obtained by mechanical method, i.e. by hulling (removing the outer husk) the seeds and by expression method (mechanical pressing). The remaining 60% of the oil is recovered by leaching, i.e. by contacting the crushed seeds with hexane. Further, oil is separated from the solvent (hexane) by evaporation and distillation. Draw a block diagram for the recovery of oil from oil seeds clearly mentioning all Unit Operations and Unit Processes. [7][CO-1,CO-5]

Q.3 (a). A single effect evaporator is fed with 10000 kg/h of weak liquor containing 15% caustic (NaOH) by weight and is concentrated to get thick liquor containing 40% by weight caustic. Calculate: (i). kg/h of water evaporated (ii). kg/h of thick liquor obtained. [5][CO-2]

(b). What is the requirement of recycling and purging operations in process and chemical industries? [5] [CO-3]

Q.4 Fresh juice contains 15% solids and 85% water by weight and it is to be concentrated to contain 40% solids by weight in a single-stage evaporator system. It is found that the volatile constituents of the juice escape with water, leaving the concentrated juice with a flat taste. In order to overcome the problem, a part of the fresh juice bypass the evaporator. The operation is shown schematically in the figure:



Calculate:

(a). The fraction of juice that by-pass the evaporator

(b). The concentrated juice (containing 40% solids) per 100Kg of fresh juice fed to the process. [8] [CO-2,CO-3]

Q6. What is Standard Heat of Reaction. What are the conditions for Solid, Liquid and Gases, under which the Heat of reaction is termed as Standard Heat of Reaction. How the standard heat of reaction is calculated from Standard Heat of Formation and Standard Heat of Combustion. Write expression for both.

[5] [CO-4]

Q.7 The gas having the following composition is at temperature of 775 K: SO_2=7.09%, O_2=10.55%, SO_3=0.45% and N_2=81.91%.

Calculate the heat content of 1 kmol gas mixture over 298 K using the heat capacity data given below: $C_p^o = a + bT + cT^2 + dT^3$, kJ/(kmol.K)

Gas	a	$bX10^{-3}$	$cX10^{-6}$	$dX10^{-9}$
SO_2	24.7706	62.9481	-44.2582	11.122
O_2	26.0257	11.7551	-2.3426	-0.5623
SO_3	22.0376	121.624	-91.8673	24.3691
N_2	29.5909	-5.141	13.1829	-4.968

[6][CO-4]

Q.8 The gross heating value (GHV) of gaseous propane at 298 K is 2219.71 kJ/mol. Calculate the net heating value (NHV) of the propane. Given that, the latent heat of water vapours at 298 K=2442.5 kJ/kg.

[4][CO-5]

Q.9 An inspector files a report against a factory owner charging him that CO_2 content in the gases leaving the chimney rises above 15% being dangerous to the health and against city code. The factory owner burns natural gas containing 100% CH_4 and the air supply is adjusted to provide 130% excess air. Is the inspector's charges correct? [6][CO-5]

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Total no. of Pages 02 Roll no.....

3rd SEMESTER

B.Tech.

END TERM EXAMINATION *Nov.-2022*

COURSE CODE CH203 COURSE TITLE: Transport Phenomena

Time: 3:00 Hours *Max. Marks: 50*

Note : All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1

(a) Explain the Different time derivatives used in transport phenomena. Write down their significance. [5][CO 1]

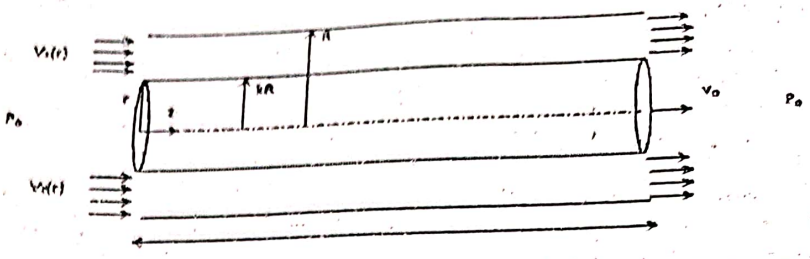
(b) What are the different types of boundary conditions used in Momentum transport? [5][CO 2]

Q.2

(a) Write down the axiom used in heat transport. What are the different modes of heat transport? [5][CO 4]

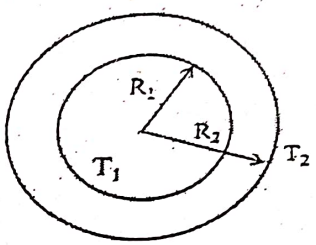
(b) Explain the similarities between Newton's Law of viscosity, Fourier's Law of heat conduction and Fick's Law of diffusion. [5][CO 6]

Q.3 In a wire coating machine, a wire of radius kR is moving into a cylindrical hollow die. The radius of the die is R, and the wire is moving with a velocity v_0 along the axis. The die is filled with a Newtonian fluid, a coating material. The pressure at both ends of the die is same. Find the velocity distribution in the narrow annular region. Obtain the viscous force acting on the wire of length L. Also, find the mass flow rate through the annular region.



[10][CO3]

Q.4 Consider a long cylindrical shell of inner radius R_1, outer radius R_2, and length L shown in Figure below. The inner wall of cylindrical shell is maintained at constant temperature T_1 and outer wall is maintained at constant temperature T_2. Calculate the heat transfer rate in radial direction from the cylindrical shell.



[10][CO4]

Q.5 Explain the difference between convective, diffusive and absolute flux with suitable examples. Derive the mathematical correlation between convective, diffusive and absolute mass flux. [10][CO5]

Total No. of Pages:01 Roll No. .....

Third Semester
B.Tech.

END TERM EXAMINATION Nov/Dec-2022

CH 205 Chemical Engineering Thermodynamics

Time: 3 Hours Max. Marks: 40

Note: Attempt all Questions
All Questions carry equal marks.
Assume suitable missing data, if any

Q.1 What is the work required for the separation of air (21-mol-% oxygen and 79-mol-% nitrogen) at 298.15 K (25°C) and 1 bar in a steady-flow process into product streams of pure oxygen and nitrogen, also at 298.15 K (25°C) and 1 bar, if the thermodynamic efficiency of the process is 5% and if T_0 = 300 K? [5 marks][CO5]

Q.2 A system formed initially of 2 mole CO_2, 5 mole H_2 and 1 mole CO undergoes the reactions

$$CO_2(g) + 3H_2(g) \rightarrow CH_3OH(g) + H_2O(g)$$

$$CO_2(g) + H_2(g) \rightarrow CO(g) + H_2O(g)$$

Develop expressions for mole fraction of the reacting species as a function of reaction coordinate for the above two reactions. [5 marks][CO4]

Q3 Estimate the fugacity of Cyclopentane at *383.15 K (110°C)* and *275* bar. At *383.15 K (110°C)* the vapor pressure of cyclopentane is *5.267* bar. [5 marks][CO5]

Q.4 Derive Margules equations. [5 marks][CO5]

Q.5 What is Raoult's Law, explain the failure of Raoult's Law and need of modified Raoult's Law. [5 marks][CO3]

Q.6 A refrigeration system cools a brine from 298.15 K to 258.15 K (25°C to -15°C) at the rate 20 kg s^{-1}. Heat is discarded to the atmosphere at a temperature of 303.15 K (30°C). What is the power requirement if the thermodynamic efficiency of the system is 0.27? The specific heat of the brine is 3.5 kJ kg^{-1} K^{-1}. [5 marks][CO3]

Q.7 Explain carnot's theorem in detail. [5 marks][CO2]

Q.8 Write a note on Flash calculations. [5 marks][CO3]

-------End----

Total no. of Pages:03 Roll no.....

THIRD SEMESTER

B.Tech.

END TERM EXAMINATION Nov-2022

CH207 ENGINEERING DESIGN AND ANALYSIS

Time: 03:00 Hours Max. Marks: 40

Note: IS 2825-1969 Indian Standard code for Unfired Pressure vessel of 14 pages from page no. 43-56 is allowed in the examination hall.
Assume suitable missing data, if any.

Q.1 (a) A vessel is to be designed to withstand an internal pressure of 200 MN/m^2. An internal diameter of 25 cm is specified, and steel (μ=0.3) has a yield point of 450 MN/m^2 has been selected. The factor of safety is 1.5. Calculate the wall thickness (in mm) required by the
(i) Maximum principal stress theory;
(ii) Maximum strain theory [5+5][CO4]

(b) A process vessel is to be designed for maximum operating pressure of 8 bars. The effective diameter of the vessel is 150 cm. As the material is made up of IS 2002-1962 quality steel, the allowable design stress is 180 MN/m^2. Calculate the thickness (in mm) of the flanged flat covers of the process vessel. The corrosion allowance thickness is 2 mm.

Q.2 (a) Write down the Guidelines for selecting an appropriate vessel. [3+4+3][CO2]

(b) What do you mean by the term support? How can we classify the supports for various process equipment?

(c) Write down the final wall thickness expression for the pipes and tubes under internal and external pressure.

Q.3 (a) A process vessel is to be designed for the maximum operating pressure of 520 kN/m². The vessel has a nominal diameter of 1.5 m and tangent to tangent length of 2.4 m. The vessel is made of IS: 2002-1962 Grade 2B quality steel having an allowable design stress value of 118 MN/m² at working temperature. The corrosion allowance is suggested to be 2 mm for the life span expected for the vessel. The vessel is to be fabricated according to class 2 of Indian standards specifications, which stipulate the weld joint efficiency factor of 0.85. Calculate the standard plate thickness to fabricate the vessel. [5][CO3,CO1]

(b) Write down the temperature considerations that must be followed while designing the various process vessels.

Q.4 A ring-type flange with a plain face for a heat exchanger shell is required to be designed to the following specifications: [10][CO4]

Design pressure = 1 MN/m²
Design temperature = 302 °F
Flange material = IS: 2004-1962 Class 2
Bolting steel = 5% Cr Mo steel
Gasket material = asbestos composition
Shell outside diameter = 1000 mm
Shell thickness = 1 cm
Shell inside diameter = 98 cm
Allowable stress of flange material = 100 MN/m²
Allowable stress of bolting material = 138 MN/m²
Flange type = optional
Ratio of outer diameter to inner diameter = 1.021 m
Gasket thickness = 1.6 mm
Minimum design seating stress = 25.5 MN/m²
Gasket factor = 2.75
Outer diameter = 1.032 m
Diameter at location of gasket load reaction = 1.022 m

a_1 or h_D = 0.035m;
a_2 or h_T = 0.030 m;
a_3 or h_G = 0.024 m

Bolt size	Root area (m^2)	Actual no. of bolts (n)	R (m)	B_s (m)	C = nBs/π (m)	C = ID+2*(1.415 g_o+R) (m)
M 16*1.5	$1.33*10^{-4}$	52	0.025	0.075	1.24	1.058 3
M 18*2	$1.54*10^{-4}$	44	0.027	0.075	1.05	1.062 3
M 20*2	$2.00*10^{-4}$	36	0.030	0.075	0.86	1.068 3

(i) Check the gasket width condition and
(ii) Calculate the flange moment computations and comment on the controlling moment.

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Total no. of pages: 02

Roll no.....

V SEMESTER
B.Tech

MID TERM EXAMINATION

November-2022

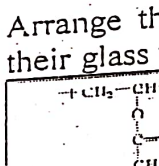
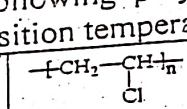
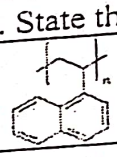
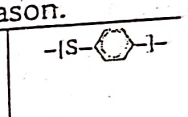
CH301 POLYMERIC MATERIALS

Time 3:00 Hours

Max. Marks: 40

Note: All questions are compulsory
Assume suitable Missing data, if any

Q.No.			Marks	CO
1		Justify the statement with suitable examples	3	CO-4
	[a]	Polymers show viscoelastic properties.	2	CO-4
	[b]	It is easy to produce amorphous polymer, however it is difficult to produce 100% crystalline polymer.		
2	[a]	What is chain transfer reaction? How do monomer, solvent, initiator affect the chain transfer reaction?	3	CO-1
	[b]	Discuss different types of copolymers	2	CO-2
3	[a]	The glass transition temperature (Tg) of polydimethyl siloxane and polycaprolactone is -120°C and 60°C respectively. A random copolymer was prepared with dimethyl siloxane and caprolactone with feed ratio of 0.4. Calculate the Tg of copolymer.	3	CO-2 CO-4
	[b]	Differentiate between conformation and configuration for polymers	2	CO-4
4	[a]	Arrange the following polymers in increasing order of their glass transition temperature. State the reason.	4	CO-4

a	b	c	d
			

	[b]	What are the parameters which determine the threshold molecular weight of polymers?	2	CO-3
5	[a]	A sample of Polyethylene is composed of a series of fraction of different sized molecules	4	CO-3

Sample	Weight fraction	Molecular Weight
A	0.15	12000
B	0.2	35000
C	0.3	49000
D	0.25	102000
E	0.1	122,000

Calculate number average and weight average molecular weight and polydispersity index of this polymer.

[b] Differentiate between the properties of semicrystalline and amorphous polymers. 2 CO-

6 [a] Discuss the stress relaxation test using maxwell model 4 CO-4

[b] Define the term storage modulus and loss modulus. 2 CO-4

CO-5

7 [a] How are the mechanical properties affected by temperature, strain rate and reinforcement? 4 CO-5

[b] How to determine stiffness and toughness of polymer using stress- strain curve? 2 CO-5

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Roll no.....:

B.Tech , V - Semester

END TERM EXAMINATION *Nov/Dec-2022*

CH-303 : Mass Transfer-I

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions are compulsory.
Use pencil to draw diagram (s)
Assume suitable missing data, if any.

Q1 (a). What are the main features of the Higbie's penetration theory? [5] [CO=3]

(b). Write the expression for Schmidt Number (S_c or N_{Sc}) for mass transfer. [2] [CO-3]

(c). Why a smaller size equipment is required in case of counter-current mass transfer, compared to co-current mass transfer, for a given set of flow conditions? [2][CO-1]

Q2. Oxygen (A) is diffusing through a non-diffusing mixture of Methane (B) and Hydrogen (C) in a ratio of 2:1. The total pressure is $1X10^5$ N/m^2 and the temperature is 0°C. The partial pressure of oxygen at two planes 2.0 mm apart is respectively 13000 and 6500 N/m^2 respectively. The diffusivities are estimated to be $D_{O2-H2}=6.99X10^{-3}$ m^2/s and $D_{O2-CH4}=1.86X10^{-3}$ m^2/s. Calculate the rate of diffusion of oxygen in Kmol/s through each sq. meter (m^2) of the two planes. [5][CO-2]

(b). Write the empirical equation for calculating the diffusiyities of Dilute liquid solutions, mentioning each term clearly with units. [2] [CO-2]

Q.3 Derive the equation for the operating line for absorption in terms of mole fractions of gas and liquid phases. [5] [CO-4]

(b). Differentiate between:

(i)Plate Column Vs Packed Tower

(ii) Gas Absorption and Distillation [6] [CO-4]

Q.4 What are the factors on which, rate of drying depends? What is Wet-Bulb Temperature? Explain, how do the Wet-Bulb Temperature can be measured? [5] [CO-5]

Q5. With neat and labelled diagram, write a note on Natural Draft Towers. [3] [CO-5]

(b). Define the term Relative humidity and Absolute humidity. A certain air has a dry bulb temperature of 30°C. The total pressure is 760 mm Hg. Calculate (a) Molal humidity (b) Absolute humidity (c) % Relative humidity. [5] [CO-5]

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5th SEMESTER

B.Tech.

END TERM EXAMINATION *Nov.-2022*

CH307 Petroleum Refining Technology

Time: 3:00 Hours *Max. Marks: 50*

Note : All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1
(a) What are the different types of Naphtha Produced by refineries? What are their applications? [5][CO3]
(b) Explain the Smoke Point test with its importance. [5][CO4]

Q.2
(a) What are the different impurities present in crude oils? Why removal of these impurities are important? [5][CO5]
(b) Explain the working of electrical desalination process with diagram. [5][CO5]

Q.3
(a) Write down the differences between thermal conversion and catalytic conversion process. [5][CO6]
(b) Explain the Decoking of Furnace Tubers in Visbreaking Process. [5][CO6]

Q.4
(a) Explain the Fluid Catalytic Cracking process. With neat flow diagram. [5][CO7]
(b) Why Fluid Catalytic process is considered a heat balanced process? [5][CO7]

Q.5 Explain the Catalytic Reforming process with neat diagram and chemical reaction involved. [10][CO8]

Total no. of pages: 02

Roll no.....

V SEMESTER
B.Tech

END TERM EXAMINATION
CH-315: PLASTIC TECHNOLOGY

Nov/Dec-2022

Time 3:00 Hours

Max. Marks: 50

Note: All questions are compulsory
Assume suitable Missing data, if any

Q.No.			Marks
1		Answer in two- three words (a) Name the polymerization techniques used to produce polymethyl methacrylate. (b) What is the monomer used to produce polyvinyl alcohol? (c) Which polymer is used to make carpenter's glue? (d) What is DGT? (e) Name the curing agent used for urea formaldehyde.	5X1
2	a	Categorize following polymers based on their applications. State the reason. (a) Polyamide (b) Polypropylene (c) Polyvinyl alcohol (d) polycarbonate	3.5
	b	Categorize following polymers based on their thermal properties. State the reason. (a) Epoxy (b) Polymethylmethacrylate (c) melamine formaldehyde (d) polyethylene	3.5
3		Suggest suitable polymers for making following products. Also state the property of polymer for its selection. A. Saline water bottles B. Laundry detergent pods C. Wash Bottles D. Bottles to store cold drinks E. Optical fiber	5x2

4	a	Discuss the process of manufacturing epoxy resin.	4	CO-1
	b	Differentiate between amine hardening and acid hardening curing system.	3	CO-1
5	a	Explain the process of manufacturing polyvinyl acetate.	4	CO-1
	b	How do the properties of polyvinyl alcohol depend on degree of hydrolysis?	3	CO-2
6	a	Discuss the manufacturing process of polyethylene terephthalate.	4	CO-1
	b	Under which circumstances, PET is better choice to make products over (a) PVC (b) HDPE.	3	CO-2 CO-3
7	a	A person wants to set up a plant to manufacture plastic dinner sets. Suggest suitable polymer, its manufacturing process and properties.	4	CO-1 CO-2 CO-3
	b	Write the properties and applications of polymethylmethacrylate.	3	CO-2 CO-3

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Total no. of Pages 01 Roll no.....

5th Semester.
B. Tech

End Term Examination **Nov/ Dec 2022**

CH-323 Biomaterials

Time: 3:00 Hours *Max. Marks: 50*

Note: Be brief. Question No.1 is compulsory. In addition t Question No.1, answer any 4 questions from Questions 2 t 7.

1: Write your Name & Roll Number clearly (1 Mark). Define Biomaterials, Biological materials, and Biocompatibility. What are general biocompatibility requirements? (9 Marks) (CO-1)

2. What are Restorable polymers, what are their benefits do they give to the patient, and what would you keep in mind to design the above kind of polymers as a biomaterial. (10 marks) (CO-2)

3. What are ceramics? Discuss more on Zirconia as biomaterial and problem associated with Zirconia while using as a biomaterial. (10 marks) (CO-3)

4. Why carbon is used as biomaterials. What are the biomedical applications of carbon as biomaterial? (10 marks) (CO-4)

5. Discuss the local tissue response to biomaterial implants. (10 marks) (CO-5)

6. To evaluate the implant biomaterial, what kind of mechanical, physical, chemical, and biological evaluations must be done (in brief). (10 marks) (CO-4)

7. Why do we need to carry out toxicological evaluation of biomaterials and implants? (10 marks) (CO-5)

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Total no. of pages: 02 Roll no... .....

VII SEMESTER

B.Tech. Chemical Engineering

END TERM EXAMINATION *NOV-2022*

CH 407 POLYMER BLENDS & COMPOSITES

Time: 3 Hours *Max. Marks: 50*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1[A] Which fibre itself is a composite? Support your answer with a proper reason. [2][CO1]

[B] If the Automobile body panel is to be moulded, which moulding technique you will use? Explain the desired moulding process. [3][CO5]

[C] Which thermodynamic conditions need to be fulfilled for the miscible multi-component polymer blend system? [5][CO1]

Q.2[A] Discuss the properties and applications of Aramid fibres. [3][CO1]

[B] What is the Cross section of carbon fibre? Write the carbon content in carbon fibres. [2][CO2]

[C] What is the difference between Miscible Blend and Compatible Blend? [2][CO2]

[D] Justify the difference between Chemical polyblends and Mechano-chemical polyblends. Which characteristics make them suitable for use in desired applications? [3][CO5]

Q.3[A] Which fibres are used in composites to produce Bullet proof vests? Justify the properties of this fibre with respect to its chemical structure. [3][CO2]

[B] Suggest any four novel/unconventional reinforcements in a polymer matrix to achieve the desired property in the composites? [2][CO4]

[C] Which type of commercial polyblend you will recommend to increase the cost-effectiveness of natural rubber? Which improvement in synergistic properties will be achieved in the said blend? [3][CO5]

[D] What should be the essential conditions for melt blending with respect to the processing temperatures, melting temperatures and glass transition temperatures of amorphous and semi-crystalline constituent polymers respectively? [2][CO5]

Q.4[A] Interpret with the help of figure the miscibility probability of Polymer A and Polymer B. [5][CO3]

[B] How the blending of PVC and ABS helps in achieving the new properties in the resulting blend? [3][CO3]

[C] What do you mean by Reactive Compatibilization? [2][CO2]

Q.5[A] Using which arithmetical semi-empirical rule the property of miscible polyblend can be predicted? Explain. [3][CO5]

[B] How the blending improves the resin or product performance. [3][CO5]

[C] Describe the dependencies of continuity indexes on the volume fraction of 2nd component of the binary blend. [4][CO1]

Q.6[A] Discuss the Microscopic techniques used in the characterization of Polymer Blends. [5][CO5]

[B] How does the glass transition temperature of polymeric constituents and polyblend helps to predict compatibility? [3][CO5]

[C]Write the names of the X-ray techniques used to characterize the polyblends. [2][CO5]

Total No. of Pages: 02 Roll Number.....

VII Semester

B.Tech

END TERM EXAMINATION Nov-2022

CH417 Polymer Waste Management

Time: 3 hrs Max. Marks: 50

Note: Question no. 1 and 8 are compulsory.
Attempt any FOUR questions from question no 2 to 7.

Q.1 Attempt all parts. (3x7=21)

(a) What could be done on an individual level to reduce plastic waste?

(b) Out of reduce, reuse and recycle, which is the most favoured option for waste management? Justify.

(c) What are brown goods and white goods? Give two examples each of brown goods and white goods.

(d) Why do Plastics fall under a difficult material to recycle?

(e) What is closed loop recycling? Explain.

(f) Discuss the major environmental concern related to landfills.

(g) What are the advantages of waste to energy?

Q.2 What are RICs related to plastic recycling? Which type of plastic is recyclable? Explain any one in detail. [5][CO2]

Q.3 Long-term impacts and overall problem of the plastic waste issue can be addressed only by establishing better waste management systems. Justify. [5][CO1]

Q.4 What are different methods of landfilling? Discuss the problems associated with landfill. [5][CO3]

Q.5 What do we mean by 'Environmental Awareness'? Suggest certain measures to promote environmental awareness? [5][CO4]

Q.6. Discuss environmental legislations associated with Forest and Wild life in India. [5][CO4]

Q.7. Discuss the salient features of Environmental Protection Act 1986. [5][CO4]

Q.8. Write short notes on any THREE of the following: [3x3=9]

(a) Advantages of recycling.
(b) Types of polymer degradation.
(c) Environmental policies in India.
(d) Incineration

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Total no. of Pages 01 *Roll no.....*

Seventh Semester
B.Tech.

End Term Examination **Nov/Dec-2022**

CH-429 Energy Resources

Time: 3:00 Hours *Max. Marks: 50*

Note: Be brief. Question No.1 is compulsory. In addition to Question No.1, answer any 4 questions from Questions 2 to 8.

1. Write your Name & Roll Number clearly (1 Mark). What is Energy, Power, Renewable and Non-renewable forms of energy? How do you see our (India's) energy position and challenges? (9 Marks) (CO-1)
2. What is petroleum, and who are major countries having the huge reserves. How petroleum is refined into various products. (10 Marks). CO-2)
3. What is Natural Gas, LNG, CNG and Gas Hydrates? (10 Marks CO-3)
4. How would you analyse coal samples. Mention about proximate and ultimate analysis, and briefly on spectroscopic methods too. (10 Marks) (CO-4)
5. What kind of parameters are checked in petroleum analysis. What is "Flash Point" and "Fire Point" in petroleum products? (10 Marks) (CO-4)
6. What are different alternate sources of energy? What is Solar Energy, and how we in India can harness this solar energy? (10 Marks) (CO-5)
7. What are "Fuel Cells", and how can we produce energy using Hydrogen. How can we store hydrogen? (10 Marks) (CO-5)
8. What is Biomass and how can we convert biomass into alcohol. What is "Gasohol" How you can convert biomass into ethanol. (10 Marks) (CO-5)

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Total no. of Pages: 01 Roll No.....

3_SEMESTER

B.Tech.

END TERM EXAMINATION *Nov-2022*

SE201 DATA STRUCTURE

Time: 3 Hours *Max. Marks: 40*

Note : All questions are compulsory.
Use pseudocode/C for the algorithm
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Explain what is a max heap and how it can be used to implement a priority queue along with an example. [8][CO1]

Q.2 Explain the following with an example:

a) Complete Graph
b) Difference between BFS and DFS.
c) Threaded trees
d) B Tree [8][CO4,5,6]

Q.3 What is an AVL tree and what is a balance factor. Create the AVL search tree from the given set of values:
H, I, J, B, A, E, C, F, D, G, K, L [8][CO4]

Q.4 Suppose the following list of letters is inserted in order into an empty binary search tree:
S, T, P, Q, M, N, O, R, K, V, A, B

a) Find the final tree T.
b) Find the inorder traversal of T. [8][CO4]

Q.5 Explain Quick Sort.Provide a complete analysis of Quick Sort for the given set of numbers 12, 33, 23, 43, 44, 55, 64, 77, and 76. [8][CO3]

Total No. Of Pages: 03

Roll no.....

THIRD SEMESTER
B.TECH
END SEMESTER EXAMINATION Nov/Dec- 2022
SE203 OBJECT ORIENTED PROGRAMMING
Time 3:00 hours Max. Marks: 40

Note: Question 1 is compulsory. Attempt any 7 questions from the remaining 8 questions. Assume suitable missing data ,if any: CO# indicates Course Outcome Number.

Q1. State whether the following statements are TRUE or FALSE.

(a) One of the striking features of object-oriented programming is the division of programs into objects that represent real-world entities.
(b) Looking at one or two lines of code, we can easily recognize whether a program is written in C or C++.
(c) When an argument is passed by reference, a temporary variable is created in the calling program to hold the argument value.
(d) Member functions defined inside a class specifier become inline functions by default.
(e) Constructors, like other member functions, can be declared anywhere in the class.
(f) Operator overloading works when applied to class objects only.
(g) We can prevent the inheritance of all members of the base class by making base class virtual in the definition of the derived class.
(h) 'this pointer' can be made to point to any object by assigning the address of the object.
(i) To open an existing file for updating without losing its original contents, we need to open it in an append mode.
(j) The main advantage of width() junction is that we can use one width specification for more than one items. **[CO 3,4,8][0.5*10 = 5]**

Q 2. (a) What is object-oriented programming? How is it different from the procedure-oriented programming?
b) How do the following statements differ?
(i) char *const p;
(ii) char const *p;
c) When do we need to use default arguments in a function?

d) How is a member function of a class defined?
e) Distinguish between the following two statements:
time T2(T1);
time T2 = T1;
T1 and T2 are objects of time class. [CO 2,3,6] [1*5 = 5]

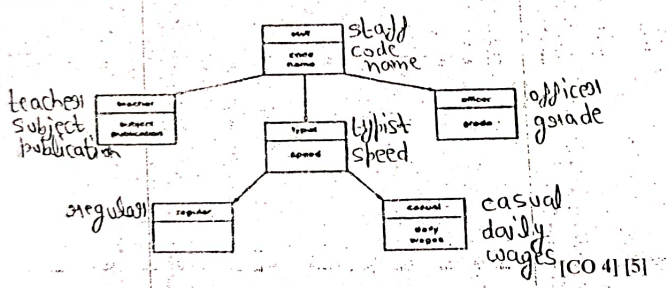
Q 3. (a) WAP in C++ to illustrates the use of **new** and **delete** operators for dynamic allocation of class objects. The program uses **bad_alloc** exception instead of null pointer for handling allocation failure.
(b) WAP in C++ to illustrates the use of endl and setw. [CO 2,3] [3+2 = 5]

Q 4. (a) Write a function using reference variables as arguments to swap the values of a pair of integers.
(b) Write a program to print the following outputs using for loops

1
22
333
4444
55555

[CO 1,5] [2.5*2 = 5]

Q 5. An educational institution wishes to maintain a data of its employees. The hierarchical relationships of related classes are as shown in figure. Define all the classes to represent above hierarchy and define functions to retrieve individual information as and when required.



[CO 4] [5]

Q 6. Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data() to initialize base class data members and another member function display_area() to compute and display the area of figures. Make display_area() as a virtual function and redefine this function in the derived classes to suit their requirements. Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively, and display the area. Remember the two values given as input will be treated as lengths of two sides in the case of rectangles, and as base and height in the case of triangles, and used as follows:

Area of rectangle = x * y
Area of triangle = ½ * x * y

[CO 1,6] [5]

Q 7. (a) Write statements using seekg() to achieve the following:
(i) To move the pointer by 15 positions backward from current position.
(ii) To go to the beginning after an operation is over.
(iii) To go backward by 20 bytes from the end.
(iv) To go to byte number 50 in the file.

(b) What is a file mode? Describe the various file mode options available.
[CO 3,7] [2+3 = 5]

Q 8. (a) Difference between Overloaded Functions and Function Templates.
(b) Difference between Class template and Template class.
(c) What are the advantages of saving data in binary form? [CO 8] [2+2+1 = 5]

Q 9. (a) What should be placed inside a try block? Give the syntax.
(b) WAP in C++ to illustrates the implementation of both multilevel and multiple inheritance. [CO 4,8] [1+4 = 5]

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FIFTH SEMESTER

B.Tech. (SE)

MID SEMESTER EXAMINATION Nov.-2022

SE205 OPERATING SYSTEM

Time: 3:00 Hours Max. Marks: 40

Note: Answer ALL questions. All questions carry equal marks.
Assume suitable missing data, if any.

1 [a] Define program and process. Draw and explain the lifecycle of proces management. (CO1)[5]

[b] Define following (CO2)[5]

(I) Priority inversion: (II) Belady's anomaly

(III) Loader (IV) Device driver

(V) TLB

2 [a] If program size =64MB page size =1KB page size entry size =4 by .What is the size of page table for this process and how many pages required to store page table? (CO2)[5]

[b] What is kernel level threading and user level threading. Write advantage and disadvantage of user level thread over kernel level thread. (CO1)[5]

3 [a] Consider the two process (i=1,2) solution for critical section probl .Discuss whether it ensure mutual exclusion , progress and bounded wait not. (CO3)[5]

```
boolean token = True;
Pi{
        if (token)
        token = False;
        else {
                while (!token) ;
                token = False;
              }
        <<<<<Critical Section>>>>>
        token = True;
}
```

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[b] Processes are Scheduled as follow. Find the average waiting time for SJF and Round Robin (time Quantum =2. (CO1)[5]

Process	Duration(ms)	Arrival Time (ms)
P1	12	0
P2	3	1
P3	4	2
P4	8	5

4 [a] If there are three process and a single resource in the system. Maximum need of each process for that resource is 3.Min how many instances of that resource is required for no deadlock in the system. (CO4)[2]

[b] Per process OS allocate 3 frames with Least recently used page replacement policy.Count the number of page fault with these reference string 123412512345 . (CO2)[3]

[c] Discuss various memory management scheme. (CO5)[5]

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Roll No.....

III SEMESTER
B.Tech. (SE)

ENDTERM EXAMINATION Nov/Dec-2022

SE 207 Engineering Analyses & Design
(Software Engineering)

Time: 03:00Hours *Max.Marks: 40*

Note: All questions carry equal marks. Attempt any FIVE questions
Assume suitable missing data, if any.

Q.1 Write short note on (any two):
(a) Software quality standards
(b) Boehm's maintenance model
(c) RAD model
(d)Measures, Metrics and Measurement [8][CO3]

Q.2 Consider the program given below:

```
#include <stdio.h>
int main()
{
   int A, B, C;
printf("Enter three numbers: ");
scanf("%d %d %d", &A, &B, &C);
   if (A >= B)
{
      if (A >= C)
printf("%d is the largest number.", A);
     else
printf("%d is the largest number.", C);
   }
   else {
```

```
    if (B >= C)
printf("%d is the largest number.", B);
    else
printf("%d is the largest number.", C);
  }

  return 0;
}
```

a) Design the set of test cases using BVA technique for the program.

b)Design a decision table for the program. [8][CO4]

Q.3 If some existing modules are to be reused in building a new system. Which design strategy is used and why? [8][CO4]

Q.4 Consider a software project with 300 KLOC. Find out effort estimation, development time, and person estimation for all different modes. [8][CO2]

Project	a_i	b_i	c_i	d_i
Organic	2.4	1.05	2.5	0.38
Semidetached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

Q.5 Discuss the following

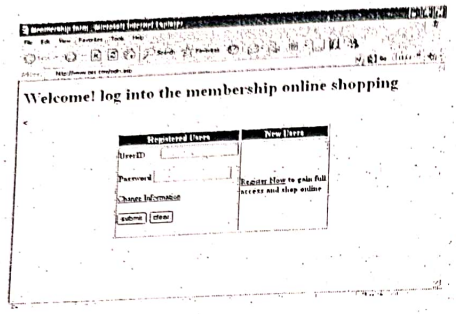
a) User versus system requirements

b) Generic and Customized Software Products. [8][CO1]

Q.6 What is risk analysis in software testing? Discuss some unavoidable risk might take place in a software. [8][CO1]

Q.5 (a) What do you understand by Response time, Throughput, and Web Page Views per Week? [3][CO7]

(b) Consider the following web page. Design test cases for user interface, performance and database w.r.t web based testing. [5][CO7]



Total no. of Pages: 4 Roll no.....

FIFTH SEMESTER

B.Tech.

END TERM EXAMINATION **Nov 2022**

COURSE CODE: SE 301 COURSE TITLE: SOFTWARE TESTING

Time: 03:00 Hours **Max. Marks: 40**

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Consider a program that determines the previous date. Given a month, day and year as input, it determines the date of the previous day. The month, day and year have integer values subject to the following conditions:

C1: 1 <= month <= 12

C2: 1 <= day <= 31

C3: 1800 <= year <= 2025

We are allowed to add new conditions as per our requirements.

(a) Create equivalence classes and generate test cases [4][CO3]

(b) Develop a decision table and generate test cases [4][CO3]

OR

Q.1 Consider a program for the determination of the nature of roots of a quadratic equation. Its input is a triple of positive integers (say a, b and c) and values may be from interval [0, 100]. The output may have one of the following words: [Not a quadratic equation, Real roots, Imaginary roots, Equal roots]

(a) Create equivalence classes and generate test cases [4][CO3]

(b) Develop a decision table and generate test cases [4][CO3]

Q.2 Consider the following program

```
# include<stdio.h>
# include<conio.h>
# include<math.h>
int main ()
{
    float a,b,c,r1,r2,d;
    printf ("enter the values of a b c");
    scanf (" %f %f %f", &a, &b, &c);
    d= (b*b) – (4*a*c);
    if (d>0)
    {
        r1 = -b+sqrt (d) / (2*a);
        r2 = -b-sqrt (d) / (2*a);
        printf ("The real roots = %f %f", r1, r2);
    }
    else if (d==0)
    {
        r1 = -b/(2*a);
        r2 = -b/(2*a);
        printf ("roots are equal =%f %f", r1, r2);
    }
    else
        printf("Roots are imaginary");
    return 0;
    getch ();
}
```

Generate test cases for all du paths, all uses paths and all definition paths. [8][CO4]

Q.3 Consi[illegible] the program given in Q.2. Consider all variables and generate possible program slices. Design at least one test case from every slice. [8][CO5]

OR

Q.3 Consider the program given in Q.2. Generate two first order mutants. Design a test suite of five test cases and calculate the mutation score of the test suite. [8][CO5]

Q.4 (a) Describe walkthrough, inspection and review activities. [3][CO6]

(b) What is regression testing? Explain the various steps of the regression testing process. Which step is the most important and why? [5][CO6]

Q.5 (a) What is load testing? What metrics must be captured during load testing? List some commercially available software testing tools. [3][CO7]

(b) Consider the following webpage. Design questionnaire for usability testing. [5][CO7]



OR

iv. Addition failures and execution time required to reach the failure intensity objective of 4 failures/CPU hr.

[5][CO5]

Q.4 a. Define the following inheritance metrics with example:

i. DIT
ii. AID
iii. NOC
iv. NOP
v. NOD
vi. NOA
vii. SIX [7][CO5]

b. What is a significance of software quality metrics based on defects? [3][CO5]

Q.5 a What is Computer Aided Quality Engineering (CAQE)? Explain CAQE techniques with example. [5][CO6]

b. What are various application areas of software metrics? [5][CO4]

Total no. of Pages: 4 Roll no.....

FIFTH SEMESTER

B.Tech.

END TERM EXAMINATION ***Nov-2022***

SE303a Software Quality Metrics

Time: 03:00 Hours *Max. Marks: 50*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a. Design the table of associations between elements of a quality system and life cycle phases. Which life cycle phases require all the elements of a quality system and why? [10][CO1]

OR

Consider the program given below. Calculate Halstead software science metrics (program volume, program length, program level, program difficulty, estimated program difficulty/ level, effort and time). [10][CO3]

```
1.  #include<stdio.h>
2.  void main()
3.  {
4.      int i, a[20], n, key, flag = 0;
5.      clrscr();
6.      printf("Enter the size of an array \n");
7.      scanf("%d", &n);
8.      printf("Enter the array elements");
9.      for(i = 0; i < n; i++)
10.     {
11.       scanf("%d", &a[i]);
12.     }
13.     printf("Enter the key elements");
14.     scanf("%d", &key);
15.     for(i = 0; i < n; i++)
16.     {
```

```
17.          if(a[i] == key)
18.          {
19.            flag = 1;
20.            break;
21.          }
22.        }
23.        if(flag == 1)
24.        printf("The key elements is found at location
           %d", i + 1);
25.      else
26.        printf("The key element is not found in the
       array");
27.    getch();
28.  }
```

Q.2 a. Define the role of fan-in and fan-out in information flow metrics with example. What is a significance of sophisticated information flow model? [4][CO4]

b. Consider a following C program of merge sort. Compute number of live variables, average number of live variables ($\overline{LV}$), average life variables (γ) and module weakness (WM). [6][CO3]

```
#include<stdlib.h>
#include<stdio.h>
// Merge Function
void merge(int arr[], int l, int m, int r)
{
    int i, j, k;
    int n1 = m - l + 1;
    int n2 = r - m;
    int L[n1], R[n2];
    for (i = 0; i < n1; i++)
    L[i] = arr[l + i];
    for (j = 0; j < n2; j++)
    R[j] = arr[m + 1+ j];
    i = 0;
    j = 0;
    k = l;
```



```
while (i < n1 && j < n2)
{
    if (L[i] <= R[j])
    {
        arr[k] = L[i];
        i++;
    }
    else
    {
        arr[k] = R[j];
        j++;
    }
    k++;
}
while (i < n1)
{
    arr[k] = L[i];
    i++;
    k++;
}
while (j < n2)
{
    arr[k] = R[j];
    j++;
    k++;
}
}
```

Q.3 a. Explain various cohesion and coupling metrics given in C&K metrics suite with example. [5][CO4]

b. Assume that a program will experience 100 failures in infinite time. It has now experienced 50. The initial failure intensity was 10 failures/CPU hr. Use basic execution model for this program. Calculate the following:

i. Current failure intensity

ii. Decrement of failure intensity per failure.

iii. Failures experienced and failure intensity after 15 and 15 CPU hrs. of execution.

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Total no. of Pages: 1 Roll no.....

5th SEMESTER

B.Tech(SE)

ENDTERM EXAMINATION Nov/Dec-2022

SE305 Software Requirement Engineering

Time: 03:00Hours Max.Marks:40

Note: All questions carry equal marks. Assume suitable missing data, if any.

Q.1 Answer any two of the following questions.

(a) Explain the types of Requirements. [5][CO1]

(b) Explain the process of requirements development. [5][CO1]

(c) What is Risk management? Describe the classification and principles of risk management. [5][CO1]

Q.2 (a) Define ER-Diagram and make ER Diagram for the Hospital Management system. [5][CO2]

(b)What are the best practices of requirement management? [5][CO2]

Q.3 (a) What is change management? Explain its different levels and key benefits. [5][CO3]

(b) What are the key principles of requirement engineering? [5][CO3]

Q.4 Explain the Caliber RM tool. [5][CO4]

Q.5 Explain any five Commercial Software Requirements Management Tools. [5][CO5]

OR

Explain aspect-oriented requirement engineering and agent based requirement engineering. [5][CO6]

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Total No. of Pages 02 *Roll No. .....*

FIFTH SEMESTER
B.Tech. (SE)
END SEMESTER EXAMINATION *Nov-2022*

SE307 COMPUTER GRAPHICS

Time: 3:00 Hours *Max. Marks: 40*

Note: Attempt any 5 questions. All questions carry equal marks.
Assume suitable missing data, if any.

1 [a]Define resolution and aspect ratio? [2][CO1

[b]Using Cohen Sutherland line clipping algorithm, find the coordinates clipped line. Given the initial line coordinate as (-1,5), (3,8) and the windo coordinates as (X_{wmin}, Y_{wmin}) = (-3,1) and(X_{wmax}, Y_{wmax}) = (2,6) ? Also, sh the actual line, region codes and clipped line with the help of diagra [6][CO4]

2[a]Explain with diagram parallel and perspective projections in detail? [4][C

[b]A rectangular parallelopiped is given having length on x-axis, y-axis and z as 3, 2 and 1 respectively. Perform a rotation by an angle -90^0 about x-axis ar angle $+90^0$ about y-axis. [4][CO3]

3Perform a 45^0 rotation of triangle A (0, 0), B (1, 1) and C (5, 2)
[a] About the origin [4][C
[b] About the point P (-1,-1) [4][C

4 [a] Write four properties of each Bezier and B-Spline curve. [4][C

[b]Differentiate between
i. Diffuse and specular reflection [2][
ii. Explicit and parametric curve [2][

5 [a] Define Anti-aliasing. Which techniques are used for antialiasing? [2][CO2]
[b]Consider a line from (0, 0) to (6, 7). Use Bresenham's algorithm to rasterize the line. [6][CO2]

6 Write short notes on [4][CO6]
[a] Fractals and geometric fractals [4][CO1]
[b]Components of graphics systems

Total number of pages: 2

Roll No. _____

FIFTH & SEVENTH SEMESTER — B.TECH

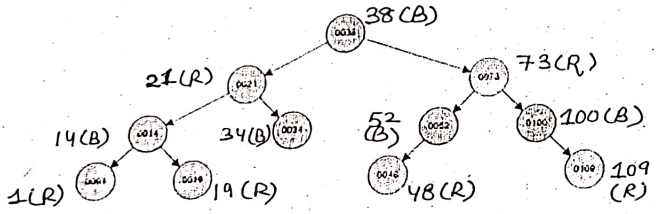
END SEMESTER EXAMINATION — NOV-DEC 2022

SE-313 ADVANCED DATA STRUCTURES

Time: 3:00 hr. — *Max. Marks: 40*

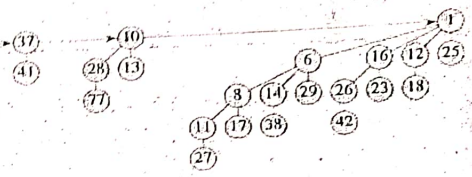
NOTE: Attempt any four questions.
All Questions carry equal marks.
Assume suitable missing data, if any.

Q.1. i. A *Red-Black Tree* is given below. Perform deletion for (a) 48 (b) 21 in the same sequence. Draw the tree after each deletion. *(Note: 0021, 0073, 0001, 0019, 0048, 0109 are Red in color and rest nodes are Black in color).* [5] [CO1]



ii. After the two deletions for the same tree shared in *Q.1. (i)*, what is the final height of the tree? Provide in-order traversal for the final tree. [5] [CO7]

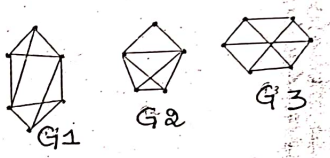
Q.2. i. Perform all the steps for extracting the node with minimum key with proper justification in the binomial heap given below. [5] [CO4]



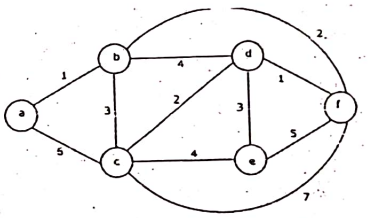
ii. Describe B+-tree and specify its properties. Consider a B+-tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non-root node? [5] [CO5]

Q.3. i. Define Isomorphism. What are the invariants of Isomorphic graphs. [5] [CO1]

ii. Define a planar graph. Identify among G1, G2 and G3 provided below, which graph(s) is/are planar. [5] [CO7]



Q.4 i. For the graph given below, apply *Kruskal algorithm* to obtain *Minimum Spanning Tree*. [5] [CO6]



ii. Explain the working of ***Johnson's algorithm*** for finding all-pair shortest path for a given graph. In which situation, it is preferred over ***Floyd-Warshall*** algorithm? [5] [CO3, CO4]

Q.5. i. Write down the algorithm for performing ***Insert*** operation of a string in Trie. Also, provide the time-complexity analysis for the algorithm. [5] [CO2, CO3]

ii. For the given five strings "cat", "car", "dog", "pick", "pickle" in the same sequence, illustrate properly how the ***Trie*** appears after each string is added. [5] [CO6]

--END--

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Total No. of Pages 02

Roll No.....

5TH SEMESTER

B.Tech. (SE)

ENDTERM EXAMINATION

NOV/DEC-2022

SE325 WEB TECHNOLOGY

Time: 3:00 Hours

Max. Marks: 50

Note: All questions are compulsory. All questions carry equal marks. Assume suitable missing data, if any.

Q.1 [a] Define data communication and differentiate Simplex, Half duplex and Full duplex with Examples. [5][CO1]

[b] Describe OSI model. What are the responsibilities of Presentation layer and Session layer of OSI model? [5][CO1]

Q.2 [a]Define E-Mail. Explain the basics of POP3 and IMAP mail access protocols. [5][CO2]

[b] Describe TCP/IP model. What is the Significance of TCP protocol? [5][CO1& CO2]

Q.3 [a] Explain the html elements. How can we use linking in html document? [5] [CO3]

[b] Define HTML Formatting tags. How to define an image in html document? [5][CO3]

Q.4 [a]Explain the different levels of style sheets are available in CSS. [5][CO4]

[b] Write a PHP functions that reads contents from a file and write into a file. [5][CO5]

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OR

Discuss the different pattern matching operations are available in ruby with examples. [10][CO4 & CO5]

Q.5 Write short notes (Any Two)

[a] Web Crawling [5][CO6]

[b] JDBC & ODBC [5][CO4]

[c] Search Engine Optimization [5][CO6]

Total no. of Pages: 3

Roll no.....

FIFTH & SEVENTH SEMESTER

B.Tech.

END TERM EXAMINATION *Nov-2022*

SE327 Methods for Data Analysis

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a. Differentiate between statistical modelling and algorithmic modelling. Elaborate various levels for division of data collection techniques into different categories. [8][CO1]

OR

Explain various categories of Version Control System (VCS) with example. [8][CO1]

Q.2 a. A software company plans to adopt a new programming paradigm, that will ease the task of software developers. To assess its effectiveness, 50 software developers used the traditional programming paradigms and 50 others used the new one. The productivity values per hour are stated as follows. Perform a hypothesis testing to assess the effectiveness of the new programming paradigm 5% significance level. [4][CO3, 5]

Statistics	Old Programming Paradigm	New Programming Paradigm
Mean	1.5	2.21
Standard Deviation	0.4	0.36

b. Analyze the performance of eight algorithms when applied on a single dataset as given in table below. Evaluate whether there is any significant difference in the performance of the six algorithms at 5% significance level. [4][CO3]

Algorithm	Performance
A1	81
A2	61
A3	92
A4	43
A5	34
A6	29
A7	97
A8	89

Q.3 The performance of five algorithms has been investigated for six different datasets. Performance values of the machine learning algorithms corresponding to six different datasets has been given below. Normality of the given dataset is not required. Investigate whether there is a statistical difference among the performance of four machine learning algorithms at 5% significance level. If there is a significant difference among the performance of these algorithms.

Performance values of different machine learning algorithms

Datasets	Algorithm				
	A1	A2	A3	A4	A5
D1	73.00	69.00	83.00	60.00	83.00
D2	89.00	70.00	85.00	68.00	52.00
D3	97.00	73.00	55.00	54.00	79.00
D4	79.00	71.00	96.00	61.00	93.00
D5	99.00	77.00	75.00	59.00	64.00
D6	77.00	73.00	69.00	56.00	92.00

a) Investigate whether there is a statistical difference among the performance of five machine learning algorithms.

b) Assume algorithm A2 perform better than A1 and A4 perform better than A3. State null and alternate hypothesis. Using pairwise t-test,

investigate about the statistical difference among pairs of these algorithms.

c) Which hypothesis is accepted or rejected with respect to the stated assumption in part a) and b)? [8][CO3, 5]

Q.4 a Compute the principal component using PCA algorithm for the given data.

x: 6, 7, 8, 9, 10, 15, 18
y: 9, 11, 13, 10, 13, 17

[5][CO4]

b. Differentiate between wrapper and filter method with example. [3][CO4]

OR

Differentiate between feature selection and feature extraction techniques with example. [3][CO4]

Q.5 a Write a short note on various statistical tools for data analysis. [4][CO6]

b. Find out spearman's coefficient of correlation between the two kinds of assessment of graduate students' performance in a college.

Name of students	A	B	C	D	E	F	G	H
Internal Exam	51	68	73	46	50	65	47	38
External Exam	49	72	74	44	58	66	50	30

[4][CO4, 6]

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										

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Chi-square Distribution Table

d.f.	.995	.99	.975	.95	.9	.1	.05	.025	.01
1	0.00	0.00	0.00	0.00	0.02	2.71	3.84	5.02	6.63
2	0.01	0.02	0.05	0.10	0.21	4.61	5.99	7.38	9.21
3	0.07	0.11	0.22	0.35	0.58	6.25	7.81	9.35	11.34
4	0.21	0.30	0.48	0.71	1.06	7.78	9.49	11.14	13.28
5	0.41	0.55	0.83	1.15	1.61	9.24	11.07	12.83	15.09
6	0.68	0.87	1.24	1.64	2.20	10.64	12.59	14.45	16.81
7	0.99	1.24	1.69	2.17	2.83	12.02	14.07	16.01	18.48
8	1.34	1.65	2.18	2.73	3.49	13.36	15.51	17.53	20.09
9	1.73	2.09	2.70	3.33	4.17	14.68	16.92	19.02	21.67
10	2.16	2.56	3.25	3.94	4.87	15.99	18.31	20.48	23.21
11	2.60	3.05	3.82	4.57	5.58	17.28	19.68	21.92	24.72
12	3.07	3.57	4.40	5.23	6.30	18.55	21.03	23.34	26.22
13	3.57	4.11	5.01	5.89	7.04	19.81	22.36	24.74	27.69
14	4.07	4.66	5.63	6.57	7.79	21.06	23.68	26.12	29.14
15	4.60	5.23	6.26	7.26	8.55	22.31	25.00	27.49	30.58
16	5.14	5.81	6.91	7.96	9.31	23.54	26.30	28.85	32.00
17	5.70	6.41	7.56	8.67	10.09	24.77	27.59	30.19	33.41
18	6.26	7.01	8.23	9.39	10.86	25.99	28.87	31.53	34.81
19	6.84	7.63	8.91	10.12	11.65	27.20	30.14	32.85	36.19
20	7.43	8.26	9.59	10.85	12.44	28.41	31.41	34.17	37.57
22	8.64	9.54	10.98	12.34	14.04	30.81	33.92	36.78	40.29
24	9.89	10.86	12.40	13.85	15.66	33.20	36.42	39.36	42.98
26	11.16	12.20	13.84	15.38	17.29	35.56	38.89	41.92	45.64
28	12.46	13.56	15.31	16.93	18.94	37.92	41.34	44.46	48.28
30	13.79	14.95	16.79	18.49	20.60	40.26	43.77	46.98	50.89
32	15.13	16.36	18.29	20.07	22.27	42.58	46.19	49.48	53.49
34	16.50	17.79	19.81	21.66	23.95	44.90	48.60	51.97	56.06
38	19.29	20.69	22.88	24.88	27.34	49.51	53.38	56.90	61.16
42	22.14	23.65	26.00	28.14	30.77	54.09	58.12	61.78	66.21
46	25.04	26.66	29.16	31.44	34.22	58.64	62.83	66.62	71.20
50	27.99	29.71	32.36	34.76	37.69	63.17	67.50	71.42	76.15
55	31.73	33.57	36.40	38.96	42.06	68.80	73.31	77.38	82.29
60	35.53	37.48	40.48	43.19	46.46	74.40	79.08	83.30	88.38
65	39.38	41.44	44.60	47.45	50.88	79.97	84.82	89.18	94.42
70	43.28	45.44	48.76	51.74	55.33	85.53	90.53	95.02	100.43
75	47.21	49.48	52.94	56.05	59.79	91.06	96.22	100.84	106.39
80	51.17	53.54	57.15	60.39	64.28	96.58	101.88	106.63	112.33
85	55.17	57.63	61.39	64.75	68.78	102.08	107.52	112.39	118.24
90	59.20	61.75	65.65	69.13	73.29	107.57	113.15	118.14	124.12
95	63.25	65.90	69.92	73.52	77.82	113.04	118.75	123.86	129.97
100	67.33	70.06	74.22	77.93	82.36	118.50	124.34	129.56	135.81

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188	.53586
0.1	.53983	.54380	.54776	.55172	.55567	.55962	.56356	.56749	.57142	.57535
0.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026	.61409
0.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803	.65173
0.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439	.68793
0.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904	.72240
0.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175	.75490
0.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230	.78524
0.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057	.81327
0.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646	.83891
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993	.86214
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100	.88298
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973	.90147
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91309	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295	.94408
1.6	.94520	.94630	.94738	.94845	.94950	.95053	.95154	.95254	.95352	.95449
1.7	.95543	.95637	.95728	.95818	.95907	.95994	.96080	.96164	.96246	.96327
1.8	.96407	.96485	.96562	.96638	.96712	.96784	.96856	.96926	.96995	.97062
1.9	.97128	.97193	.97257	.97320	.97381	.97441	.97500	.97558	.97615	.97670
2.0	.97725	.97778	.97831	.97882	.97932	.97982	.98030	.98077	.98124	.98169
2.1	.98214	.98257	.98300	.98341	.98382	.98422	.98461	.98500	.98537	.98574
2.2	.98610	.98645	.98679	.98713	.98745	.98778	.98809	.98840	.98870	.98899
2.3	.98928	.98956	.98983	.99010	.99036	.99061	.99086	.99111	.99134	.99158
2.4	.99180	.99202	.99224	.99245	.99266	.99286	.99305	.99324	.99343	.99361
2.5	.99379	.99396	.99413	.99430	.99446	.99461	.99477	.99492	.99506	.99520
2.6	.99534	.99547	.99560	.99573	.99585	.99598	.99609	.99621	.99632	.99643
2.7	.99653	.99664	.99674	.99683	.99693	.99702	.99711	.99720	.99728	.99736
2.8	.99744	.99752	.99760	.99767	.99774	.99781	.99788	.99795	.99801	.99807
2.9	.99813	.99819	.99825	.99831	.99836	.99841	.99846	.99851	.99856	.99861
3.0	.99865	.99869	.99874	.99878	.99882	.99886	.99889	.99893	.99896	.99900
3.1	.99903	.99906	.99910	.99913	.99916	.99918	.99921	.99924	.99926	.99929
3.2	.99931	.99934	.99936	.99938	.99940	.99942	.99944	.99946	.99948	.99950
3.3	.99952	.99953	.99955	.99957	.99958	.99960	.99961	.99962	.99964	.99965
3.4	.99966	.99968	.99969	.99970	.99971	.99972	.99973	.99974	.99975	.99976
3.5	.99977	.99978	.99978	.99979	.99980	.99981	.99981	.99982	.99983	.99983
3.6	.99984	.99985	.99985	.99986	.99986	.99987	.99987	.99988	.99988	.99989
3.7	.99989	.99990	.99990	.99990	.99991	.99991	.99992	.99992	.99992	.99992
3.8	.99993	.99993	.99993	.99994	.99994	.99994	.99994	.99995	.99995	.99995
3.9	.99995	.99995	.99996	.99996	.99996	.99996	.99996	.99996	.99997	.99997

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003
-3.8	.00007	.00007	.00007	.00006	.00006	.00006	.00006	.00005	.00005	.00005
-3.7	.00011	.00010	.00010	.00010	.00009	.00009	.00008	.00008	.00008	.00008
-3.6	.00016	.00015	.00015	.00014	.00014	.00013	.00013	.00012	.00012	.00011
-3.5	.00023	.00022	.00022	.00021	.00020	.00019	.00019	.00018	.00017	.00017
-3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
-3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
-3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
-3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
-3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00101
-2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
-2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
-2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
-2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
-2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
-2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
-2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
-2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
-2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
-2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
-1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
-1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
-1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
-1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
-1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
-1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
-1.2	.11507	.11314	.11123	.10935	.10749	.10565	.10383	.10204	.10027	.09853
-1.1	.13567	.13350	.13136	.12924	.12714	.12507	.12302	.12100	.11900	.11702
-1.0	.15866	.15625	.15386	.15151	.14917	.14686	.14457	.14231	.14007	.13786
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760
-0.4	.34458	.34090	.33724	.33360	.32997	.32636	.32276	.31918	.31561	.31207
-0.3	.38209	.37828	.37448	.37070	.36693	.36317	.35942	.35569	.35197	.34827
-0.2	.42074	.41683	.41294	.40905	.40517	.40129	.39743	.39358	.38974	.38591
-0.1	.46017	.45620	.45224	.44828	.44433	.44038	.43644	.43251	.42858	.42465
-0.0	.50000	.49601	.49202	.48803	.48405	.48006	.47608	.47210	.46812	.46414

Wilcoxon Signed-Rank Test Critical Values Table

n	One tailed, $\alpha = 0.05$ Two tailed, $\alpha = 0.10$	$\alpha = 0.025$ $\alpha = 0.05$	$\alpha = 0.01$ $\alpha = 0.02$	$\alpha = 0.005$ $\alpha = 0.01$
5	1	--	--	--
6	2	1	--	--
7	4	2	0	--
8	6	4	2	1
9	8	6	3	2
10	11	8	5	3
11	14	11	7	5
12	17	14	10	7
13	21	17	13	10
14	26	21	16	13
15	30	25	20	16
16	36	30	24	19
17	41	35	28	23
18	47	40	33	28
19	54	46	38	32
20	60	52	43	37
21	68	59	49	43
22	75	66	56	49
23	83	73	62	55
24	92	81	69	61
25	101	90	77	68
26	110	98	85	76
27	120	107	93	84
28	130	117	102	92
29	141	127	111	100
30	152	137	120	109

G. Sarty & University of Saskatchewan Distance Education Unit

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SEVEN SEMESTER | B.Tech. (SE)

MID SEMESTER EXAMINATION | NOV-2022

SE-409 SOFTWARE MAINTENANCE

Time: 3:00 Hours | Max. Marks:50

Note: Answer ANY FIVE questions. All questions carry equal marks.
Assume suitable missing data, if any.

1. [a] Define following: Maintainability, Reengineering, Reverse engineering, verification, validation [5][CO1]
   [b] Explain software maintenance measurement parameters. [5][CO2]

2. [a] What is fourth generation language and its weakness. [5][CO1]
   [b] Write the components of software maintenance framework. [5][CO4]

3. [a] Discuss reuse oriented model with diagram? [5][CO2]
   [b] What do you mean by halstead's measure. How to calculate the program length and program effort? [5][CO4]

4. [a] What is generic reuse model? Explain each steps in detail. [5][CO5]
   [b] Draw the comprehension process model explain each step. [5][CO3]

5. [a] Draw and explain waterfall and spiral model. [5][CO2]
   [b] Write are the limitation of software change? Explain each. [5][CO4]

6. [a] Discuss the objectives of reverse engineering. [5][CO5]
   [b] Explain different categories of testing. [5][CO1]

7. [a] Discuss tools for comprehension and reverse engineering. [5][CO2]
   [b] Annual change traffic for software system is 50% per year. The development effort is 500 person-month. Compute and estimate the annual maintenance effort. If the life time of the project is 15 year, what is the total effort of the project? [5][CO3]

Total No. of Pages 02

Roll No.....

VII SEMESTER
B.Tech. [SE]

ENDTERM EXAMINATION *Nov/Dec-2022*

SE 425 Intellectual Property Rights

Time: 03:00Hours *Max.Marks:50*

Note: All questions carry equal marks. Attempt any FIVE questions. Assume suitable missing data, if any.

Q.1 Write short notes (any two)
(a) R and ™ Symbol
(b) WIPO
(c) WPPT
[10][CO1, CO5]

Q.2 A person applies for the registration of following trademarks:
a) the word Rampur to be applied on knives;
b) the word Collegiate for a tooth paste;
Is his application likely to succeed in each case? Discuss. [10][CO4]

Q.3 How long does copyright last? What happens when a copyright expires? [10][CO3]

Q.4 "An invention may satisfy the condition of novelty, inventiveness and usefulness but it may not qualify for a patent"-comment. Who checks the novelty features of the invention and what is procedure of registering a patent? [10][CO2]

Q.5 What constitutes piracy of a registered design? What penalties have been provided for piracies of a registered design under the Designs Act, 2000? [10][CO4]

Q.6 State whether following inventions qualify for patent in India? Give reasons if not patentable?
a) A vehicle travelling faster than speed of light.
b) A method of agriculture or horticulture.
c) New type of gambling machine.
d) The topography of integrated circuits.
e) A new procedure for brain surgery that does not need anaesthesia
[10][CO4]

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Total no. of Pages:02 Roll no.....

V / VII SEMESTER

B.Tech.

END TERM EXAMINATION *Nov/Dec-2022*

COURSE CODE: SE427 COURSE TITLE: SOFTWARE PROJECT MANAGEMENT

Time: 03:00 Hours *Max. Marks: 40*

Note: Answer any FIVE questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Consider the description of a set of activities given below.

Activity	Predecessor	Time/Duration		
		Optimistic(a)	Most likely(m)	Pessimistic(b)
A	-	1	7	13
B	A	2	5	14
C	B	2	14	26
D	B	2	5	8
E	C, D	7	10	19
F	A	5	5	17
G	F	5	8	29
H	F, G	3	3	9

Draw the PERT network diagram (including ES, EF, LS, LF and slack/float). Identify the critical path and critical activities for the given network Calculate the expected project duration for given set of activities. Is crashing possible in this network and how? [8] [CO3]

Q.2 Explain the statement, "One important aspect of software economics is that, the relationship between effort and size exhibits a diseconomy of scale". Suggest some measure for improving the software economics. [8] [CO5]

Q.3 With the help of a suitable example, briefly explain the content of Closure Analysis Report. Explain the cultural shifts that are required while transitioning to modern software processes and technologies. [8] [CO4, CO6]

Q.4 What is payback period in cost benefit analysis? Consider the cash flows for 4 different projects.

Year	Cash flow of Project 1	Cash flow of Project 2	Cash flow of Project 3	Cash flow of Project 4
0	-100,000	-1000,000	-100,000	-120,000
1	10,000	200,000	30,000	30,000
2	10,000	200,000	30,000	30,000
3	10,000	200,000	30,000	30,000
4	20,000	200,000	30,000	30,000
5	100,000	300,000	30,000	75,000

Calculate payback period and net profit for each project. Which project should be preferred among the given 4 projects on the basis of 'payback period' and why? [8] [CO1]

Q.5 With the help of suitable diagram explain, Putnam Resource Allocation Model. A software development project is planned to cost 100 PY in a period of 1 year and 6 months. Calculate the peak manning and average rate of software team build up. [8] [CO2]

Q.6 Mention any five improvements in Waterfall model. Explain ten Modern Software Management Principles. [8] [CO5, CO6]

Q.7 List down Barry Boehm's "Industrial Software Metrics Top 10 List". What is an organization structure, explain its type. [8] [CO3, CO5]

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7th SEMESTER

B.TECH

END TERM EXAMINATION Nov/Dec-2022

COURSE CODE SE429 COURSE TITLE Data Warehouse & Data Mining

Time: 03:00 Hours

Max. Marks: 40

Note : (i) Assume suitable missing data, if any.
(ii) Attempt any 5 questions.

Q1. (a) What is data mining? How is a data warehouse different from a database?

(b) Describe architecture of data warehouse. [5+3][CO1]

Q2. (a) With following data transactions and support 0.6. Find all frequent itemsets:

1. I1, I2, I3, I4, I5, I6
2. I7, I2, I3, I4, I5, I6
3. I1, I8, I4, I5
4. I1, I9, I10, I4, I6
5. I10, I2, I4, I11, I5

(b) Let c be a candidate itemset in C_k generated by the Apriori algorithm. How many length- (k-1) subsets do we need to check in teh prune step? Explain with an example. [5+3][CO4]

Q3. (a) What are the advantages and disadvantages of STAR Schema. Draw IPD for car sales analysis. Convert this IPD to STAR Schema.

(b) Explain Bagging and Random Forest. [5+3][CO2]

Q4. Given two objects represented by the tuples (22, 1, 42, 10) and (20, 0, 36, 8), compute the following metrics between the two objects:

(a) Euclidean Distance

(b) Manhattan Distance
(c) Minkowski Distance, using q=3
(d) Supremum Distance [2*4=8][CO3]

Q5. (a) Explain ID3 algorithm.
(b) Suppose that the mean and standard deviation of the values forthe attribute income are $54,000 and $16,000, respectively With z-score normalization, to what value, $73,600 is transformed to? [5+3][CO4]

Q6. (a) Briefly explain Naive Bayesian classification.
(b) What is classification? Differentiate between classification and clustering. [5+3][CO2]

Q7. (a) Briefly describe k-means algorithm. How k-medoid is different from k-means.
(b) Suppose the following data points represented with (x, y) are:
a(2, 10), b(2, 5), c(8,4), d(5,8), e(7,5), f(6,4), g(1,2), h(4,9)
Using Euclidean distance, k-means clustering algorithm, and a, d, and g as initial centroids (cluster centers). Find the final three clusters. [5+3][CO5]

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BTech_SEMESTER_V

END TERM EXAMINATION Nov/Dec-2022

DD303 Design Thinking

Time: 03:00 Hours Max. Marks: 40

Note: All questions are compulsory.

Q.1 What is "Double Diamond Approach' to Design Thinking? Please explain each part/phase of this approach through visual representation and explanation. [10] [CO#1]

Q.2 What is Experience Mapping? Please enumerate a real life example through a visual chart. [10] [CO#2]

Q.3 Applying learnings from class discussions, devise a seamless service for hostel accommodation for DTU students. Please represent the same thru a flowchart. Please identify stakeholders in each phase/part of the service. [15] [CO#3

Q4. What is a holistic approach and humanistic approach? Define them in your own words and enumerate the difference between the two approaches. [5]

CO#1

9541A

END TERM EXAMINATION *Nov-Dec-2022*

COURSE CODE: BBA-202

COURSE TITLE: Marketing Management

Time: 3 Hours *Max. Marks: 50*

Note: All questions are compulsory. All questions carry equal marks. Assume suitable missing data, if any.

Q1. Explain the role and importance of Marketing for an organisation with the support of suitable illustrations. (CO2, L3)

Q2. Explain the importance of Product Development in today's competitive business environment? (CO2, L3)

Q3. Why companies prefer Personal Selling for specific products? Explain with the support of suitable examples. (CO2, L3)

Q4. Write a short note on **Any Two** (5 marks * 2= 10) (CO1, L2)

a) Product Mix
b) Sales Promotion
c) Online Payments
d) Retailing

Q5. Answer any one of the following (CO3, L4, L5)

a) XYZ Company is six-month-old and it is manufacturing and selling soaps. XYZ Company wishes to adapt and implement Green Marketing. Suppose you are a consultant and you are having a working lunch meeting with the Managing Director of XYZ Company. What feasible Green Marketing suggestions you will provide to the Managing Director of XYZ Company?

OR

b) Mr. Michael Jordan, Managing Director, ABC Company wishes to open an amusement park that features Water Play areas such as Swimming Pool, Water Slides, Splash Pads, Water Playgrounds, Bathing and Swimming in Delhi/NCR. How understanding of Consumer Behaviour will support Mr. Michael Jordan in running the ABC Company successfully? Explain with the support of suitable examples.

4355

Total no. of Pages: Roll no.....

_____SEMESTER

B.Tech./B.Des./BBA/BAE/M.Sc./M.Des./M.Tech./MBA/Ph.D/ B.Tech. (Eve)

END TERM EXAMINATION *Nov/Dec-2022*

COURSE CODE **BBA303** COURSE TITLE **Entrepreneurship Development**

Time: 03:00 Hours *Max. Marks: 50*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Explain the various formats of company formation in India. [10][CO#8]

Q.2 What is a business opportunity? Explain the various sources of identifying opportunities with the help of suitable examples. [10][CO#5]

Q.3 Attempt any **one**:

What is innovation? What are the different types of innovation? Describe their features. Illustrate with the help of suitable examples. [10][CO#5]

or

Explain the Big 5 Personality Model and how it is related to entrepreneurship. Give suitable examples [10][CO#6]

Q.4 Explain Dr. James V. Green's opportunity canvas analysis in detail. [10][CO#7]

Q.5 Explain the various sources of financing for startups. [10][CO#6]

Roll No.....

Total no. of Pages: 02

1st SEMESTER

MBA/B. TECH

Nov/Dec-2022

END TERM EXAMINATIONS

MBA-107 Marketing Management

Time 3:00 Hours Max. Marks: 50

Note: Attempt any *Five* questions.
All questions carry equal marks.

1. Attempt any two of the following:

a). Donald E. Petersen, chairman of the board of Ford Motor Company, remarked, "If we aren't customer-driven, our cars won't be either." Explain how this statement reflects the marketing concept. [CO1]

b). "Many of the marketing theories are required to be re-institutionalized and redefined under this data driven world". Comment. [CO1]

c). What are the five-six emerging trends which you think are going to dominate the marketing landscape in next couple of years? [CO4]

2. Rapido is an Indian bike taxi aggregator and logistics service provider based out at Bengaluru. Founded in 2015, the company operates in over 100 cities. The Rapido app allows the user to book a ride, after which a rider (called "Captain") arrives at the location. The fare includes a base fare of ₹15 in addition to ₹3 for every kilometer of the ride. The "Captains" need to register through the Rapido-Captain app and get validated by submitting the required documents. They can use motorcycles, scooters, or e-bikes, but the vehicle cannot be older than 2012. The company's bike taxi booking platform helps to book a bike ride with just two taps with helmets and shower caps to make the experience smoother and hygienic and economical and transparent fares, enabling users to experience the most affordable and fun commute option in the city.

Develop a suitable segment profile/ persona of the customers whom do you feel are the best target market for this kind of services in the major metropolitan cities of India. [CO2]

3. Why is environment scanning essential for value delivery, strategy formulation and long-term survival of the firm? How does the government policies on prices of petrol and diesel impact the car market in India? [CO5]

4. a) Differentiate between brand extension and product extension by an example of your own choice. What are the risks associated with brand extension? [CO2]

b) What are the stages of Product Life Cycle? What strategy would you like to use for a brand which in your opinion is in the final stage of PLC? [CO6]

5. What do you understand from the term 'omnichannel marketing'? What are its advantages and disadvantages? Explain the brand which you consider is close to your perception/ idea of omnichannel in India. [CO1]

6.a) Explain with example the difference between earned, owned and paid media. [CO2]

b) Indian edtech firm BYJUS has recently won a contract to sponsor the FIFA World Cup 2022 scheduled in Nov-Dec, 2022 in Qatar at an estimated cost of USD 30-40 million. Analyze the cost- benefit of such a sponsorship from communication/promotion perspective. [CO3]

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Total No. of Pages: 02

Roll No. .....

THIRD SEMESTER

MBA (odd)

END SEMESTER EXAMINATION Nov-2022

MBAMK213- Consumer Behaviour

Time: 3:00 Hours *Max. Marks: 50*

Note: Answer ALL questions. All questions carry equal marks. Assume suitable missing data, if any.

Q.1 Attempt any TWO of the following [5+5]

i. Describe with examples how technology enhances the exchange between marketers and consumers [CO2]

ii. A company is introducing a new e-book reader. Suggest segmentation, targeting, and positioning strategies for the new product. [CO3]

iii. Some marketers consider benefit segmentation to be the segmentation approach most consistent with the marketing concept. Do you agree or disagree with this view? Why? [CO3]

Q.2 Attempt any TWO of the following [5+5]

i. Discuss the differences between the absolute threshold and the differential threshold. Which one is more important to marketers? Explain your answer with suitable examples. [CO2]

ii. Why do marketers have to reposition their brands? Illustrate with examples. [CO3]

iii. Discuss the statement, "Marketers don't create needs; needs pre-exist marketers." Can marketing efforts change consumer's needs? Why or why not? Can they arouse consumer needs? If yes, how? [CO1]

Q.3 Attempt any TWO of the following [5+5]

i. Why are consumers' needs and goals constantly changing? What factors influence the formation of new goals? Apply the concepts of needs and goals to the introduction on a new program by your university. [CO2]

ii. Discuss the differences between low and high involvement media. How would you apply the knowledge of hemispheric lateralization to the design of TV commercials and print advertisements? [CO2]

iii. What is the difference between primary and secondary research? What are some major sources of secondary data? [CO3]

Q.4 Asian Paints is a well-known company with a dominant market share in the paints sector. The company is looking for diversification in the allied businesses. Discuss how the company can use the consumer behaviour to achieve this objective. [10] [CO1,4]

Q.5 Titan wishes to introduce premium luxurious segment of watches for Indian customers. Elucidate how the company can influence the consumer behaviour with respect to other multinational brands. [10] [CO1,4]

460

Total no. of pages : 02

Roll No.....

3rd SEMESTER

MBA/B. TECH

END TERM EXAMINATIONS

Nov/Dec-2022

MBAMK-219 Marketing Research

Time 3:00 Hours

Max. Marks: 50

Note: Attempt any *Five* questions.
All questions carry equal marks.

1. Attempt any two of the following:
   a) Differentiate between deductive vs inductive reasoning. [CO1]
   b) What are the basic steps of conducting a scientific research enquiry? [CO1]
   c) The Indian Army wants to ascertain why young students do not select the armed forces as a career option in their graduation. How would you formulate and define this research problem? [CO3]

2. a) "Even though exploratory research designs are lowest in terms of accuracy of findings, it is recommended that no research must be carried out without them". Examine the above statement and justify with examples why do you agree/ disagree with it. [CO4]

   b) You are appointed as a research consultant for Himalyan Foods Limited. The company wants to know ideal price differential between its frozen vegetables and those marketed by SAFAL from Mother Dairy. The customers of the frozen vegetable category are mostly working women in metros. What research design would you like to use for this study? Justify your answer. [CO2]

3. Aries Foods Industries is planning to launch a sugar coated, oval shape, center filled liquid gel candy. The candy shall be available in three flavours- chocolate, strawberry and blueberry. It will be available in mono pillow packs at a price point of INR 1:00. The name of the candy will be moon delight. The brand manager reaches out to you and ask to design a suitable questionnaire to get comprehensive customer insight on decision like meaning of candy in child's life, competition, positioning, better avenues for promotion etc. Design a suitable questionnaire to help the product launch. [CO2]

4. Explain various fundamental scaling techniques in measurement of variables. Indicate the type of scale you would use (i.e., Likert, staple, paired comparison.....) for the: color of mobile phone, occupation, brand loyalty, happiness, readership of a survey, ranking of brands and intention to purchase an air purifier. Justify your choice in each case. [CO4]

5. a) Differentiate between systematic, stratified and quota sampling. [CO2]

b) A Govt. of India undertaking involved in providing skill enhancement courses to the students at various centers across India approaches to you and ask to conduct a socio-economic impact analysis of the students who graduated in 2020 from different centers considering that 2 years' time span is enough to get employment opportunities to a candidate. What would be your sampling and data collection plan for this study? [CO3]

6. Write short note on any two of the following:

a) Focus Group Technique (FGT) [CO1]
b) Applied vs Fundamental research [CO1]
c) Longitudinal research [CO3]

Total No. of pages

Roll Number.....

III SEMESTER

MBA+B.Tech.

END TERM EXAMINATION

Nov/Dec- 2022

MBASC-211 OPERATIONS ANALYTICS

Time: 3:00 HR

NOTE: Max Marks:50

1. *Answer any five questions. All questions carry equal marks.*
2. *Statistics tables are allowed.*
3. *Assume suitable missing data if any.*

Q1. OilCo is building a refinery to produce four products: diesel, gasoline, lubricants, and jet fuel. The minimum demand (in bbl/day) for each of these products is 14,000, 30,000, 10,000, and 8000, respectively. Iraq and Dubai are under contract to ship crude to OilCo. Because of the production quotas specified by OPEC (Organization of Petroleum Exporting Countries), the new refinery can receive at least 40% of its crude from Iraq and the remaining amount from Dubai. Oil Co predicts that the demand and crude oil quotas will remain steady over the next 10 years. The specifications of the two crude oils lead to different product mixes. One barrel of Iraq crude yields .2 bbl of diesel, .25 bbl of gasoline, .1 bbl of lubricant, and .15 bbl of jet fuel. The corresponding yields from Dubai crude are .1, .6, .15, and .1, respectively. Oil Co needs to determine the minimum capacity of the refinery (in bbl/day). [10][CO1,2,3]

Q2. SunRay Transport Company ships truckloads of grain from three silos to four mills. The supply (in truckloads) and the demand (also in truckloads) together with the unit transportation costs per truckload on the different routes are summarized in Table 5.8. The unit transportation costs, Cij (shown in the northeast corner of each box), are in hundreds of dollars. The model seeks the minimum cost shipping schedule between the silos and the mills. [10][CO1,2,3]

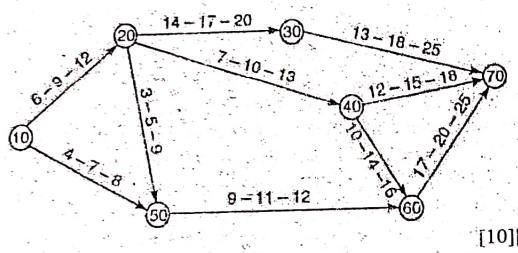
	Mill 1	Mill 2	Mill 3	Mill 4	Supply
Silo 1	10	2	20	11	15
Silo 2	12	7	9	20	25
Silo 3	4	14	16	18	10
Demand	5	15	15	15	

Q3. There are 5 jobs A, B, C, D, and C. these five jobs are to be assigned 5 workers 1,2,3,4, and 5. The processing time taken by each worker for each job is given below in the table. Write the LP model of the assignment problem. Solve the following Assignment Problem so that over all cycle time is minimum. Also find the total cycle time.

	1	2	3	4	5
A	20	18	23	16	20
B	50	17	20	15	11
C	60	40	30	8	7
D	18	28	19	60	70
E	9	20	10	40	55

[10][CO1,2,3]

Q4. Find the critical path and critical path time of the following PERT network. Also find the total variance of critical path.



[10][CO2,3]

Q5. There is a shop in which three machines A, B, and C are available. Seven jobs are to be process on three machines A, B, and C in the order A-B-C. Find the optimum sequence of the jobs so that overall cycle time is minimum. Write all your assumptions clearly. Machining times are given in hours as follows. Also prepare the GANTT CHART. [10] [CO3,4]

JOB	A	B	C
1	3	2	13
2	12	7	15
3	5	4	9
4	2	6	10
5	9	3	7
6	11	1	13
7	7	6	18

Q6. Solve the following problem.
Maximize $Z = 2X1 + 3X2$
Subjected to
$6X1 + 5X2 \leq 25$
$X1 + 3X2 \leq 10$
X1 and X2 Non-Negative Integers [10] [CO2,3,4]

Q7. Write the short notes on any four of the following. [10] [CO2,3,4]

(i) Sensitivity Analysis
(ii) Goal Programming
(iii) Analytical Hierarchy Process (AHP)
(iv) Infeasible solutions in linear programming
(v) Multiple solutions in linear programming

-END-

Poster Banner Shop wishes to monitor the blem[illegible]s count in the painted posters of big size. Develop a 3-sigma c-chart for the painting process, suggest that the process is under control. Blemish count data for sample posters are as follow:

Sample Number	1	2	3	4	5	6	7	8	9	10
Number of Defects	4	3	1	2	4	1	2	3	2	4

Q.5 Write short notes on **ANY THREE** **[5x3=15]** [CO#3,5]

a) ISO standards
b) Taguchi's Quality Loss Function
c) TPM
d) Acceptance Sampling O.C Curve

Q.6 Elaborate the philosophy of any one of the quality gurus **[5]** [CO#2]

Q.7 Is six sigma implementations different in manufacturing and services ? Explain in either case. **[5]** [CO#3]

END

Total no. of Pages:4 *Roll no.....*

FIFTH / SEVENTH SEMESTER **B.Tech**

END TERM EXAMINATION ***Nov/Dec-2022***

MBASC-213 **TOTAL QUALITY MANAGEMENT**

Time: 03:00 Hours ***Max. Marks: 50***

Note : Assume suitable missing data, if any.
Use of non-programmable scientific calculator is allowed.

Q.1 *Ritz-Carlton.* The name alone evokes images of luxury and quality. As the first hotel company to win the Malcolm Baldrige National Quality Award, the Ritz treats quality as if it is the heartbeat of the company. This means a daily commitment to meeting customer expectations and making sure that each hotel is free of any deficiency.

In the hotel industry, quality can be hard to quantify. Guests do not purchase a product when they stay at the Ritz: They buy an experience. Thus, creating the right combination of elements to make the experience stand out is the challenge and goal of every employee, from maintenance to management.

Before applying for the Baldrige Award, company management undertook a rigorous self-examination of its operations in an attempt to measure and quantify quality. Nineteen processes were studied, including room service delivery, guest reservation and registration, message delivery, and breakfast service. This period of self-study included statistical measurement of process work flows and cycle times for areas ranging from room service delivery times and reservations to valet parking and housekeeping efficiency. The results were used to develop performance benchmarks against which future activity could be measured.

With specific, quantifiable targets in place, Ritz-Carlton managers and employees now focus on continuous improvement. The goal is 100% customer satisfaction: If a guest's experience does

not meet expectations, the Ritz-Carlton risks losing that guest to competition.

One way the company has put more meaning behind its quality efforts is to organize its employees into "self-directed" work teams. Employee teams determine work scheduling, what work needs to be done, and what to do about quality problems in their own areas. In order to see the relationship of their specific area to the overall goals, employees are also given the opportunity to take additional training in hotel operations. Ritz-Carlton believes that a more educated and informed employee is in a better position to make decisions in the best interest of the organization. **[5x2=10]** [CO#1,3,5]

a) In what ways could the Ritz-Carlton monitor its success in achieving quality?

b) Many companies say that their goal is to provide quality products or services. What actions might you expect from a company that intends quality to be more than a slogan or buzzword?

c) Why might it cost the Ritz-Carlton less to "do things right" the first time?

d) How could control charts, Pareto diagrams, and cause-and effect diagrams be used to identify quality problems at a hotel?

e) What are some nonfinancial measures of customer satisfaction that might be used by the Ritz-Carlton?

Q.2 The overall average on a process you are attempting to monitor is 100 units. The process population standard deviation is 3.44. Determine the upper and lower control limits for a mean chart, if you choose to use a sample size of 5. [5] [CO#4]

a) Set $z = 3$

b) Now set $z = 2$. How do the control limits change?

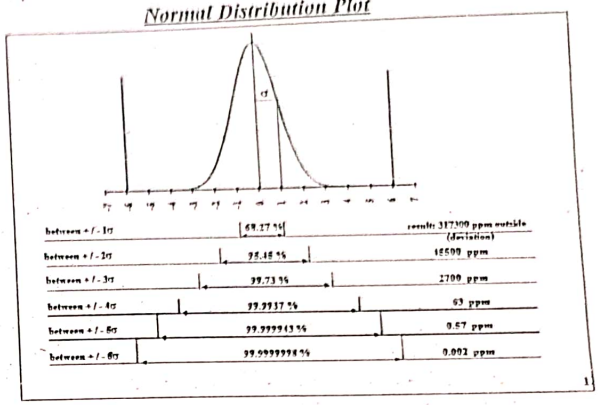
Q.3 The specifications for a plastic liner for concrete highway projects calls for a thickness of 3.0 mm $\pm$ 0.1 mm. [5] [CO#4]

a) The standard deviation of the process is estimated to be 0.02 mm. What are the upper and lower specification limits for this product? The process is known to operate at a mean thickness of 3.0 mm.

b) Wi[illegible]

c) About what percentage of all units of this liner will meet specifications? (below chart can be used)

Normal Distribution Plot



Q.4 Attempt **ANY ONE** [5] [CO#4]

A traffic police person is checking whether cars have recently mandated smart numbers plates or not at a busy road crossing. He is checking 200 cars as targeting reporting how many cars do not have smart number plates. The sample size is fixed at n=200 each day. Sample data for the last 10 days are shown in the following table:

Day	1	2	3	4	5	6	7	8	9	10
Cars without smart number plates	16	15	12	17	20	13	18	16	10	19

a) Estimate overall proportion of cars without smart number plates and the standard deviation of proportions,

b) Calculate the LCL and UCL for $\pm 3\sigma$ limits

OR

Total no. of pages: 6 Roll no.....

VII SEMESTER

B.Tech (Minor)

END TERM EXAMINATION *Nov./Dec.-2022*

MBE-ALS II: Action Learning Segment- II

Time: 3:00 Hours *Max. Marks: 40*

Note : All questions are compulsory.
Assume suitable missing data, if any.

Q.1 Identify and explain the type of offensive tactic highlighted in the following situations:

i. HUL introduces Knorr instant noodles to compete with Nestle Maggi.

ii. Procter & Gamble began a program of extensive market research to promote its spray cleaning product called Cinch. Wilson Harrell, owner of Formula 409 (small cleaning spray company), knew that Procter & Gamble would perform test market research. He began a program where he reduced advertising expenditures in Denver and stopped promoting his Formula 409. P&G immediately begin a national sales campaign. However, before the company could begin, Harrell introduced a promotion of his own. He took the Formula 409 sixteen-ounce bottle and attached it to a half-gallon size bottle. He then sold both at a significant discount. This quantity of spray cleaner would last the average consumer six to nine months. As a result, the market for Procter & Gamble's Cinch was significantly reduced.

iii. Reliance trends attacked on Shoppers stop, lifestyle, big bazaar in terms of fashion, features, user preferences and anything that might interest the consumer.

iv. Canon acquired Xerox's copier market share by targeting on small size photo copier market that could not afford Xerox's large photo copiers.

v. In FIFA world cup, Adidas was the game's official sponsor while Nike advertised its products through TV commercials and popular football players. [10] [CO3]

Q.2 (a) Mr. Rahul is planning to work on an idea of providing athleisure wear to youngsters. It's his first business and he is not at all aware of the important components/ elements that a business should have. You have recently got to know about startup equation which include certain elements that should fits the business perfectly, no matter what type of business you plan to start. Advise him regarding how he should incorporate start-up equation in his business. [5] [CO2]

Q.2 (b) Best Buy is the largest consumer electronics retailer in the United States. The company competes aggressively on price with such rivals as Costco Wholesale, Sam's Club, Walmart, and Target, but it is also known by consumers for its first-rate consumer service and knowledgeable staff. Best Buy consumers also appreciate that demonstration models of PC monitors, digital media players and other electronics are fully powered and ready for in-store use. Best Buy Geek Squad tech support and installation services are additional customer service features that are valued by many customers. How would you characterize Best Buy's competitive Strategy? Explain your answer by giving the advantages of the strategy. [5] [CO1]

Q.3 Explain the kind of corporate level strategies which might be used in the following cases:

i. A leading FMCG company has decided to reduce its investment in a particular product to extract maximum profit from its sales.

ii. A pioneer computer firm after achieving incredible growth has decided to take a breathing spell.

iii. Nestle repositioned launch of its product 'milkmaid' (which was earlier introduced as a substitute for milk) as an important dessert ingredient. [5] [CO3]

OR

"BMW plans to roll out more electric cars and add self-driving features faster than rivals to help fend off growing threats to its status as the world's biggest maker of luxury vehicles." In your opinion:

i. What type of defensive strategy is the company trying to follow?

ii. What all alternatives are available to the competitors? [5] [CO3]

Q.4. Read the following case and answer the following questions:

Vidit Aatrey and Sanjeev Barnwal graduated from IIT Delhi in Electrical Engineering in 2012. After graduation, Barnwal took up a job in Sony as a software developer and moved to Tokyo, while Aatrey joined InMobi as manager, Original Equipment Manufacturer (OEM) Partnerships. In 2015, Barnwal was approached by a Bangalore-based startup with a job offer. He immediately thought of his old friend, Aatrey, who was working in Bangalore and reached out to him to discuss the offer. Aatrey was well plugged into the local startup ecosystem. They discussed the vibrant startup ecosystem in Bangalore and the plethora of opportunities that were opening up in India. It turned out to be a pivotal call, because soon after, they decided to launch their own startup. Over the next month, they both resigned from their well-paying jobs and Barnwal moved to Bangalore.

The founders wanted to start a venture but had not zeroed in on what they would do. They researched various businesses that were attracting venture capital investment and figured that hyperlocal was an emerging space. The term "hyperlocal" refers to a small geographic area. Hyperlocal delivery model is a business model in which the service provider acquires the required product locally, from neighborhood establishments, and delivers it to the customer in the same geographic area. The unique value proposition of hyperlocal businesses is that they could deliver products and services to their customers in a short time. This speed of delivery was convenient for consumers in a fast-paced world. Aatrey leveraged his network and spoke to a number of acquaintances who were active in the startup ecosystem. They agreed with the assessment that hyperlocal was the way to go and fashion seemed to be a promising category.

Market research confirmed that there was an opportunity in this space. Apparels were the largest segment within the fashion industry. The total apparel market size in India was $33.41 billion (INR 2,48,250 crore) (cr - crore) in 2014 and was estimated to grow at a CAGR of 9.9% to reach $86.23 billion (INR 6,40,800 crore) in 2024. Further, branded apparel accounted for only 25% of the overall market in 2012, and the rest was unbranded. This strong demand for unbranded apparel was expected to continue in the years to come. The founders also did their own market research by visiting several neighborhood shops in Bangalore. While talking to these shop owners, they found that these shops, mostly retailing unbranded apparel, had no online presence and sold mainly through the physical storefront. Large e-commerce platforms like Amazon and Flipkart mostly sold branded apparel.

This reinforced the founders' idea – the hyperlocal model for fashion would help these small businesses sell unbranded fashion apparels online, while making shopping convenient for the consumers. They decided to build a mobile application that would map neighborhood stores and connect them to consumers. Thus, FashNear was born in September 2015. FashNear was a mobile application that would let consumers browse all the neighborhood stores selling apparels in their locality. Consumers had the option of choosing products that they wished to try. This would trigger a request to the store, which would send a sales boy to the consumer's house with the requested products. The consumer could try on the apparels and buy whatever they liked and send the remaining apparels back with the sales boy to the store. In the first month, which coincided with the 'end of season' sale in offline retail, FashNear had received 56 home trial orders and sold 40 products, accounting for a gross merchandize value (GMV) of $673 (INR 50,000). However, as the sale ended and discounts disappeared, the orders dried up too. The second month onward, there were fewer orders coming in and by December 2015, Aatrey and Barnwal realized that FashNear was not gaining the kind of traction they hoped for.

POPULARITY OF SOCIAL COMMERCE

Almost 40% of the sales were happening through WhatsApp by retargeting existing customers. Strangely, Aatrey and Barnwal had overlooked this customer interaction process earlier, although a majority of the small shops were using this model. They visited more shops to research this trend deeper and found that this process was not without its own set of challenges. One of the main issues was that the retailers frequently resent pictures of the unsold products and ended

up spamming the consumers. As a consequence, consumers often left the WhatsApp group or muted notifications. This led to another problem – by the time they responded on a product of interest, it would no longer be available. Also, once a deal was made between the store and the consumer, the mode of payment proved to be an issue; retailers had to send someone from the shop to collect payment in cash.

Around 2015-16, social commerce was gradually growing in popularity in India. Aatrey and Barnwal had stumbled into the world of social commerce – a subset of e-commerce that supported transactions over social media. Social commerce allowed businesses to promote and sell their products via social networking sites like Facebook, WhatsApp, Twitter, and others. While Aatrey and Barnwal were quite aware of the increasing importance of social commerce for small businesses, they were also aware of the gaps. They knew which pain points to address to make social commerce more successful and streamlined. With this new knowledge, they pivoted toward developing an alternative distribution channel for the small retail shops that led to the birth of Meesho (derived from Meri Shop, meaning "My Shop" in Hindi) in January 2016. Meesho was the Indian mobile version of 'Shopify'. When users logged into Meesho for the first time, a webpage for their business was created using the information from their Facebook account. The application provided the retailers a comprehensive set of features to manage their business operations. This included inventory management, catalog management, order management, and payments. The retailers could share links of their stores over WhatsApp, which enabled consumers to browse through the latest product(s), choose product(s), and make payments.

The founders introduced the beta version of Meesho as a free tool to the retailers of small, neighborhood shops. The team was constantly in touch with their users, discussing the problems they were facing with the tool and introducing features that made it more convenient. Their goal was to make the product sticky and increase the rate of retention. The industry benchmark for retention was ~30% in the third month.

At the end of 6 months, 25,000 shops all over India were using Meesho. Aatrey pointed out some tailwinds that helped Meesho grow faster: *WhatsApp gaining popularity around 2015 worked in Meesho's favor. For most people in India, WhatsApp is the first and only app they have used. Also, Reliance Jio (Indian telecom company) got popular and it significantly reduced the cost of data usage in India. Now, this resulted in more and more people coming online even from the smaller towns of the country. This was huge for us. Also making digital and mobile payments using Unified Payment Interface (UPI), an instant real time payment system, was rapidly gaining popularity making a lot of people do transactions online, which they wouldn't be doing otherwise.*

This was a stage of mixed emotions for the founders. On one hand, Meesho was steadily gaining traction, but on the other hand, Aatrey and Barnwal were yet to figure out a way to make money. It seemed difficult to monetize by charging the small retailers a user fee. There was a possibility of exploring advertising revenues. Even as they were grappling with the issue of monetization, Meesho's retention rate stubbornly remained below the industry benchmark. To add to this, they were fast running out of funds and investors did not seem interested in Meesho's business model.

Source: Adapted from Harvard Business Review

i. Did Fashnear have problem-solution fit?
ii. What could have founders done differently? Where did they went wrong?
iii. Does Meesho have problem-solution fit? Do they have product-market fit?
iv. What are the options before Aatrey and Barnwal? What should they do? [3+4+4+4] [CO1]

END

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Total No. of Pages: 01 Roll No.....

III SEMESTER
B.Tech. Evening

END TERM EXAMINATION Nov/Dec-2022

CHU201 Professional Ethics and Human Values

Time: 3 Hours Max. Marks : 50

Note : Attempt *any five* questions
All questions carry equal marks.

Q1. How does **Value Education** help in fulfilling one's aspiration to be happy and prosperous in life? Explain with suitable examples. [10 Marks] [CO#7]

Q2. Write a detailed note on **Professional Ethics** highlighting different roles, rights and responsibilities of professionals. [10 Marks] [CO#1 &CO#6]

Q3. Elaborate on the fundamental aspects of **Engineering Ethics**? [10 Marks][CO#1& CO4]

Q4. Explain the major issues that concern **Environmental Ethics** today? [10 Marks][CO#1]

Q5. How can the **Eco- Friendly Production System** be helpful for mitigating environmental issues faced across the globe in the modern scenario? [10 Marks] [CO#2 &CO#3]

Q6. Write down elaborately about engineering as **social experimentation.** [10 Marks][CO#2]

Q7. Describe the **global issues** and respective **ethical challenges** for upcoming engineers. [10 Marks] [CO#6 & CO#8]

2

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Total No. of Pages: 02

Roll No:.....

Ist Sem.

B.Tech.(Evening) December 2022

CMA 101, Applied Mathematics - I

Time: 3 Hours.

Max. Marks: 40

Note: Attempt any five questions and all questions carry equal marks.

(1) (a) Find the *inverse Laplace transforms* of

$$\frac{s^2 + 6s + 9}{(s-1)(s-2)(s+4)}.$$

(b) Solve

$$\frac{d^2x}{dt^2} + 9x = \cos 2t, \text{ if } x(0) = 1, x(\pi/2) = -1,$$

by *Laplace transforms*.

(2) (a) Find the rank of matrix.

$$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$

(b) Find the value of k so that the equations:

$$x + y + 3z = 0$$
$$4x + 3y + kz = 0$$
$$2x + y + 2z = 0$$

have a non-trivial solution.

(3) (a) Evaluate

$$\int_0^{4a} \int_{y^2/4a}^{2\sqrt{ay}} dxy.$$

(b) Evaluate

$$\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz dx dy dz.$$

(4) (a) Solve $(D-2)^2 y = 8\left(e^{2x} + \sin 2x\right)$.

(b) Solve $(D^2 - 2D + 2)y = x + e^x \cos x$.

(5) (a) Find the half range cosines series for the function

$$f(x) = x(\pi - x), \text{ for } 0 \leq x \leq \pi.$$

(b) Find the Fourier series for the function $f(x)$ in the interval $(-\pi, \pi)$, where

$$f(x) = \begin{cases} \pi + x, & -\pi < x < 0, \\ \pi - x, & 0 < x < \pi \end{cases}$$

(6) (a) Evaluate (upto 3 places of decimals) the integral

$$\int_2^{10} \frac{dx}{1+x}$$

by dividing the range into eight equal parts.

(b) Find by *Newton-Raphson iterative method*, the real root of the equation $e^x = 4x$, which is approximately 2, correct to three places of decimals.

(7) (a) Use *Runge-Kutta* method of fourth order to solve the differential equation

$$\frac{dy}{dx} = x + y, \quad y(0) = 1$$

and find an approximate value of y for $x = 0.1$.

(b) Solve the equations:

$$27x + 6y - z = 85;$$
$$x + y + 54z = 110;$$
$$6x + 15y + 2z = 72,$$

by *Gauss-Seidal iteration method.*

Total pages: 2 4 Roll No. 4172

3rd SEMESTER **B.Tech. *(Eve)* - (Mechanical Engg.)**

END TERM EXAMINATION ***Nov-Dec-2022***

COURSE CODE: CME 201 COURSE TITLE: Thermal Engg. - I

Time: 3 Hours *Max. Marks: 40*

Note : Answer any **FIVE** questions in full. Assume suitable missing data, if any. Use of steam tables and Mollier charts (steam charts) are allowed to solve problems.

Q.1 **(a)** Define the following: (i) reversible and irreversible processes, (ii) closed and open systems, (iii) work and heat (iv) enthalpy and entropy. [4 marks][CO#1]

(b) With the help of T-h and T-v diagrams, briefly explain the constant pressure heating of water conversion from solid state to superheated vapour state. [4 marks][CO#1]

Q.2 **(a)** With the help of T-s diagrams, briefly explain the effects of temperature and pressure on the performance of simple Rankine cycle. [4 marks][CO#2]

(b) In a simple Rankine cycle, boiler exit conditions are 20 bar dry saturated steam. The condenser pressure is 0.1 bar. Calculate (i) Pump and turbine work, (ii) thermal efficiency (iii) quality of steam entering condenser. [4 marks][CO#2]

Q.3 **(a)** Give the classification of boilers with two examples and advantages and disadvantages. [4 marks][CO#3]

(b) With the help of expressions, define the following: (i) equivalent evaporation, (ii) boiler thermal efficiency, (iii) heat loss due to incomplete combustion, (iv) heat loss due to unburnt fuel. [4 marks][CO#3]

Cont.....

Q.4 (a) Derive the expression for mass flow rate of steam flow through the nozzle. [4 marks][CO#4]

(b) Steam at a pressure of 7 bar and dry saturated expands through a nozzle having a throat area of 4.7 cm^2. The exit pressure is 1 bar. Calculate (i) mass flow rate of steam, (ii) the exit velocity. [4 marks][CO#4]

Q.5 (a) Draw the inlet and exit velocity diagrams for a single stage impulse turbine and give its nomenclatures. [4 marks][CO#5]

(b) Steam enters a single stage impulse turbine with a velocity of 1000 m/s. The nozzle angle is 20°. Mean blade velocity is 400 m/s. The blades are symmetrical. Friction factor is 0.8. Calculate (i) work done per kg of steam, (ii) blade efficiency, (iii) blade angles. [4 marks][CO#5]

Q.6 (a) List out the necessity and advantages of usage of steam condenser in a vapour power cycle. [4 marks][CO#6]

(b) With the help of diagram, briefly explain the requirement of air cooling section in surface condenser. [4 marks][CO#6]

Total no. of Pages : 03 Roll No._____

III SEMESTER

B.Tech (Evo). - ME

END TERM EXAMINATION *November-2022*

CME-203 THEORY OF MACHINES

Time: 3:00 Hours *Max. Marks : 40*

Note: Answer any FIVE questions.
All questions carry equal marks.
Assume suitable missing data, if any.

1. Draw velocity and acceleration diagram for the mechanism given in Fig.1 below, all the dimensions are in metres. The crank rotates with 360 rpm CCW and makes 30° with the IDC. Also determine the velocity and acceleration of slider C with respect to another slider N. **[8][CO-1]**

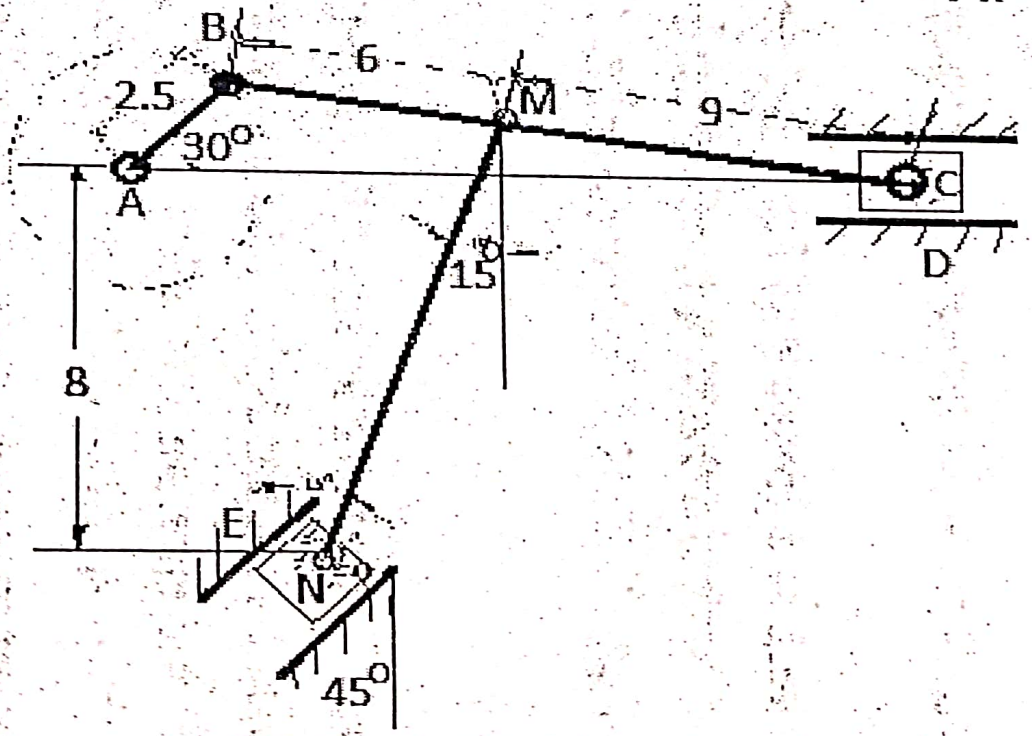


Fig.1

2 Attempt the following:

[a] Define and describe the law of steering and its importance for power transmission through gear wheels.

[b] Compare the function and properties of knife edge, roller and flat face followers **[4x2=8][CO-1,2]**

3 Attempt the following:

[a] Describe underdamped, overdamped and critical damped vibrations with the help of neat sketch and expressions.

[b] Derive the expressions and discuss the effect of whirling of the shaft. **[4x2=8][CO-3]**

4 Fig.2 shows an epicyclic gear train. Pinion A has 20 teeth and is rigidly fixed to the motor shaft. The wheel B has 32 teeth and gears with A, and also with annular fixed, wheel D. Pinion C has 24 teeth and is integral with B (C.B being a compound gear wheel). Gear C meshes with annular wheel E, which is keyed to the machine shaft. The arm rotates about the same shaft on which A is fixed and carries the compound wheel B, C. If the motor runs at 1000 r.p.m., find the speed of the machine shaft. Find the torque exerted on the machine shaft if the motor develops a torque of 120 Nm. **[8][CO-4]**

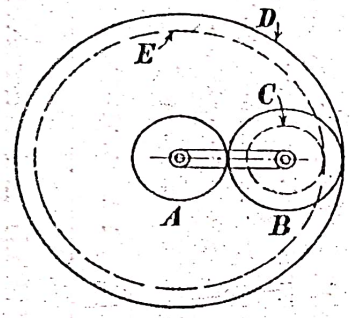


Fig. 2

5 [a]With the help of neat sketch describe the turning moment diagram for two stroke and four stroke I C Engine. For the same power output for middle range of I C Engine, compare the requirement of mass moment of inertia for the both two stroke and four stroke I C Engine.

[b] Describe Tractive force, swaying couple and hammer blow with all the necessary condition in 2-cylinder, 90° crank, inline, uncoupled locomotive engine. **[4x2=8][CO-5]**

6 [a] Discuss the stabilization of naval ship during rolling, pitching and steering.

[b] Draw and describe the controlling force diagram for spring controlled Mechanical Governor **[4x2=8][CO-6]**

7 Attempt any two of the following:

[a] Describe under, over and critical damped vibrations and their applications.

[b] Explain the law of gearing.

[c] With the help of example, differentiate between dynamic and static balancing **[4x2=8][CO-3,4,5]**

8 Attempt any two of following:

[a] Define and inter relate the different pitch for gear and its importance in transmission of power through gearing of wheels.

[b] Compare the function of flywheel and mechanical governor.

[c] Discuss the stabilization of 4-wheel vehicle regarding gyroscopic couple and include the effect of motion of engine also. **[4x2=8][CO-5,6]**

-END-

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Total No. of Pages: 2 Roll No. .....

THIRD SEMESTER

B.Tech Eve(ME)

END SEMESTER EXAMINATION NOV/DEC 2022

CME205: PRODUCTION TECHNOLOGY-I

Time: 3 Hrs. Max. Marks: 40

Note: Answer any *FOUR* questions. Assume suitable missing data, if any.

[1] Differentiate the following briefly. *(ANY FIVE)*

(i) AC and DC welding

(ii) Direct and reverse polarity

(iii) Open die forging and close die forging

(iv) Hot working and cold working

(v) Constant current and constant voltage type power sources

(vi) Thermo plastics and thermos setting plastics 10 [CO 2,3,4,5]

2[a] List the various casting defects. Explain in detail the causes and remedies of any four. 5 [CO 1]

[b] With a neat sketche discuss the working of a continuous casting process. Also discuss its relative merits, and applications. 5 [CO 1]

3[a] With a neat sketch explain the working principle of GMAW. List its applications and also compare its advantages and disadvantages with GTAW. 5 [CO2]

[b] Sketch the electrical circuit and setup for the ESW and discuss the following.

(a) Working principle (ii) Electrode and flux material (iii) Applications (iv) Limitations 5 [CO 2]

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4[a] Determine the punch and die sizes for blanking and punching a circular disc of 25 mm diameter from a stainless-steel sheet whose thickness is 1.5 mm. Shear strength of stainless steel may be taken as 470 MPa and stripping constant as 0.0241. Also calculate the punching force and stripping force. 5 [CO 3]

[b] Describe the following processes with their specific applications and limitations.
(i) Metal spinning
(ii) Wire drawing 5 [CO 3]

5[a] Differentiate drop forging and press forging. Also, with a neat sketch explain the working principle of the drop forging. 5 [CO 4]

[b] With neat sketches discuss the various extrusion processes. Also discuss their relative merits, demerits and applications 5 [CO4]

END

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Total no. Of pages : 2

Roll No.

FIFTH SEMESTER B.Tech.(Cont Edu)

END SEMESTER EXAMINATION NOV 2022

CME 301 HEAT AND MASS TRANSFER

Time : 3 hr Max Marks: 40

Answer any FIVE questions. Assume missing data suitably if any.
Use of steam tables & psychrometric charts permitted.

1.(a) Explain the following (i) thermal conductivity (ii) thermal diffusity

(b) Derive the expression for critical thickness of insulation for cylinder.

(c) Derive the expression for heat flow rate for a three layered composite spherical wall and also develop the expression for overall heat transfer coefficient for the composite spherical wall. (2,2,4) [CO1]

2(a) A steel pipe (k=50 W/mK) of inner diameter 100 mm and outer diameter 120 mm is to be covered with two layers of insulation each having thickness of 40 mm. The thermal conductivity of first insulation material is 0.06 W/mK and that of second is 0.10 W/mK. Calculate the heat loss / m length of pipe and intermediate temperatures when the temperature of inside surface is 250^0 C and that of outside is 45^0 C.

(b) Derive the expression for temperature distribution and heat dissipation from a long fin. State assumptions made. (4,4) [CO2]

3(a) What is transient heat conduction? Derive the expression for temperature distribution and rate of heat transfer in lumped heat capacity system.

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(b) A steel ball (C=460 J/kg/K, K=40 W/mK) 8 cm diameter and initially at a uniform temperature of 800° C is suddenly placed in a controlled environment at 90° C. Determine the time required for the ball to reach a temperature of 150° C. Take density of steel as 7800 kg/m3 and h as 100 W/m2K. (4,4) [CO3]

4(a) Explain various Dimensionless numbers used in convective mass transfer.

(b) What do you mean by free and forced convection heat transfer?

(c) Explain the dimensional analysis applied to free convection heat transfer. (2,2,4) [CO4]

5(a) Define effectiveness of heat exchanger and derive the expression for effectiveness of parallel flow heat exchanger.

(b) A counterflow heat exchanger is to be designed to cool 3600 kg/hr of oil (C_p = 2 kJ/kg/K) from 180° C to 80° C with 1800 kg/hr of water (C_p = 4.18 kJ/kg/K) available at 30° C. Determine the heat exchanger surface area. Take U = 500 W/m2/K (4,4) [CO5]

6(a) State and explain various laws relating to thermal radiation.

(b) Derive the expression for radiation heat transfer between two parallel non black surfaces. (4,4) [CO6]

7 Explain the following:

(a) Significance of Biot number and Fourier number

(b) Boiling heat transfer

(c) Reynolds analogy (2,3,3) [CO3,CO4]

Total no. of pages: 3 *Roll No.* _____

Fifth Semester
B.Tech. [Eve.]

End Semester Examination *Nov- 2022*

CME- 303 REFRIGERATION AND AIR CONDITIONING

Time: 3.00 Hours *Max. Marks: 40*

Note: Answer all questions by selecting any two parts from each question. Use of Psychrometric chart, refrigeration table and steam table are allowed. Assume suitable missing data, if any.

Q.1 [a] Derive an expression for coefficient of performance (COP) for an air-refrigeration system working on reversed Brayton cycle. [4] [CO1]

[b] Explain with a neat sketch the reduced ambient air-refrigeration system. [4] [CO1]

[c] A Bell-Coleman refrigerator operates between pressure limits of 1 bar and 8 bar. Air is drawn from the cold chamber at 9°C, compressed and then it is cooled to 29°C before entering the expansion cylinder. Expansion and compression follow the law $pv^{1.35}$ = constant. Calculate the theoretical COP of the system. For air take $\gamma = 1.4$, $C_P = 1.003$ kJ/kg K. [4] [CO1]

Q.2 [a] With help of T-s diagrams explain the difference between wet compression and dry compression? [4] [CO2]

[b] Following results were obtained in a test conducted on a vapour compression refrigerator: Evaporator temperature = -28.5°C, condenser pressure = 2.75 bar; Refrigerant entering the condenser is 3°C superheat, refrigerant leaving the condenser is at 12.8°C. Determine the COP. The following properties are given: [4] [CO2]

Pressure (bar)	Saturation temp. (°C)	Enthalpy (kJ/kg)		Entropy Vapour (kJ/kg K)	Specific heat at constant pressure (kJ/kg K)	
liquid	Vapour	liquid	Vapour	Vapour	liquid	Vapour
2.75	14	438.48	802.0	5.5287	1.381	0.669
0.412	-28.5	381.58	783.24	5.6852	.....	.....

[c] A refrigeration cycle uses Freon-12 as the working fluid. The temperature of the refrigerant in the evaporator is -10°C. The condensing temperature is 40°C. The cooling load is 150 W and the volumetric efficiency of the compressor is 80%. The speed of the compressor is 720 rpm. Calculate the mass flow rate of the refrigerant and the displacement volume of the compressor. Properties of Freon-12: [4] [CO2]

Temperature (°C)	Saturation Pressure (MPa)	Enthalpy (kJ/kg)		Specific Volume (m^3/kg) Saturated vapour
		Liquid	Vapour	
-10	0.22	26.8	183.0	0.08
40	0.96	74.5	203.1	0.02

Q.3 [a] Draw a neat diagram of 'Electrolux refrigerator' and explain its working principle. What is the important role of hydrogen in this refrigeration system? [4] [CO3]

[b] Draw a neat diagram of Lithium bromide water absorption refrigeration system and explain its working. [4] [CO3]

[c] In an absorption type refrigerator, the heat is supplied to NH_3 generator by condensing steam at 2 bar and 88 percent dry. The temperature in the refrigerator is to be maintained at -4°C. Find the maximum C.O.P. possible. If the refrigeration load is 18 tonnes and actual COP is 72 percent of the maximum COP, find the mass of steam required per hour. Take the temperature of the atmosphere as 25°C. [4] [CO3]

Q.4 [a] Explain the working of sling psychrometer with neat diagram. [4] [CO4]

[b] Define 'heating & humidification' and 'cooling & dehumidification' with neat diagrams. [4] [CO4]

[c] 108 m^3 of air per minute at 5°C DBT and 2.5°C WBT is passed through a heating coil which gives 48.85 kW energy to the air. Saturated steam at 110°C and with a rate of 48 kg/h is mixed with the air leaving the heater. Determine the DBT and WBT of the air after mixing the steam. Enthalpy of saturated steam at 110°C (h_s) = 2691 kJ/kg. [4] [CO4]

Q.5 [a] Describe thermodynamics of a human body, and explain the four factors which affect human comfort. [4] [CO5]

[b] Enumerate all methods of air-conditioning duct design. Explain 'velocity reduction method' and 'static regain method'. [4] [CO6]

[c] Why are the ducts used in air-conditioning systems? Explain downward and upward air-distribution systems. [4] [CO6]

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Total no. of Pages: 02 Roll no.....

III SEMESTER

B.Tech. Evening (Mechanical Engineering)

END TERM EXAMINATION ***Nov/Dec-2022***

CME307 Advanced Machining Process

Time: 3:00 Hours *Max. Marks: 40*

Note: All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Differentiate between conventional and advanced machining processes. Draw a schematic to outline and categorize the basic advanced manufacturing processes. [Marks 4][CO1]

Q.2 What is the function of "horn" in USM? Discuss USM process parameters effect on the metal removal rate with neat graphs. [Marks 4][CO2]

Q.3 With neat sketches, describe the Electric-discharge machining process and explain the basic steps underlying the mechanism of material removal. [Marks 4][CO3]

Q4. During an EDM drilling operation in a 25 mm square hole in a carbon steel plate of 10 mm thickness. Brass as the tool and kerosene as the dielectric is used. The resistance and the capacitance in the relaxation circuit are 100 Ω and 20 μF respectively. The supply voltage is 220 Volts and the gap is maintained at such a value that the discharge takes place at 150 Volts. Estimate the time required to complete the drilling operation. (Given $Q = 27.4\ W^{1.54}$, where, Q is the removal rate or steel in $mm^{3/min}$ and W is the power input in KW) [Marks 4][CO4]

Q.5. Differentiate between transferred and non-transferred modes of the plasma arc. Discuss the factors that influence the quality of the cut in PAM. [Marks 4][CO3]

OR

Q.5' A laser beam with a power intensity of 10^5 W/mm^2 falls on a tungsten sheet. Find out the time required for the surface to reach the melting temperature. The given thermal properties of tungsten are melting temperature = 3400 ^{0}C, Thermal conductivity 2.15 W/cm-^{0}C, and volume specific heat = 2.72 J/cm – ^{0}C. Assume that 5 % of the beam is absorbed. [Marks 4][CO4]

Q.6 Explain the mechanics of LBM. Explain the working principle and specific applications in micro-fabrication/machining of Excimer lasers. [Marks 4][CO5]

Q.7 Explain the working principle of ECM with a neat sketch. Prove that volumetric removal rate in ECM is given by $Q = AI/\rho vF$ cm^3/s; where ρ = density of the anode (g/cm^3), F = Faraday constant, A = Atomic weight, v = valency, I= Current (A). [Marks 4][CO4]

OR

Q.7' In ECM process, the surface finish is adversely affected by sporadic breakdown of the anodic film, explain. Give an application of ECM process where other advanced manufacturing processes are failed. [Marks 4][CO5]

Q.8 Determine the metal removal rate of a nickel superalloy with the composition of Ni = 60%, Cr = 20%, Fe = 10%, and Ti = 10%, in ECM when the current applied is 2000A.

Given

$A_{Ni} = 58.71$, $\rho_{Ni} = 8.9$, $v_{Ni} = 2$
$A_{Cr} = 51.99$, $\rho_{Cr} = 7.19$, $v_{Cr} = 2$
$A_{Fe} = 55.85$, $\rho_{Fe} = 7.86$, $v_{Fe} = 2$
$A_{Ti} = 47.9$, $\rho_{Ti} = 4.51$, $v_{Ti} = 3$

[Marks 4][CO5]

Q.9 Explain the working principle of focused beam machining with a neat sketch. Describe the FIB milling process used for nanomanufacturing with a suitable example. [Marks 4][CO6]

Q.10 Discuss the working principles of assisted ECM-based hybrid processes and their specific applications & advantages over ECM. [Marks 4][CO6]

OR

Q.10' To get the nano finish of flat steel workpiece, select the best advanced manufacturing process, explain its procedure and its limitation

[Marks 4][CO6]

Total No. of Pages _02

5th SEMESTER

Roll No..... 484

Course: B.Tech.(EVN)

END SEMESTER EXAMINATION NOV-2022

CME-361, Industrial Engineering

Time: 3:00 Hours

Max. Marks : 50

Note: Answer ANY FIVE questions.
Assume suitable missing data, if any.

1. (a) Discuss the factors considered for selection of production systems. Differentiate between Mass production and Continuous production Systems.
   (b) What are the reasons for poor productivity and what are the remedies? [5+5](CO1)

2. (a) Discuss the application of flow process chart with a neat sketch. How does it differ from operation process chart?

   (b) The Metro Food Services Company conducted a time study for 10 cycles of a job assembling ham and cheese sandwiches, which we will consider to be a sample. The average cycle time for the job was 0.381 minute for 10 cycles. The standard deviation of the sample was 0.04 minute. Determine the number of cycles for a time study such that it can be 98% confident that the average time computed from the time study is within 3% of the true average cycle time. (Z at 98% = 2.08). [5+5](CO2)

3. (a) What is a rout-sheet? Discuss the information required to prepare a rout-sheet.

   (b) Arrange the four jobs on five machines using Johnson rule as per given processing times on the different machines in minutes: [5+5](CO3)

Jobs	M/C 1	M/C 2	M/C 3	M/C 4	M/C 5
A	8	6	3	4	10
B	7	7	5	6	11
C	6	5	6	7	9
D	9	4	4	3	7

4. (a) What is process capability? Write the steps to find the process capability index.

(b) The relative humidity in a greenhouse is expected to be between 65 and 85%. Random samples taken over a span of one week yield the following values: 60, 78, 70, 84, 81, 80, 85, 60, 88, 75. Find and interpret the process capability index. [5+5](CO4)

5. (a) Discuss the different phases of Bath-tub curve. Also, differentiate MTTF and MTBF.

(b) Twenty machines have been operated for 100 hours. One machine fails in 60 hours and another fails in 80 hours. What is MTBF and what will be reliability at 500 hours and 800 hours? [5+5](CO5)

7. Write short notes on the following: [4×2.5=10] [5+5](CO6)

(e) Partial productivity and Total productivity
(f) SIMO chart
(g) High level and Low level Redundancy
(h) Objectives of material handling devices

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7TH SEMESTER B.Tech Part Time [ME]

END SEMESTER EXAMINATION Nov-2022

CME403 & Machine Design

Time: 3:00 Hours Max. Marks : 40

Note : Answer any five questions.
All questions carry equal marks. Assume suitable missing data, if any. Design Data H/Book is allowed.

Q.1 [a]Explain the procedure for selection of factor of safety for a piston of an IC engine. [2]CO-1

[b]What are different types of variable stresses? [2]CO-1

[c] Define stress concentration. How localised stresses in machine component be avoided? Explain with diagrams. [1]CO-3

[d]Explain the type of fit with applications : (i) 50H8h8 and (ii) 40H7x6 [2]CO-1

[e]Show that a hollow shaft is stronger than a solid shaft for the same length and weight. [1] CO-4

Q.2 A shaft is supported by two bearings 1m apart. A 600mm diameter pulley is mounted at a distance of 300mm to the right of left hand side bearing and drives a pulley directly below it with the help of a belt having a belt tension of 2.25kN. Another pulley 400mm in diameter is placed 200mm to the left of right hand side bearing and is driven with the help of an electric motor using a belt drive, which is placed horizontally to the right side of the shaft. The angle of contact for both the pulleys is 180° and a coefficient of friction 0.24. Determine the suitable diameter of solid shaft, allowing working stress of 60MPa in tension and 40MPa in shear for the shaft material. Assume that the torque on one pulley is equal to the other pulley. [8]CO-4

Q.3 A machine member with circular cross section made of AISI1020 steel (permissible tensile stress of 150MPa and Poisson's ratio 0.3) is subjected to an axial pull of 40kN and a shear load of 10kN. Determine the diameter of the member according to (i) Max. normal stress theory (ii) Max Shear stress theory (iii) Distortion energy theory. [8]CO-2

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Q.4 Design a simple cotter joint for an axial load of 100kN. Assume that all the parts are made of same material with permissible stresses of 70MPa, 50MPa and 90MPa in tension, shear and compression respectively. [8]CO-3

Q.5 A pair of straight teeth spur gears, having 20° involute full depth teeth is to transmit 12 kW at 300 r.p.m. of the pinion. The speed ratio is 3 : 1. The allowable static stresses for gear of cast iron and pinion of steel are 60 MPa and 105 MPa respectively. Assume the following: Number of teeth of pinion = 16; Face width = 14 times module; Velocity factor (C_v) = 4.5/(4.5 + v), v being the pitch line velocity in m/s. Determine the module, face width and pitch diameter of gears. Check the gears for wear; given, σ_{es} = 600 MPa; E_P = 200 GPa and E_G = 100 GPa. [8]CO-6

Or

Design a screw and nut with square threads for a vertical screw jack on strength basis to raise or lower a load of 4kN to a safe height of 250mm. Assume that screw is made of AISI1035 steel with permissible stresses of 100MPa, 50MPa and 75MPa in compression, shear and tension respectively. Nut is made of Phosphor Bronze with permissible stresses of 40MPa in shear and 50MPa in tension. Let the bearing pressure between screw and nut is 14MPa and a static friction of 0.15 at nut screw interface and collar- screw interface. [8]CO-5

Q.6 Design a rigid flange coupling for transmission of 30kW from a motor to a centrifugal pump at 1448rpm. The following data is given: Diameter of motor shaft=38mm, Diameter of pump shaft=30mm, No. Of bolts=6nos. Allowable Shear stress for the bolts, keys and shaft=55MPa, Allowable shear stress for the flanges=12MPa. Assume crushing stress twice the shearing stress in all cases. [8]CO-6

Q.7 Design a triple riveted butt joint with chain fashion with five rivets in one pitch length and with double cover plates of equal widths for a boiler drum of diameter ϕ1450mm and internal pressure of 1.5MPa. The allowable tensile stress, compressive stress and shearing stress of the steel used are 75MPa, 100MPa and 58MPa respectively. The efficiency of the joint should not be less than 75%. Assume that the boiler plate and rivets are made of the same steel. [8]CO-5

Total No of Pages...Two.....

Roll No.....

Seventh Semester

B Tech (P/T) [Mech. Engg.]

End Semester Examination

(November – 2022)

CME - 407

Mechatronics

Paper Code

Title of the Subject

Time: 03 Hrs.

Max Marks. 40

Note : In total attempt Five Questions.
Question No. 1 is Compulsory.
Attempt four Questions more from the rest of the Question Paper.
Assume missing data, if any.

Q No 1	Differentiate between. (a) – Sensitivity and Resolution (b) – Analogue and Digital signal (c) – Direction and Pressure control valves (d) – Static and dynamic characteristics	(2x4=08) CO1
Q No 2(a)	Describe any two sensors used for Temperature measurement. Also mention their principle and working in brief.	(4) CO1
Q No 2(b)	What is Strain gauge? Explain how it is used in Measurement with example in brief.	(4) CO3
Q No 3(a)	What is Signal Conditioning? Also mention various types of Signal conditioning processes in brief.	(4) CO2
Q No 3(b)	What is Digital Logic? What are various Logic gates used in Mechatronic systems?	(4) CO2
Q No 4(a)	Describe various types of Hydraulic and Pneumatic actuation systems in brief.	(4) CO4
Q No 4(b)	What do you understand by Valve symbols? How a 2/2 valve will be shown?	(4) CO2

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Q No 5(a) What do you understand by Drift? Also explain its types in brief. (4)

Q No 5(a) Giving examples, differentiate between Open and Close loop control. (4)

Q No 6(a) Describe various types of data display systems in brief.

Q No 6(b) How Piezoelectric materials are being used for Actuation in Mechatronic systems? Explain with some examples.

Q No 7(a) What are different type of motors used in Electrical Actuation system? Mention their principle of operation and applications in brief.

Q No 7(b) Discuss about the Advanced trends in Mechatronics systems in brief.

Q No 8 Write short note on any two of the following.

(a) – Shape Memory Alloy (b) – Electrical Switches

(c) – Dynamic characteristics (d) – PLC

Total no. of Pages: 01 Roll no.....

VIIIth SEMESTER
B.Tech. (Evening)

END TERM EXAMINATION Nov/Dec-2022

CME-411 Combustion Generated Pollution

Time: 03:00 Hours Max. Marks: 40

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1a Discuss fuel economy and CO_2 regulations. [8][CO#1]

OR

Q.1b Explain briefly various emission standards for light duty vehicles. [8][CO#1]

Q.2a What do you mean by the term alternative fuels? Explain the effect of alcohol fuels on regulated and unregulated emissions as compared to gasoline. [4][CO#2]

Q.2b Propane (C_3H_8) is burned with 75 percent excess air during a combustion process. Assuming complete combustion, determine the air–fuel ratio. [4] [CO#2]

Q.3a The heat of combustion of napthalene, $C_{10}H_8$, at constant volume at 25°C was found to be −5133 kJ mol−1. Calculate the value of enthalpy change at constant pressure at the same temperature. [4][CO#3]

Q.3b What are various advantages and disadvantages of alcohol motor fuel compared to gasoline and diesel. [4] [CO#3]

Q.4 A diesel engine is operating at overall f =0.6. Taking diesel fuel as $(CH_2)_n$ and the combustion gas temperature and pressure as 2200 K and 60 atm calculate the initial oxidation rate of soot particle and the reaction constants as given for the NS-C mechanism. Estimate the period during which a soot particle of 50 nm diameter would get completely oxidized. [8][CO#4]

OR

Q.4 Explain various effects of reduction in compression ratio on SI engine emissions. Explain with a neat sketch. [8] [CO#4]

Q.5 Explain working of Exhaust gas recirculation system with a detailed diagram. [8][CO#5]

OR

Q.5 Explain the working of evaporative emission control system for a PFI engine with a detailed diagram. [8][CO#5]

Total no. of Pages: 02 ~~2 3~~ Roll no..... 471

1st SEMESTER

B.Tech. [Evo.]

END TERM EXAMINATION *Nov/Dec-2022*

CCE101 Civil Engineering Basic and Applications

Time: 3:00 Hours *Max. Marks: 40*

Note : Answer any FIVE.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a) What is binder? State the different components of cement along with their chemical composition? [4][CO1]

b) List the factors that need to be considered for the selection of good building materials? [4][CO2]

Q.2 a) Describe the geological classification of rocks? Explain any one of them. [4][CO2]

b) What do you understand by weathering of rock? Explain in details. [4][CO3]

Q.3 Differentiate between: [2x4][CO2-CO4]

(a) Fine aggregate and coarse aggregate
(b) Lime mortar and cement mortar
(c) English bond and Flemish bond
(d) Partition wall and cavity wall

Q.4 a) What is foundation? List the type of foundation. Explain any one of them with neat diagram. [4][CO5]

b) What is mix design? What are the properties of good aggregate need to be considered for concrete preparation? [4][CO6]

Q.5 a) What is mineral? Explain the physical properties of mineral?

b) Explain the desirable qualities of soil required for manufacturing of bricks? [4+4][CO4-CO5

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Q.6 Write short note: [4+4][CO3-CO6]

a) Loads on building

b) Design criteria of building construction

c) Raft foundation

d) Concrete admixtures

Roll No 4973

Nov-Dec 2022

B.Tech (Continuing Education)

END TERM EXAMINATION

CCE103 (Engineering Analysis and Design)

Time 3:00 Hours

Max Marks 50

- The question paper has Section 'A' and Section 'B', which are required to be attempted on separate answer sheet.
- Make necessary assumptions wherever required and clearly state them. Any data, if not given, may be assumed appropriately and stated clearly.

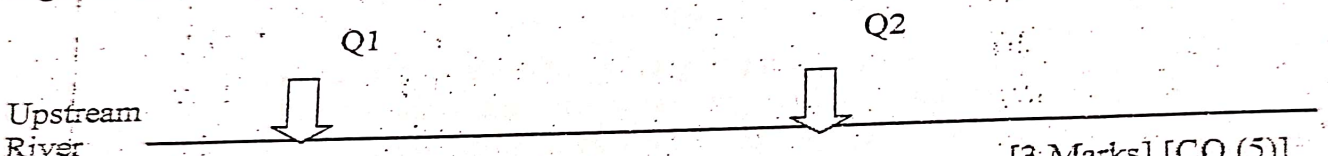
Section 'A'	The QNo1 is compulsory. Attempt 2 more questions from this section
Section 'B'	QNo 5 is compulsory and attempt 2 more question from this section

Section A

Q1. Explain the following:

(a) Concept of "whole to part" with relevant example [3 Marks] [CO (6)]

(b) Draw the likely profile of D.O in a river having two pollutant sources Q1 & Q2 having significant Bod (without any computations) The upstream river has D.O of 8 mg/L



[3 Marks] [CO (5)]

(c) Scheme of water treatment for raw water having turbidity 15 mg/L and MPN of 500, and all other parameters are within prescribed standards [3 Marks] [CO (5)]

Q2. Calculate the velocity of flow, and discharge in a sewer of circular section having diameter of 0.75 m, laid at a gradient of 1 in 600. Use Mannings formula taking N = 0.012. Assume that the sewer is running half full.

[8 Marks] [CO (3)]

Q3. Draw a sketch of any one wastewater treatment system with details of raw wastewater quality and expected parameters in the treated effluent. Also explain the details of operations and concept of the treatment system.

[8 Marks] [CO (5)]

Q4 Explain any two of the following

(i) Drawing of Contours from the RL data of several points in a terrain

(ii) Measurement of angles of triangle and adjustment for error

(iii) Three point problem statement and the situations where the need of solving it arises during plane table survey.

[4+4=8 Marks] [CO (6)]

Section B

Q.5 Answer the following:

(a) How the codal provisions are evolving worldwide using local and global engineering practices, analysis, and parameters of design?

[3 Marks] [CO (1-6)]

(b) How do the determinacy and indeterminacy influence analysis and design of engineering systems? [3 Marks] [CO (1, 2, 4)]

c) How the contribution of engineering analysis and design parameters of the paved surfaces in the development of transportation networks is incorporated?

[3 Marks] [CO(4)]

Q.6 (a) What is the role of engineering parameters in the development of codal provisions for the analysis and design of the foundation?

[4 Marks] [CO (2)]

(b) What is the role of index and engineering properties of soils in the analysis and design of foundations? What is the principle of the grain size analysis while using Cu=1 and Cc=3-6 into codal provisions classifying geomaterials based on their grain size?

[4 Marks] [CO (2)]

Q.7 (a) Distinguish between flexible and rigid pavements using the Indian Road Congress guidelines. [4 Marks] [CO (4)]

(b) Explain various challenges faced in the design and analysis procedure of surface and subsurface modes of transportation. What are the evolutions in codal provisions in the context of transportation networks? [4 Marks] [CO (4)]

Q.8 (a). Distinguish among one, two, and three-dimensional structural systems. Explain the analysis procedure of the aforementioned structural systems using equilibrium equations.

[4 Marks] [CO (1)]

(b) Enumerate factors affecting the design of various sustainable infrastructural projects? How do design philosophies influence the analysis and design procedure of structural members?

[4 Marks] [CO (1)]

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END TERM EXAMINATION NOV. 2022

III SEM B.Tech. (Even.) Civil Engineering

COURSE CODE: CCE201 COURSE TITLE: Mechanics of solids

TIME: 3 Hours Max. Marks: 40

Note: Attempt any Five questions. All questions carry equal marks.

1(a) Describe stress strain relationship of Mild steel with the help of a labelled sketch. Discuss how shall you compute Young's modulus of elasticity of Mild steel from this curve. M4/CO1

(b) A cantilever beam of span 'L' is loaded with a concentrated load 'P' at its free end. The flexural stiffness of the beam is 'EI'. Calculate the slope and deflection at the free end of the beam. M4/CO1

2(a) What is Modulus of rigidity? Explain with a neat sketch and write its expression. What is its relation to Young's modulus of elasticity? M4/CO2

(b) Draw sketches of any two statically determinate structures. Calculate kinematic indeterminacy or degree of freedom for both of them. M4/CO2

3(a) Write two statements of Mohr Area theorems. M4/CO3

(b) Write a stress matrix (stress tensor) with a neat sketch. Show various stress components in it. Discuss how many stress components are needed to define state of stress at a point. M4/CO3

4(a) Describe Conjugate beam method of analysis of beams. M4/CO4

(b) What do you understand by moving loads? How these are different from static loads? Describe any two different types of moving loads considered to model actual moving loads. M4/CO4

5(a) Draw a Shear force diagram for getting maximum shear force generated by a moving point load 'W' at a section 'C' in a simply supported beam 'AB'. The section is at a distance 'x' from left hand support 'A' and the span of the beam is 'L'. M4/CO5

(b) Draw shear force and bending moment diagrams for a simply supported beam subjected to a uniformly distributed load of intensity 'w' KN per m length. The UDL is subjected to full span 'L' of the beam. M4/CO5

6 Write short notes on any two of the following topics. M8/CO6

(a) Poisson's ratio

(b) Temperature stresses

(c) Hooke's law

TOTAL NUMBER OF PAGES: 01

M96

ROLL NO- .....

SECOND SEMISTER
B.TECH

END TERM EXAMINATION
Dec-2022

COURSE CODE:- CCE 203 COURSE TITLE:- ENGINEERING SURVEY

TIME ALLOWED:- 3:00 Hours Maximum marks: 40

NOTE:- 1. Attempt any five.
2.All questions carry equal marks.
3. Assume suitable data, if missing.

1. (a) What are the error induced in the theodolite survey?
(b)The Length of line measured with a chain was found to be 250 m if the length of line was measured with 30 m chain and the chain was short find the true length of the line. [8][CO1]
2. (a) Define magnetic bearing and true bearing .
(b) magnetic bearing of a line is found as 35°45'E .if the declination is 3°45'E,then the true bearing. [8][CO2]
© Define latitude and Departure and method to correct closing error.
3. In an aerial photography , the size of photograph is 30cm*20cm,with end to end overlap 40% and side to side overlap is 30%.if the scale of photo is 1cm:500m the calculate total number of photograph required to cover ground of size 120km*70km [8][CO3]
4. (a) What is plane table survey and explain all the method of plane table surveyig.
(b) Define contour surveying with the help of diagram and explain all the method of contouring. [8][CO2]
5. (a) Explain the following terms in the context of survey
(1) Least count (2) closing error (3) Arithmetic check
(4) Local attraction (5) Whole to part. [8][CO1]
(b) Differentiate between Prismatic and surveyor compass.

6. The following offset were taken from a chain line to a regular boundary line at an interval of 10m:
0, 2.50, 3.50, 5.00, 4.60, 3.20, 0m
Compute the area between the chain line, the irregular boundary line and end of the offset by:
(a) Simpson's rule
(b) The trapezoidal rule. [8][CO2]

Total no. of pages: 03

Roll No.....

3rd SEMESTER
B. TECH (EVENING)

END EXAMINATION

Nov/Dec-2022

CCE-205 SOIL MECHANICS

TIME: 03 Hr

MAX MARKS: 40

NOTE: ATTEMPT ALL QUESTIONS.ASSUME THE MISSING DATA IF ANY.USE OF SEMI LOG PAPER IS PERMITTED.

1. Attempt any <u>two</u> questions.

a. An earth embankment is to be compacted to a dry unit weight of 18.4 kN/m^3 at a placement water content of 16%. The in-situ dry density and water content in the borrow pit are 16.5 kN/m^3 and 8.5% respectively. How much excavation should be carried out in the borrow pit for each cubic meter of embankment. (4) (CO-3)

b. For a field pumping test, a well was sunk through a horizontal stratum of sand 14.5 m thick and underlain by a clay stratum. Two observation wells were sunk at horizontal distances of 16m and 34m respectively from the pumping well. The initial position of the water table was 2.2m below ground level. At a steady-state pumping rate of 950 litres/min, the drawdowns in the observation wells were found to be 2.45 m and 1.20 m respectively. Calculate the coefficient of permeability of the sand. (4)(CO-2)

c. How permeability of silty clay is determined in the laboratory. (4)(CO-2)

2. Attempt any <u>two</u> questions.

a. An earth dam is of trapezoidal section having following dimensions- The length of filter is 30 m, top width of dam is 6 m, Water level in upstream is 18 m above the base, Free board is 2 m, U/S slope = 4 :1 and D/S slope = 3: 1. Total base of dam = 146 m. If K = 7 x 10^{-4} cm/sec. Find seepage discharge per unit length of dam. Draw the phreatic line also. (4)(CO-3)

b. Explain quick sand phenomena. Why sheet piles are provided beneath the earthen dam. (4)(CO-3)

c. Define equi-potential function and flow function. What are the applications of flow net. Discuss any one application in details. (4) (CO-3)

3. Attempt any two questions.

a. A sand deposit is 8 m thick and overlies a bed of soft clay. The ground water table is 3 m below the ground surface. If the sand above the ground level has a degree of saturation of 40%, plot the variation of total stress, pore pressure and effective stress. The void ratio of the sand is 0.65. Assume specific gravity as 2.68. (4) (CO-2)

b. A flag pole is producing a concentrated load 100 kN which acts on the surface of a soil mass. Using Boussinesq's analysis find the vertical stress at points (i) 2.5 m below the surface on the axis of loading and (ii) at radial distance of 3 m from axis of loading but at same depth of 2.5m. (4) (CO-4)

c. What is frost action? How it can be prevented? (4) (CO-2)

4. Attempt any two questions.

a. What are the assumptions of Terzaghi's one dimensional theory of consolidation? Justify the answer. (4) (CO-5)

b. Differentiate NCC and OCC.

In a consolidation test on undisturbed clay specimen, following results are tabulated-

Effective stress (kN/m²)	Void ratio
20	0.953
40	0.948
80	0.938
160	0.920
320	0.878
640	0.798
1280	0.691
320	0.719
80	0.754
20	0.791
0	0.890

Plot the curve between void ratio vs log of effective stress. Estimate the pre consolidation pressure. (4) (CO-5)

c. A homogeneous clay layer layer 9 m thick is expected to have an ultimate settlement of 330 mm. After a time, span of 3.5 years, the average settlement was measured to be 155 mm. How much longer will it take for the average settlement to attain 235 mm. (4) (CO-5)

5. Attempt any two questions.

a. What is shear strength of the soil. Explain Mohr- Coulomb failure theory. Discuss the application of shear strength. (4) (CO-4)

b. The results of consolidated undrained test conducted on a saturated clay sample are as follows-

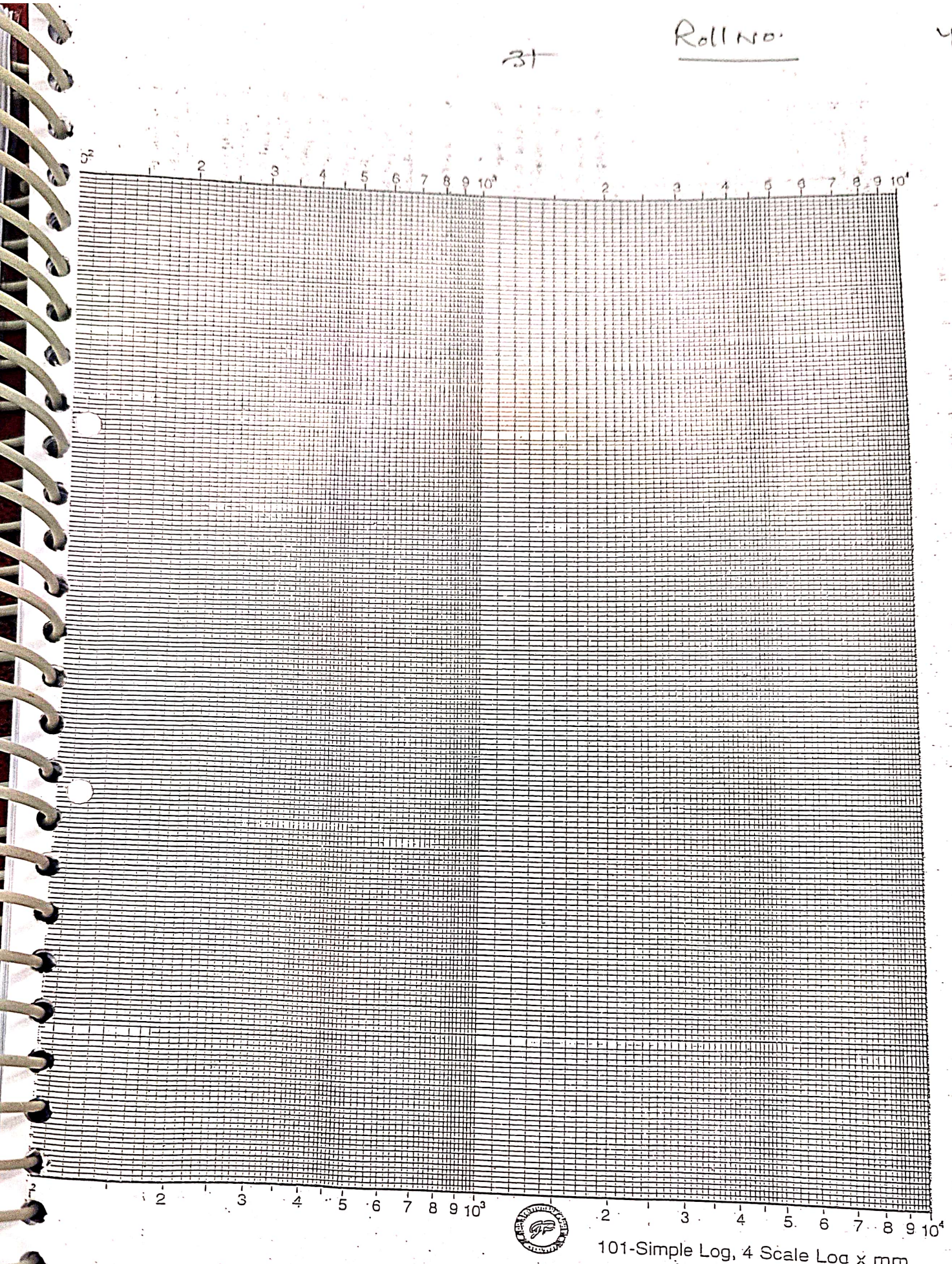
Cell pressure (kN/m²)	200	400	600
Deviator stress at failure (kN/m²)	120	242	354
Pore water pressure at failure (kN/m²)	112	222	322

Determine the shear strength parameters with respect to total stresses and effective stresses. (4) (CO-4)

c. Explain how direct shear test is conducted in the laboratory under the different drainage conditions. What are the drawbacks of the test. (4) (CO-4)

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101-Simple Log, 4 Scale Log x mm

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Total No. of Pages:03

Roll No.....

V SEMESTER

B.Tech. (Eve.)

END SEMESTER EXAMINATION

Nov./Dec.-2022

CCE-301: Analysis of Indeterminate Structures

Time: 3.00 Hours

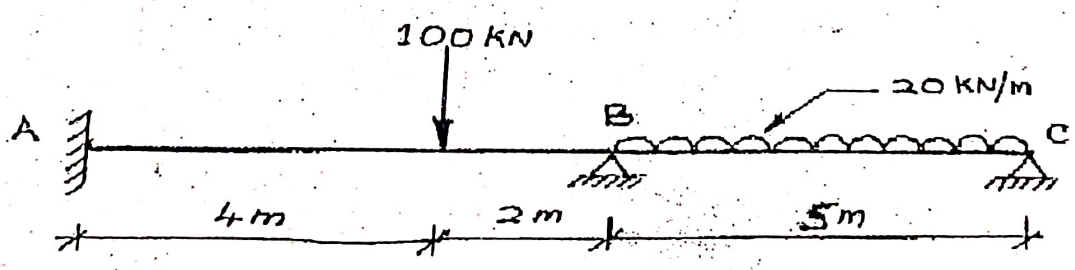
Max. Marks:50

Note: Attempt any Five questions.
All questions carry equal marks.
Assume suitable missing data, if any.

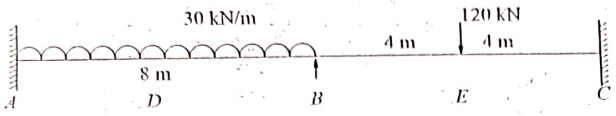
Q.1 (a) What do you mean by a fixed beam? What is a continuous or propped beam? Why is it not possible to analyses these by equations of static equilibrium? [4][CO1]

(b) Five members OA, OB, OC, OD and OE meeting at O, are hinged at A and C and fixed at B, D and E. The length of OA, OB, OC, OD and OE are 3m, 4m, 2m, 3m and 5m and their moment of inertia are 400 mm^4, 300mm^4, 200mm^4, 300mm^4 and 250mm^4 respectively. Determine the distribution factors for the members and distributed moments, when a moment of 4000kN-m is applied at O. [6][CO2]

Q.2 Analyze two span continuous beams ABC by slope deflection method. Then draw Bending moment & Shear force diagram. Take EI constant. [10][CO2]

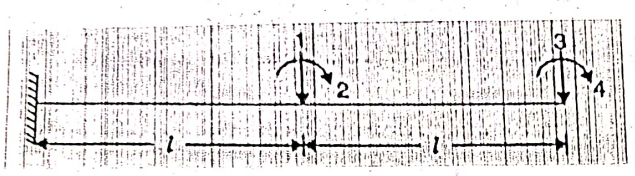


Q.3 Analyze the continuous beam by the moment distribution method. Draw the shear force diagram and bending moment diagram. [10][CO2]



Q.4 (a) Define Stiffness and Flexibility. [3][CO3]

(b)Develop the flexibility matrix for the bean shown in Figure. [7][CO3]

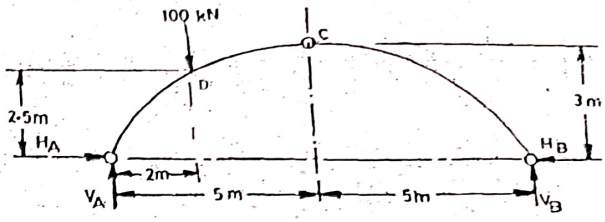


Q.5(a) Define Plastic hinge. [2][CO3]

(b) Find the shape factor of a T-section beam of flange dimension 80mmx10mm and web dimension 90mmx10mm. [8][CO3]

Q. 6(a) A fixed beam AB of 5m span carries a point load of 20kN at a distance of 2m from A. Determine the values of fixing moments. [3][CO1]

(b) A three hinged parabolic arch shown in Figure. Find the reaction at the support A and B . Find Moment at D also. [7][CO4]



Total no. of Pages: 02

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5th SEMESTER

B.Tech. [Eve.]

END TERM EXAMINATION *Nov/Dec-2022*

CCE-303 Geotechnical Engineering

Time: 3:00 Hours *Max. Marks: 40*

Note : Answer any FIVE.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a) List the different types of shallow foundation with neat diagram.

b) What is expansive soil? How do you identify the expansive soil? List the disadvantages of expansive soil. [4+4][CO1-CO2]

Q.2 a) What is bearing capacity of soil? State the assumptions made in Terzaghi's analysis on bearing capacity failures of soil. [4][CO3]

b) Discuss bearing capacity of layered soil. How ground water affects the bearing capacity of soil? [4][CO3]

Q.3 a) What is earth pressure at rest? List the assumptions of Coulomb's earth pressure theory? [4][CO4]

b)Recommend the design diagram of earth pressure for any two:
(i) Typical soil
(ii) Earth pressure on cantilever retaining wall
(iii) Earth pressure on anchored sheet pile wall [2+2][CO4]

Q.4 a) What is deep foundation? List the type of deep foundation. Explain any one of them with neat diagram. [4][CO5]

b) What is retaining wall? Explain the stability condition of retaining wall with neat diagram. [4][CO6]

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Q.5 a) List the situation where pile foundation is suitable than other type of foundations. [4][CO5]

b) Explain the criteria for deciding the location and number of test pits and bores for the construction of various civil engineering structures. [4][CO6]

Q.6 Write short note: (any two) [4+4][CO1-CO4]

a) Borelog

b) Machine foundation

c) Retaining wall

d) Surcharge loading

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Total No. of Pages 2 36 Roll No. .....

FIFTH SEMESTER **B.Tech. [Civil]**

END SEMESTER EXAMINATION

November -2022

CCE-309 Environmental Engineering Design

Time: 3 Hours *Max. Marks: 50*

Answer any four questions from Part A and Part B is compulsory

Part A

1. Find the volume of Activated sludge unit for a town having sewage flow 50×10^6 l/day. The BOD of the sewage is 100 mg/l, with the following data
   (i) 550 gram of BOD should have 1 m^3 of volume.
   (ii) The mixed liquor is maintained to have 1800 mg/l suspended solids
   (iii) BOD loading should be 50 gram per 100 gram of suspended solids
   (10 Marks) (CO4)

2. (a) Define sludge Volume Index. What is its importance in sewage treatment?
   (4 Marks) (CO4)

   (b) Design a trickling filter to treat 10 million litres per day of settled sewage having a BOD of 180 mg/l, it is desired to produce a filter effluent having BOD of 20 mg/l,. check also hydraulic loading. (6 Marks) (CO4)

3. (a) Design a rectangular grit chamber from the following data
   Flow of sewage $= 55 \times 10^6$ litres/day
   Sp. Gravity of grit = 2.7
   Size of grit particle to be removed = 0.21 mm
   Viscosity of water = 1.0×10^{-2} cm^2/s
   (6Marks) (CO2)

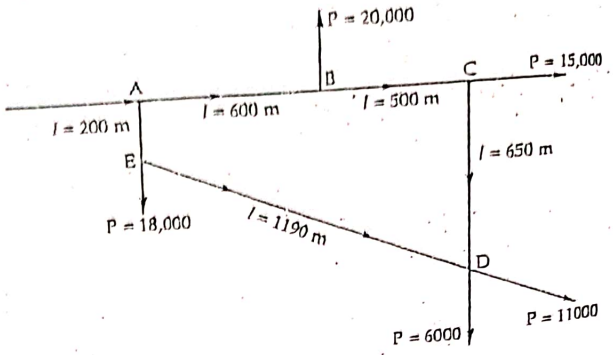
   (b) Sketch and briefly explain the conventional sequence of various unit operations in a complete municipal sewage treatment plant.
   (4 Marks) (CO3)

4. Figure shows one of the circuits of a distribution system, along with the populations (P) to be served at different points. The pressure at the start point A is 40 m head of water and the minimum pressure desired at the point D is

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20 m head of water. Design the various pipes of this circuit by assuming the per capita demand to be 180 litres/persons/day, and the peak rate of demand for the design of distribution system as 2.7 times the average.

(10 Marks) (CO5)



5. (a) Design a bell mouth canal intake for a city of 75000 persons drawing water from a canal which runs only for 10 hours a day with a depth of 1.5 m. Also calculate the head loss in the intake conduit if the treatment works are ½ km away. Draw a neat sketch of the canal Intake. Given average consumption per person = 150 l/d. Assume the velocity through the screens and bell mouth to be less than 16 cm/s and 32 cm/s respectively.

(6 Marks) (CO1

(b) Prove that the area and overflow rates rather than the detention period govern the design of settling tank. (4 marks) (CO2

Part B

1. Differentiate the following (10 Marks

(a) Sedimentation and Flocculation (CO1)

(b) Aerobic and anaerobic decomposition (CO4)

(c) Sediment and Sludge (CO3)

(d) Skimming and settling (CO4,2)

(e) Primary and secondary sedimentation (CO2,4)

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Total No. of Pages : 01 Roll No.....

THIRD SEMESTER
B.TECH -CIVIL ENGINEERING (EVENING)
END TERM EXAMINATION NOV-2022
CCE 351: Geoinformatics & its Applications
Time: 3 Hours Max. Marks : 50

Note: All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (a) What is remote sensing, an EMR and tabulate the EMR spectrum [5]

(b) Define PAN, Multispectral, Thermal, Hyperspectral and ultraspectral ? [5]

Q.2 (a) What are different types of, platforms, resolutions and the implications [5]

(b) Discuss energy interactions in atmosphere and on earth's surface [5]

Q.3 (a) What are the major feature of a remote sensing satellite systems [5]

(b) What is registration and different types of errors and their corrections [5]

Q.4 (a) Explain full pixel, sub-pixel, and mixed pixels targets using a diagram [5]

(b) Explain with example how to find proportions of classes in a mixed pixel [5]

Q.5 (a) What is Reflectance, spectra and spectral reflectance curve and applications [5]

(b) Differential between actual and an ideal remote sensing system [5]

Total no. of Pages 02

Roll no.....

7th SEMESTER

B.Tech. [Evening]

Nov/ Dec-2022

END TERM EXAMINATION

CCE401 Design of Steel Structures

Time: 3:00 Hours

Max. Marks: 40

Note: 1. Attempt any five questions. Use of IS: 800 & Steel Table is permitted.
2. Marks of the questions are mentioned opposite to them.
3. Assume suitable missing data, if any.

Given: Yield strength, $f_y = 250$ N/mm^2 and ultimate strength, $f_u = 410$ mm^2.

1. Design a double plate web connection at the end of a beam ISLB350 used on 8 m span and carrying a total uniformly distributed load of 300 kN. The beam is to be connected with flange of ISHB200 @ 40 kg/m. [8] [CO1]

2. Design the slab base of a column, consisting of one ISHB250 @ 64.96 kg/m with two cover plates 300 mm X 25 mm and carrying an axial load of 2340 kN. The column is to be supported on a concrete pedestal. The characteristic strength of concrete is 20 N/mm^2. [8] [CO2]

3. A beam of 7 m effective span, carries a uniformly distributed load of 25 kN/m including its own weight. Design the beam using conventional rolled steel sections assuming design strengths and deflection criteria according to IS: 800-2007. The compression flange is held throughout the span against lateral displacement [8] [CO3]

4. Design the web splice of a plate girder at the section, where working shear force and working bending moments are 100 kN and 1500 kNm respectively. Moment of inertia of complete section is 635000 cm^4. Web plate 1000 mm x 10 mm size and each flange consists of 2 ISA 100 mm X 100 mm X 12 mm and two plates of 300 width each with thicknesses 10 mm (outer) and 12 mm(inner). [8] [CO4]

5. A rectangular pressed steel tank of 7.50 m x 6.25 m x 2.50 m size to be constructed at Delhi, which has to be supported at 9 m above ground. Orientation of stays should be shown and size of plates along with stays should also be determined. [8] [CO5]

6. Design a main strut of a truss subjected to factored compression load of 16.80 due to dead and live loads. This is also subjected to factored tension of 31.00 kN under wind load. The length of the member is 251 cm. [8 [CO5]

VIIth-SEMESTER

B. Tech.[Eve.][Civil Engineering]

End Term Examination (November 2022)

Course Code CCE-403 Course Title: Water Resources Engineering

Time: 3:00 Hours Max. Marks: 40

NOTE: All questions are compulsory
All questions carry equal marks
Assume suitable missing data, if any

1. (a) Compare the surface and sub-surface irrigation methods. [2][CO-1]

(b). A water course has a culturable commanded area of 1200 hectares. The intensity of irrigation for crop A is 40% and for B is 35%, both the crops being Rabi crops. Crop A has a kor period of 20 days, and crop B has a kor period of 15 days. Calculate the discharge of the watercourse if the kor depth for A is 10 cm and for B is 16 cm. [6][CO-1]

Or

(b). A channel section has to be designed for the following data:

Discharge Q = 30 cumecs

Silt factor f =1.0

Side slope = $\frac{1}{2}$: 1

Find also the longitudinal slope. [6][CO-1]

2. (a) Explain the different types of falls used in regulation works with neat sketches. [4][CO-2]

(b) What is the necessity of cross drainage structures, and describe with neat sketches. [4][CO-2]

3. (a) Distinguish clearly between a weir and a barrage. [2][CO-3]

(b) Explain, with the help of a diagram, the various component parts, along with their function of a diversion headwork. [6][CO-3]

Or

5(b

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3. A dam 6 m high and 1.5 m wide at the top has a vertical water face. Find the base width of the dam if no tension is to develop. Take the unit weight of masonry as 20kN/m^3 and c =1. Investigate the stability of the above dam if the coefficient of friction is 0.6 and the maximum allowable compressive stress is 1800 kN/m^2. [8][CO-3]

4. (a) What is the hydrograph, and explain the factors that affect the runoff? [2][CO-4]

(b) The average annual rainfall in cm at 4 existing rain gauge stations in a basin are 105, 79, 70, and 66. If the average depth of rainfall over the basin is to be estimated within 10 % error, determine the additional number of gauges needed. [6][CO-4]

5. (a) What do you understand by the precipitation (rainfall)? Explain various types of precipitation. [4][CO-4]

(b) Draw a single peaked hydrograph and explain its components with neat sketches. [4][CO-4]

Or

(b) Explain the following terms briefly: [4][CO-5]

(i) Aquifer (ii) Aquiclude (iii) Aquifuge (iv) Specific yield

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Roll Number .....

B.TECH.EVE (CIVIL) VII SEMESTER Nov/Dec-2022

END TERM EXAMINATION

CCE411: TRANSPORTATION SAFETY AND ENVIRONMENT

Duration: 3:00 Hr *Max. Marks: 50*

Note: Attempt all questions.
All questions carry equal marks.
Assume suitable missing data, if required.

Q.1 Discuss the factors that cause road accidents and also give their remedial measures. [CO4:10]

Q.2 What are the different types of friction coefficients and their usage? A car skids to stop on a road leaving four skid marks under its four wheels, with an average length of skid marks as 40 m. Friction tests reveal a drag factor of 0.7 for the pavement surface. Estimate speed of the car. [CO3:10]

Q.3 Describe the benefits of Road Safety Audit. Discuss different stages of road safety audit. [CO2:10]

Q.4 Explain various traffic noise parameters. How they are determined? Also give the Noise Level Standards which are applicable in India. [CO2:10]

Q.5 Write short notes on any two of the following: [CO1:5+5]
a) Gaseous pollutant dispersion model
b) Requirements of EIS
c) Advantages of EMP

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Roll no.....

Total no. of Pages: 02

Fifth Semester
B.Tech.

Nov/Dec-2022

End Term Examination

CCE-419 Advance Transportation Engineering

Time: 03 hrs **Marks: 50**

Attempt any five questions. Draw neat and labelled diagrams wherever necessary. Assume suitable missing data

Q.1 (a) Describe various modes of Transport and criteria for their choice. [5] [CO1]

Q.1 (b) Discuss Goals and Objectives of Transport Planning process. [5] [CO1]

Q.2(a) Mention stages in Transport Planning Process [5] [CO2]

Q.2(b) Explain in brief various types of surveys which needs to be carried out for Transportation Planning [5] [CO2]

Q.3 (a) Draw a sketch of flexible pavement cross section and show the component parts. Enumerate the functions and importance of each component of the pavement. [5] [CO3]

Q.3 (b) What are the various factors to be considered in pavement design? Discuss the significance of each. [5] [CO3]

Q.4 (a) Discuss the importance of gross wheel load and contact pressure in stress distribution pattern and in pavement design. [5] [CO4]

Q.4 (b) Explain ESWL and its concept in determination of equivalent load. [5] [CO4]

Q.6 (b) The loaded weight on rear pairs of a truck is 4100 Kg, There are two pairs of dual wheels, The centre to centre spacing and clear space in dual wheels is 30 cm and 10 cm respectively. Calculate ESWL for pavement thickness of (i) 20 cm (ii) 40 cm (iii) 70 cm [5] [CO4]

Q. 7(a) Explain Group Index Method of pavement design. What are the limitations of this method. [5] [CO4]

Q. 7(b) Estimate the thickness of cement concrete pavement using the method suggested by Indian Roads Congress [5] [CO4]

Modulus of elasticity of concrete = 3.0 x 105 Kg/cm²
Modulus of rupture of concrete = 50 Kg/cm²
Design factor of safety = 2.0
Poisson's ratio of concrete = 0.15
Modulus of subgrade reaction = 6 Kg/cm²
Wheel Load = 4100 Kg
Radius of contact area = 15 cm

Q.8(a) How is the cost of Highways analysed? [5] [CO5]

Q.8(b) Explain briefly various factors affecting vehicle operation costs. [5] [CO5]

Total no. of pages: 01 ~~46~~ Roll No.....

FIRST SEMESTER

B.Tech. (Evo)

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END TERM EXAMINATION Nov/Dec-2022

CEC 105 BASIC ELECTRONICS & INSTRUMENTATION

Time: 3 Hours Max. Marks: 40

Note : All questions are compulsory.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (a) Explain with a neat circuit diagram, the working of transistor in Common Base configuration. Explain the four parameters with equations. [5M][CO2]

(b) Derive the relations between α, β and γ [5M][CO2]

Q.2 (a) State the ideal characteristics of Operational Amplifier [5M][CO3]

(b) Explain the working of Operational amplifier with equations as (i) three input adder (ii) integrator (iii) Non-Inverting amplifier [5M][CO3]

Q.3 (a) Simplify the Boolean expression using K-map and implement with basic gates

$F(A, B, C, D) = \sum (0,2,4,5,6,7,8,10,13,15)$ [4M][CO3]

(b) Simplify the Boolean Expression using postulates

$AB + ABD + ABD + ACD + ABC$ [2M][CO3]

(c) Implement the following Boolean function with 8×1 multiplexer

$F(A, B, C, D) = \sum (0, 1, 3, 4, 8, 9, 15)$ [4M][CO3]

Q.4 (a) Explain the working of CRO in detail the measurements with a neat block diagram [5M][CO4]

(b) Explain transducer and differentiate between inductive and capacitive transducers [5M][CO4]

Total no. of pages: 2 Roll no.....

3rd SEMESTER, B.Tech. (Eve)

END TERM EXAMINATION (Nov/Dec-2022)

CEC-201 : ANALOG ELECTRONICS-II

Time: 03:00 Hours Max. Marks: 40

Note : Assume suitable missing data, if any.

Q.1 (a) With the help of a neat circuit diagram explain the working of Colpitt's oscillator. Design the Colpitt's oscillator so that the oscillating frequency is $f_o = 150$ kHz. [8][CO3]

or

(a) With the help of a neat circuit diagram explain the working of Hartley oscillator. Design the Hartley oscillator so that the oscillating frequency is $f_o = 150$ kHz. [8][CO3]

Q.2 (a) The feedback factor (β) of a closed-loop amplifier is 0.8. The open-loop gain is expressed as

$$A(s) = \frac{250}{1 + s/(2\pi \times 100)}$$

Determine (i) the closed-loop low-frequency gain A_f, (ii) The closed-loop bandwidth BW_f, and (iii) The gain-bandwidth product GBW. [3][CO2]

(b) The open-loop gain (A) and the closed-loop gain (A_f) of a closed-loop amplifier are 100 and 5, respectively. Find the percentage change in A_f, if A is increased by 10%. [2][CO2]

(c) Derive the expression of input and output resistances with feedback in Series-Shunt feedback amplifier topology. [3][CO2]

Q.3 (a) Explain the construction and working of a complementary class B push-pull power amplifier. What are the advantages and disadvantages of a class B amplifier? [6][CO4]

(b) Derive the expression for maximum efficiency of a class A power amplifier? [2][CO4]

Q.4 (a) Define gain and phase margin. [2][CO2]

(b) Figure 1 shows the bode plot of an amplifier. Find the gain and phase margin from the given bode plot.

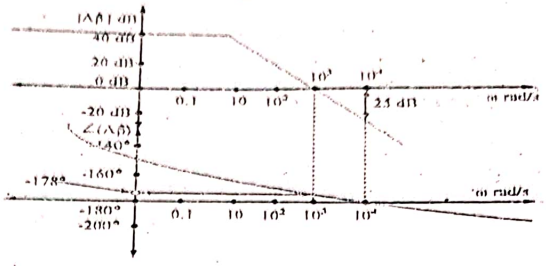


Figure 1

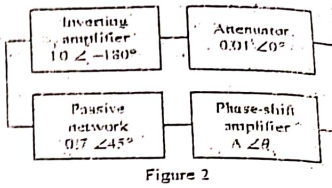


Figure 2

[2][CO2]

(c) Explain the Barkhausen criterion for oscillations? [2][CO3]

(d) For the circuit in Figure 2, determine the values of A and θ that will produce a steady-state sinusoidal oscillation. [2][CO3]

Q.5 (a) Describe the steps involved in the fabrication of a monolithic IC. [4][CO5]

(b) It is provided that the higher cut-off frequency of an individual CE-configured amplifier is 250 kHz, find the net higher cut-off frequency of a cascaded network consisting of 4 similar amplifiers.

[2][CO1]

(c) Explain the effects of negative feedback on amplifiers.

[2][CO2]

Total no. of Pages: 01 Roll no..... 517

3rd SEMESTER
B.Tech. (Evo.)

END TERM EXAMINATION Nov/Dec-2022

CEC 203 Digital Design II

Time: 03:00 Hours Max. Marks: 40

Note: All questions carry equal marks. Answer any five questions. Assume suitable missing data, if any.

Q.1 (a) Discuss the process statement in behavioural modelling. [4] [CO1]

(b) Explain data objects and its declaration in VHDL with example. [4] [CO1]

Q.2 (a) What is pulse mode sequential circuit? How the erratic behaviour can be avoided? [4] [CO2]

(b) Design a pulse mode circuit represented by the following state table

PS	NS Z(o/p)	
	X_2	X1
A	A	B
B	C	B
C	D	B
D	A, Z=1	B

[4] [CO2]

Q.3 Design a serial parity bit generator, which generates an even parity bit for the message of three bits. Use implication chart method for state reduction. [8] [CO3]

Q.4 (a) Discuss state 1 hazard and dynamic hazard with example. [4] [CO3]

(b) Explain briefly about races and cycles. [4] [CO3]

Q.5 (a) Implement a full subtractor circuit by using PAL. [4] [CO4]

(b) Explain FPGA and ASIC. [4] [CO4]

Q.6 (a) What is ASM? Differentiate with flow chart. [4] [CO5]

(b) What is microprograming in ASM designing? [4] [CO5]

Total no. of Pages: 2

Roll no.....

5th SEMESTER

B.Tech. (Eve)

END TERM EXAMINATION *Nov/Dec-2022*

CEC-301 DIGITAL SIGNAL PROCESSING

Time: 03:00 Hours *Max. Marks: 40*

Note : All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 The desired frequency response of low pass filter is given by

$$H_d(e^{j\omega}) = \begin{cases} e^{-j2\omega} & 0 \le |\omega| \le \frac{\pi}{2} \\ 0 & \frac{\pi}{2} \le |\omega| \le \pi \end{cases}$$

Design a linear-phase FIR low pass filter using Hamming window for M=5. [M=8][CO4]

Q.2 (a) Discuss the comparison between impulse invariant and bilinear transformation methods for infinite impulse response filter design. [M=2][CO5]

(b) Design a digital filter using impulse invariant method from analog filter whose transfer function is given by

$$H(s) = \frac{s + 0.3}{(s + 0.3)^2 + 16}$$

Assume T=1s [M=5][CO5]

Q.3 Draw the lattice-ladder structure for pole-zero IIR system described as [M=8][CO3]

$$H(z) = \frac{1 + 2z^{-1} + 2z^{-2} + z^{-3}}{1 + \frac{13}{24}z^{-1} + \frac{5}{8}z^{-2} + \frac{1}{3}z^{-3}}$$

Q.4 (a) Determine the Impulse response and direct form coefficients of an FIR lattice filter with parameters $K_1 = 0.6$, $K_2 = 0.3$, $K_3 = 0.5$, and $K_4 = 0.9$. Also draw the direct form and lattice all zero filter for the given parameters. [M=5][CO3]

(b) Discuss the comparison between finite impulse response and for infinite impulse response filter. [M=2][CO3]

Q.5 Perform 4-point circular convolution of the two given sequences $h_1(n) = \{1, 2, 3\}$ and $h_2(n) = \{1, 2, 3, 4\}$ using analytical method. [M=4][CO2]

Q.6 State and verify convolution property of DFT. [M=2][CO1]

Q.7 Find the inverse DFT of the given $X(k)=\{1, 2, 3, 4\}$ using DIF-FFT algorithm. [M=4][CO2]

Total no. of Pages:2

Roll no. .....

FIFTH_SEMESTER

B.Tech. (Eve)

END TERM EXAMINATION

Nov/Dec-2022

CEC-313-MICROPROCESSOR & INTERFACING

Time: 03:00 Hours

Max. Marks: 40

Note : All questions carry equal marks. Attempt Eight (8) questions in all. Assume suitable missing data, if any.

Q.1 Explain the function of the following signals/flags of the 8086 processor.

(i) Ready (ii) $\overline{TEST}$ (iii) $\overline{LOCK}$ (iv) HOLD (v) DF [5][CO1]

Q.2 How serial data communication is supported by the 8085 microprocessor? Also, write the suitable associated instructions to implement serial transmission and reception of data. [5][CO2]

Q.3 Write an assembly language program in 8085, along with the flow chart to find the 2's complement of the number FCH stored at memory location 2100H. Store the result in memory location 2300. [5][CO3]

Q.4 How the real mode operation of the 80286 processor is different from the protected mode operation? How the swapping concept is used along with virtual memory? [5][CO5]

Q.5 Why there is a need of an external Priority Interrupt Controller with 8085/8086 microprocessor-based system? What is the function of In-Service Register and Interrupt Request Register? [5][CO4]

Q.6 Differentiate the Fully nested mode with automatic rotation mode of Priority Interrupt Controller. [5][CO4]

Q.7 Write an assembly language program in 8086, along with the flow chart to transfer string of 5 bytes from an offset 2000H to the offset 2400H using string instruction and index pointers. [5][CO3]

Q.8 Explain the operation of 8253/54 Timer in mode 3. Assuming that the port addresses for 8253/54 are as follows:

Counter 0: 01H; Counter 1: 02H;

Counter 2: 03H; Control Register: 04H;

Now write suitable instructions to program counter 1 for binary count operation for mode 3 to divide CLK1 by number 0616.

Given below is the control register of 8253/54 –

D7	D6	D5	D4	D3	D2	D1	D0
SC1	SC0	RL1	RL0	M2	M1	M0	BCD

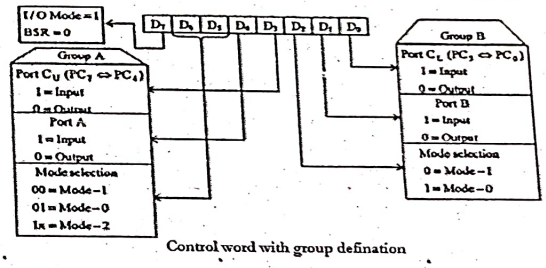
[5][CO4 &3]

Q.9 Explain how 8087 NDP expands the capability of 8086 processor? How does 8087 NDP gets instructions to execute? With suitable diagram explain the interfacing of 8087 NDP with 8086 processor. [5][CO5]

Q.10 Explain the BSR mode of 8255 PPI and configure the ports of the 8255 as per the given below requirements using suitable instructions:

Port A as input, port B as output, upper bits of port C as output, lower bits of port C as input.

Assume that the four registers of the 8255 PPI are located at 10H - 13H. The control register of 8255 is given below [5][CO4]



Control word with group defination

END

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Total no. of pages: 2 Roll no.....

5th SEMESTER, B.Tech. (Eve)

END TERM EXAMINATION (Nov/Dec-2022)

CEC-323 : Control Systems

Time: 03:00 Hours *Max. Marks: 50*

Note : Assume suitable missing data, if any.

Q.1 (a) Sketch the root locus of the unity feedback system, whose open loop transfer function is given below and determine the range of K for the system to be stable.

$$G(s) = \frac{K}{s\left(s^2 + 4s + 5\right)}$$

[6][CO3]

(b) Using the Routh Hurwitz stability criterion, determine the range of K for the stability of the given characteristic equation.

$$s^4 + 2s^3 + (4 + K)s^2 + 9s + 25 = 0$$

[4][CO3]

Q.2 (a) Sketch the bode plot for the following transfer function and determine the phase and gain margin. Also, comment on the stability of the system.

$$G(s)H(s) = \frac{10}{s(s+1)(s+5)}$$

[7][CO4]

(b) Find out the maximum phase lead for the compensator having transfer function as follows:

$$G(s)H(s) = \frac{1 + 0.6s}{1 + 0.2s}$$

[3][CO4]

Q.3 (a) Derive an expression for the time response of a first-order system to step-input.

[3][CO2]

S22

(b) Draw the Nyquist plot for the system whose open loop transfer function is given below and comment on the stability of the closed loop system

$$G(s)H(s) = \frac{s+4}{(s+1)(s-2)}$$

[7][CO4]

Q.4 (a) Find the state transition matrix for the following system matrix.

$$A = \begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix}$$

[5][CO5]

(b) Obtain the phase variable state-space representation for the system described by the following differential equation.

$$\ddot{y} + 5\dot{y} + 7y = 11u$$

where 'y' is the output and 'u' is the input.

[5][CO5]

Q.5 (a) Find the transfer function of the LTI system whose state-space model is given as follows:

$$\dot{x} = \begin{bmatrix} 0 & 5 \\ -1 & -2 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 1 & 1 \end{bmatrix} x$$

[5][CO5]

(b) Apply Kalman's test to find the controllability and observability of the system described as follows:

$$x = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 2 & 2 & 2 \end{bmatrix} x$$

[5][CO5]

Total No. of Pages 02 55 Roll No. 523

V SEMESTER B.Tech (Evon) (ECE)

END TERM EXAMINATION Nov-2022

CEC-357: Digital Image Processing

Time: 03 Hours *Max. Marks: 50*

Note: Attempt any FIVE questions.
Assume suitable missing data, if any.

Q.1[a] Apply histogram equalisation to given image with 4 bits per pixel.

9	10	9	11	12
10	11	11	12	9
9	11	10	10	10
11	11	11	9	8
12	10	10	11	10

[4][CEC357.2]

[b] An image is captured by a colour digital camera of size 40 x 40 and having 8 levels. Determine the memory require for storing image in bits on the following conditions:

(i) In original form of image.
(ii) The original image is converted into a gray scale image of size half of the original image.
(iii) Gray scale image is converted into a binary image of size half of the gray scale image.

[4][CEC357.1]

Q.2 [a] A 2 bit 5x5 image is defined as below; determine the mean and variance of the pixels.

0	1	1	1	3
1	2	2	0	1
3	3	2	1	0
2	3	2	1	0
1	2	3	3	2

[6][CEC357.2]

[b] What is image segmentation? What are the motivations and advantages of image segmentation?

[4][CEC357.3]

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Q.3 Write short note on followings: [4 + 4 + 2][CEC357.4]

(i) Mean filter as low pass filter
(ii) + 45° and - 45° line detection
(iii) Gamma correction in image and its effects on image

Q.4 [a] Explain following noise models in detail with derivation of mean and variance: [6][CEC357.3]

(i) Gamma Noise
(ii) Gaussian Noise

[b] What is the periodical noise of image? Why is frequency domain filtering required to clean the periodical noise of image? [4][CEC357.3]

Q.5 [a] For given A and B, calculate (i) Dilation of A by B and (ii) Erosion of A by B.

$$A = \begin{bmatrix} 1 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$$

[4][CEC357]

[b] What are the properties of opening and closing operators? For given A and B (As in [a]), calculate

(i) Internal Boundary of A
(ii) External Boundary of A
(iii) Morphological Gradient of A.

[6][CEC357.5]

Q.6 [a] What are the applications of derivative operators for edge detection in image? Explain the limitations of the derivative operators for edge detection in case of noisy image. [5][CEC357.4]

[b] What are the properties of Laplacian mask used for point detection in image? Explain with a suitable example. Why is threshold used after point detection mask? [5][CEC357.4

Total no. of Pages: 3 Roll no.....

VII SEMESTER

B.Tech. [Eve] [ECE]

END TERM EXAMINATION **Nov 2022**

CEC-401 INFORMATION THEORY AND CODING

Time: 03:00 Hours *Max. Marks: 50*

Note : Attempt any five questions.
Assume suitable missing data, if any.

Q.1 (a) Consider a (6,3) linear block code with parity-check matrix H given by

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

i. Find generator matrix G.
ii. Find the code word for data bit (101).
iii. Suppose that the received word is (110011). Decode this received word by finding the location of the error and the transmitted data bits.

[2+1+2][CO3]

(b) Two binary channels are connected in cascade, as shown in the Figure 1.

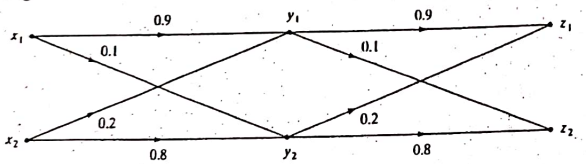


Figure 1

i. Find the overall channel matrix of the resultant channel [P(Z/X)] and draw the resultant equivalent channel diagram.
ii. Find $P(z_1)$ and $P(z_2)$ when $P(x_1) = 0.4$ and $P(x_2) = 0.6$.

[3+2][CO1]

Q.2 (a) Calculate the capacity of an AWGN channel with a bandwidth of 1 MHZand an SNR of 40 dB.

[2][CO2]

(b) Determine whether the channel given by following channel matrix [P(Y/X)] is symmetric or not.

$$P(Y/X) = \begin{bmatrix} 1/2 & 1/4 & 1/4 \\ 1/4 & 1/4 & 1/2 \\ 1/2 & 1/4 & 1/4 \end{bmatrix}$$

[2][CO1]

(c) A DMS X has five symbols x_1, x_2, x_3, x_4 and x_5 with respective probabilities 0.2, 0.15, 0.05, 0.1 and 0.5.

i. Construct a Shannon-Fano code for X and calculate the code efficiency.
ii. Construct a Huffman code for X and calculate the code efficiency.

[3+3][CO2]

Q.3 (a) Consider a single-error-correcting code for 11 data bits. Determine the number of check bits required.

[2][CO3]

(b) For a (6,3) systematic linear block code, the three parity-check bits c_4, c_5 and c_6 are formed from the following equations:

$$c_4 = d_1 \oplus d_3$$
$$c_5 = d_1 \oplus d_2 \oplus d_3$$
$$c_6 = d_1 \oplus d_2$$

i. Write down the generator matrix G.
ii. Construct all possible code words.
iii. Show that $d_{min} = 3$ and that it can correct a single error.

[2+3+3][CO3]

Q.4 (a) The generator polynomial of a (7,4) cyclic code is:

$$g(x) = 1 + x + x^3$$

i. Determine the code word for data vector 0110 using non-systematic form.

ii. Determine the code word for a vector 1011 using systematic form.

[2+3][CO4]

(b) Find the parity-check polynomial h(x) and the parity-check matrix H for the (7,4) cyclic code C with $g(x) = 1 + x^2 + x^3$.

[5][CO4]

Q.5 (a) Design an encoder for (7,4) binary cyclic code generated by $g(x) = 1 + x^2 + x^3$.

(b) Suppose message vector is (1001). Determine the code word by showing the contents of shift register at each step.

(c) Verify the code word obtained in above part (b) using the systematic form.

[3+5+2][CO4]

Q.6 Consider the convolutional encoder shown in the Figure 2:

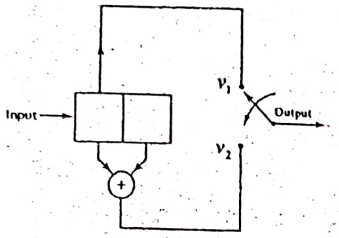


Figure 2

(a) Derive the state table and draw the state diagram for the given convolutional encoder.

(b) Sketch the Trellis diagram for the given convolutional encoder.

(c) Determine the free distance of this convolutional code.

[4+3+3][CO5]

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Total no. of Pages 02

Roll no.....

SEVENTH SEMESTER

B.Tech. (Eve)

END TERM EXAMINATION

Nov-2022

CEC403 Wireless Communication

Time: 3:00 Hours

Max. Marks: 40

Note : Answer FIVE questions.
Question No. 1 is compulsory.
Assume suitable missing data, if any.

Q.1 Answer all the following questions:

a) What is the difference between paging and WLAN? [2] [CO1]

b) What is 'frequency reuse factor'? [2] [CO2]

c) What is the use of FFT in OFDM receiver? [2] [CO3]

d) Find the approximate radius of coverage of a base station having antenna height 24.5 feet. [2] [CO4]

e) Define coherence bandwidth and coherence time. Also give their expressions. [2] [CO4]

f) In what frequency ranges can cell phones be found? [2] [CO4]

Q.2 Answer all the following questions:

a) Compare and contrast FDMA, CDMA and TDMA. [3] [CO1]

b) What is ZigBee? Explain in detail ZigBee networks. [4] [CO1]

Q.3 Answer all the following questions:

a) Explain the different techniques to improve the coverage and capacity of cellular systems? [3] [CO2]

b) A seven-cell cluster cellular system has an Omni-directional antenna with SIR about 27 dB. To increase the number of available channels, a 60° sectoring is introduced. Find the percentage of number of number of increase of channels for path loss component $n = 3$. [4] [CO2]

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Q.4 Answer all the following questions:

a) A unit gain antenna with a maximum dimension of 1 m produces 10 W power at 1 GHz. Find the transmit power in dBm and the received power at a distance of 5 m and 10 m. Assume unity gain for the transmitter and receiver antenna? [3] [CO3]

b) Find the expressions for the path difference, phase difference and time delay between the line of sight (LOS) path and the ground reflected path for the 2-ray ground reflection model. [4] [CO3]

Q.5 Answer all the following questions:

a) If a mobile handset is kept at a distance of 10km from a 100 watt transmitter and the carrier frequency is 800 MHz, find the power at the receiving antenna. Let G_t=1 and G_r=2 at free space propagation condition. [3] [CO4]

b) Compare the power received in a reflection model and a free space model. [4] [CO4]

Q.6 Answer all the following questions:

a) Consider a 3*2 MIMO system with zero-forcing (ZF) receiver having SNR equals 30dB. Calculate the average approximated BER? [3] [CO5]

b) Derive the expression for generalized SNR of maximal ratio combining(MRC) technique. [4] [CO5]

Q.7 Answer all the following questions:

a) Differentiate between 3G, HSDPA and HSUPA. [3] [CO3]

b) Examine the variations of channel behaviour due to frequency flat and frequency selective fading in wireless communication. [4] [CO4]

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Total No. of Pages: 3

7th SEMESTER

Roll No. .....

B.Tech.

END TERM EXAMINATION Nov-2022

COURSE CODE: CEC409 **COURSE TITLE: Computer Vision**

Time: 3:00 Hours *Max. Marks: 50*

Note: Answer *any* FIVE questions.
Assume suitable missing data, if any.

Q.1 **a)** Differentiate ICA and PCA. [2] [CO-3]

b) Draw the transfer function of Contrast Stretching and write mathematical expression of the function. [2] [CO-2]

c) Define Mean and Median Background Models and state their one disadvantage. [3] [CO-2]

d) Differentiate Bagging classifier and Boosting classifier with suitable diagram. [3] [CO-4]

Q.2 **a)** Perform Histogram Equalisation of the data given below in Table 1.

Table 1

Grey level	0	1	2	3	4	5	6	7
Frequency	1	6	3	2	3	2	1	2

[5] [CO-2]

b) Explain steps of Gradient-Based Edge Detection Algorithm with any suitable one-dimensional signal plots. [5] [CO-2]

Q3. **a)** The performance of the frame differencing technique depends on which two parameters? [1] [CO-2]

b) Find horizontal and vertical Sobel gradients on image I, given as below:

$$I = \begin{bmatrix} 10 & 50 & 10 & 50 & 10 \\ 10 & 55 & 10 & 55 & 10 \\ 10 & 65 & 10 & 65 & 10 \\ 10 & 50 & 10 & 50 & 10 \\ 10 & 55 & 10 & 55 & 10 \end{bmatrix}$$

[5] [CO-6]

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Total No. of Pages: 3 — Roll No. .....

7th SEMESTER — B.Tech.

END TERM EXAMINATION — Nov-2022

COURSE CODE: CEC409 — **COURSE TITLE: Computer Vision**

Time: 3:00 Hours — *Max. Marks: 50*

Note: Answer *any* FIVE questions.
Assume suitable missing data, if any.

Q.1 **a)** Differentiate ICA and PCA. [2] [CO-3]

b) Draw the transfer function of Contrast Stretching and write mathematical expression of the function. [2] [CO-2]

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[5] [CO-6]

c) If a grayscale image aspect ratio is (c:r) 5:2, pixel resolution is 480000 and Bits per pixel is 8bpp. Find the size and dimension of an image. [4] [CO-1]

Q.4 a) Explain Independent Component Analysis with suitable mathematical definition of mixed signal and independent components of the signal. [5] [CO-3]

b) Given the data in Table 2, reduce the dimension from two to one using the Principal Component Analysis (PCA) algorithm. [5] [CO-3]

Table 2: Sample Data

Feature	Example 1	Example 2	Example 3	Example 4
X1	4	8	13	7
X2	11	4	5	14

Q.5 a) Cluster the following eight points (with (x, y) representing locations) into three clusters:
A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9)
Initial cluster centres are: A1(2, 10), A4(5, 8) and A7(1, 2).
The distance function between two points a = (x1, y1) and b = (x2, y2) is defined as:

$$P(a, b) = |x2 - x1| + |y2 - y1|$$

Use K-Means clustering Algorithm to find the three cluster centres after the second iteration. [5] [CO-4]

b) Differentiate GMM from Clustering. Give Mathematical model of GMM. [2] [CO-2]

c) Explain three basic grey level transformation functions. [3] [CO-5]

Q6. a) Define Margin and Prior Probability. For the given sample of data in Table 3, find if the weather is sunny, then the Player should play or not? [5] [CO-4]

Table 3: Sample Data

Outlook	rainy	sunny	overcast	overcast	sunny	rainy	sunny	overcast	rainy	sunny	sunny
Play	yes	yes	yes	yes	no	yes	yes	yes	no	no	yes

b) Define Integral Images. How concept of Integral Images improves the performance of SURF features over SIFT features. Write the expression for Hessian matrix for SURF feature computation. [5] [CO-6]

-6'5

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7th SEMESTER
B.TECH

END TERM EXAMINATION NOV 2022

COURSE CODE: CEC-427 OPTICAL COMMUNICATION

TIME: 3 Hours Max. Marks: 40

Note:	All questions are compulsory. All Questions carry equal marks. Assume suitable missing data, if any

Q1:

In the process of fiber fabrication, what are the two major stages?

[4 Marks][CO2]

Q2:

Differentiate spontaneous Raman scattering and stimulated Raman scattering.

[4 Marks][CO3]

Q3:

Analyze the optical amplifier Erbium Doped Fiber Amplifier and Raman Amplifier.

[4 Marks][CO6]

Q4:

A photodetector has a quantum efficiency of 80 % at 1000 nm. A radiation of optical power 0.01 watt/ m^2 at this wavelength is incident on the device which has a receiving area of 1 mm^2. The detector has a dark current of 5 nA and a shunt resistance of 10^8 ohms. If the bandwidth of operation is 100 MHz, calculate the power SNR of the detector.

[4 Marks][CO3]

Q5:

Examine the Reach-Through Photodiode construction, working and measurement of quantum efficiency against wavelength *SiRAPD*.

[4 Marks][CO3]

Q6:

a) The responsitivity of the photodiode is 0.85 A/W and input-power saturation is 1.5 mW. What is the photocurrent if the incident power is (i) 1 mW and (ii) 2 mW?

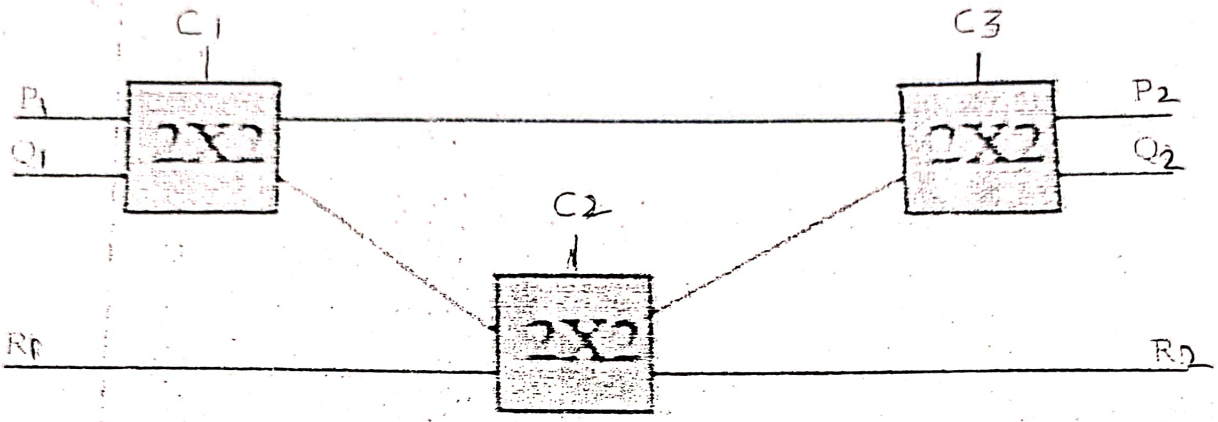
P. T.O

b) What thickness (width) of the depletion region of the InGaAs photodiode do we need to make it's quantum efficiency 70%?

[4 Marks][CO3]

Q7:

For the given directional coupler as cross-connect formulate the output for each possible combination of control signal (C_1, C_2 and C_3) configuration (bar/cross-connect). Whereas, input signals: P_1; Q_1 and R_1; output signals: P_2, Q_2 and R_2.



[4 Marks][CO4]

Q8:

Characterize the sources of noise in the photodiode with their equivalent circuit and mathematical representation.

[4 Marks][CO3]

Q9:

Analyze the nonlinear effect in the optical communication based on Kerr and Scattering effects and with components.

[4 Marks][CO5]

Q10:

Investigate the wavelength-division multiplexing technique and dens wavelength-division multiplexing.

[4 Marks][CO



Q.11 Find Z parameters using h parameters given below: [5]

$h_{11} = -1, h_{12} = 2, h_{21} = 2, h_{22} = -2$

Q.12 Find the Laplace of any two of the following: [5]

a. $f(t) = \sin^2 t$

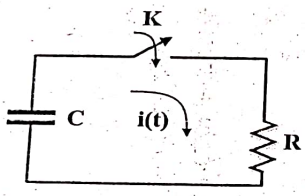
b. $f(t) = t^2 e^{-at} \cos wt$

c. $f(t) = e^{-at^2}$

Q.13 Obtain Foster-I and Cauer-I synthesis of the given function [5]

$$F(s) = \frac{(s^2+1)(s^2+9)(s^2+25)}{s(s^2+4)(s^2+16)}$$

Q.14 In the network shown below C is charged to V_o and the switch K is closed at t = 0, solve for current i(t) for t > 0. [5]



Total No. of Pages: 04 Roll No. .....

THIRD SEMESTER B.Tech.[EE]

END SEM EXAMINATION (NOV-2022)

CEE-101 NETWORK ANALYSIS AND SYNTHESIS

Time: 03 Hrs *Max. Marks:50*

Note: Attempt any TEN questions. Assume suitable data if missing and clearly mention the assumption.

Q1. In the network of the figure, the switch k is in position a for long period of time. At t = 0, the switch is moved from a to b. find $V_2(t)$ using the numerical values given in the network. Assume the initial current in the 2H inductor is zero. [5]

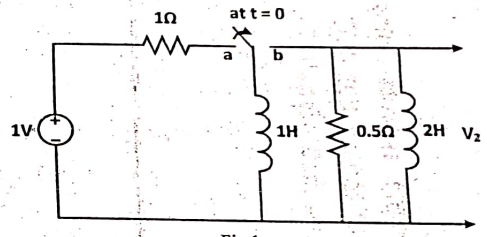


Fig.1

Q.2 a) Find the value of R that will result in maximum power transfer to the 10Ω resistance as shown in Fig.2(b).Also determine the maximum power. [5]

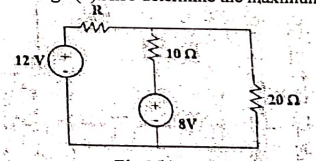


Fig.2(b)

Q3. Find the maximum power transfer to resistance R in Fig.3 [5]

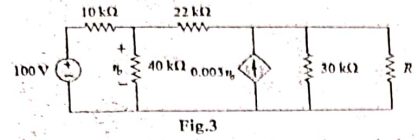
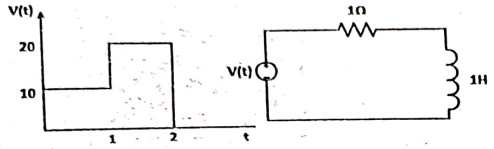


Fig.3

Q4. a) An R-L circuit is excited by the waveform shown below find the response i(t)) for t > 0. Assume initial conditions to be zero. [2]

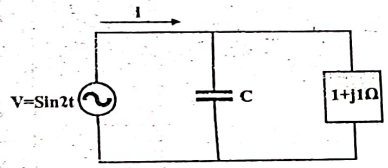


b) A 4-mF capacitor has the terminal voltage [3]

$$v(t) = \begin{cases} 50 \text{ volts}, & t \le 0 \text{ sec} \\ Ae^{-100t} + Be^{-600t} \text{ volts}, & t \ge 0 \text{ sec} \end{cases}$$

If the capacitor has an initial current of 2 A, find:
(a) the constants A and B,
(b) the energy stored in the capacitor at $t=0$ sec,
(c) the capacitor current for $t>0$ sec .

Q.5 Find the value of C so that V & i are in phase [5]

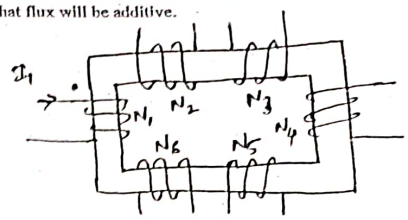


Q.6 Find whether the following polynomial is Hurwitz or not. [5]

a. $p(s) = s^4 + 2s^3 + 4$

b. $p(s) = s^4 + s^3 + 5s^2 + 3s + 4$

Q.7 Find the dot and direction of current in other windings using dot convention so that flux will be additive. [5]



Q.8 a) State thevenin theorem and its limitation [2]

b) Find the Thevenin equivalent of the circuit in Fig.8 as seen from terminals a-b. [3]

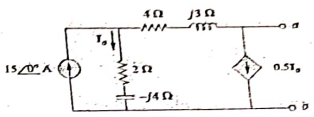


Fig.8

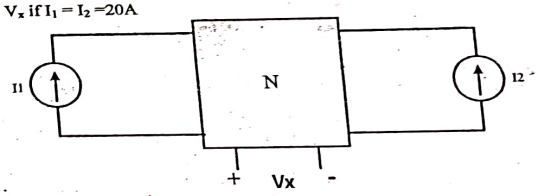
Q.9 a) State Superposition theorem and its limitation. [5]

b) A linear circuit is shown contains only resistors

If $I_1 = 8A$, $I_a = 12A$, $V_x = 80V$

If $I_1 = -8A$, $I_2 = 4A$, $V_x = 0V$

Find V_x if $I_1 = I_2 = 20A$



Q.10 Referring to the below figure calculate the following:

a) Find n for maximum power supplied to the 200Ω resistance.

b) Determine the power in 200Ω resistance if $n = 10$.

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Total No. of Pages 2

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I SEMESTER

B.Tech (PT)

END SEMESTER EXAMINATION

Nov 2022

PAPER CODE: CEE-103 SUBJECT: ENGINEERING ANALYSIS AND DESIGN

Time: 3hr

Max. Marks: 40

Note: Answer all questions. All questions carry marks on the top or on the side. Assume suitable missing data, if any.

Q.No.1. The spring-mass-damper system consists of a cart with weight (m), a spring with stiffness (k) and a shock absorber with a damping coefficient of (c). The damping coefficient (c) is simply defined as the damping force divided by shaft velocity. Find Equation of Motion for a Spring-Mass-Damper System [4][CO1]

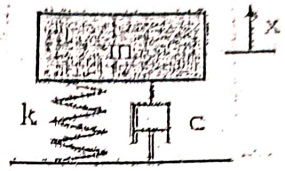


Fig 1

QNo.2] Using Euler's method, find an approximate value of y corresponding to $x = 1$, given that $dy/dx = x + y$ and $y = 1$ when $x = 0$. [4][CO2]

Q No.3] Using modified Euler's method, find an approximate value of y when $x = 0.3$, given that $dy/dx = x^2 + y^2$ and $y = 1$ when $x = 0$ [4][CO2]

Q No.4] Apply the Runge-Kutta fourth order method to find an approximate value of y when $x = 0.2$ given that $dy/dx = x + y$ and $y = 1$ when $x = 0$. [4][CO3]

QNO.5] Find $y(0.1)$ and $y(0.2)$ using the Runge-Kutta fourth order formula, given that $y' = x^2 - y$ and $y(0) = 1$. [4][CO3]

5536

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QNo 6] The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface:

x=height	100ft	150ft	200ft	250ft	300ft	350ft	400ft
Y=distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of y when (i) x = 160 ft. (ii) x = 410ft. [4][CO3]

QNO7] Find y(0.2) for $y''=1+2x^3y-xz^2$, $x_0=0, y_0=1, z_0=0$, with step length 0.1 using Runge-Kutta 2 method (2nd order derivative) [4][CO3]

QNo 8] Given sin 45° = 0.7071, sin 50° = 0.7660, sin 55° = 0.8192, sin 60° = 0.8660, find sin 52° using Newton's forward formula. [4][CO4]

QNo 9] Solve using Newton Raphson method the root of the equation $x^3 - x - 1 = 0$ for x. Initial value of the x=0 [4][CO4]

QNo 10] The distance covered by a rocket in meters from t = 8s to t = 30 s is given by [4][CO4]

$$x = \int_8^{30} \left(2000 \ln\left[\frac{140000}{140000 - 2100t} \right] - 9.8t \right) dt$$

a) Use Simpson's 1/3 rule to find the approximate value of x . b) Find the true error

Total No. of Pages: 03 Roll No. .....

FIRST SEMESTER B.Tech.[EVE]

END-SEMESTER EXAMINATION (Nov.-2022)

CEE-105 ELECTRICAL TECHNOLOGY

Time: 3 Hour *Max. Marks: 40*

Note: Question no.1 is compulsory. Attempt any three questions from Q2. to Q5.

Q1. a) Calculate the power absorbed or supplied by each element in Fig.1. [4]

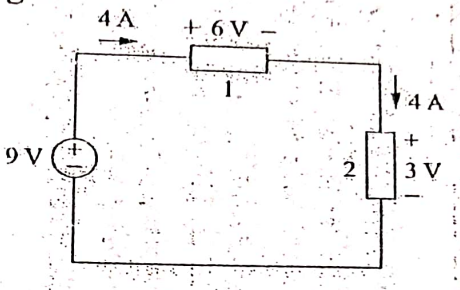


Figure- 1

b) Find *I* in the network of Fig. 2. [4]

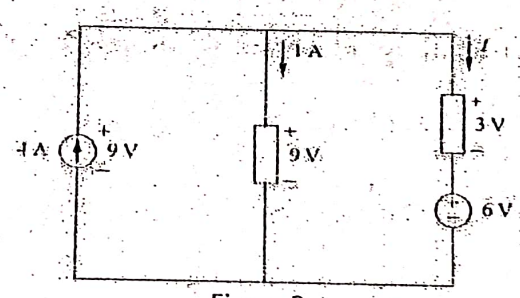


Figure 2

c) A battery is rated in ampere-hours (Ah). A lead-acid battery is rated at 160 Ah. What is the maximum current it can supply for 40 h? [4]

d) For the circuit shown in Fig. 3, calculate the voltage V, the conductance G, and the power P. [4]

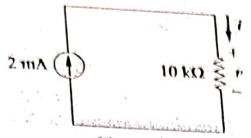


Figure -3

Q2. Convert the delta network in Fig.4 to an equivalent Y network. [8]

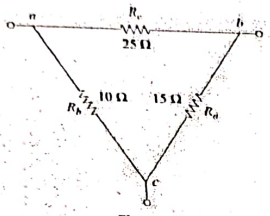


Figure- 4

Q.3 Determine the voltages at the nodes 1, 2 and 3. [8]

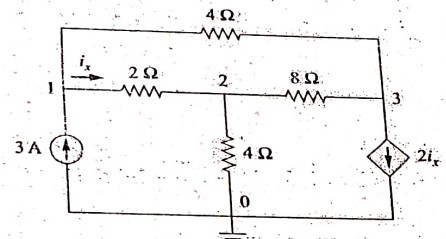


Figure-5

Q4. Find the value of R_L for maximum power transfer in the circuit in Fig. 6. Find the maximum power [8]

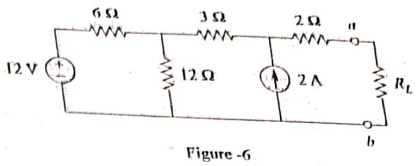


Figure -6

Q5. Determine i, i_o and v_o for all t in the circuit shown in Fig.7. Assume that the switch was closed for a long time [8]

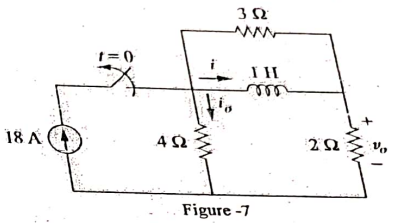


Figure -7

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Total No of Pages : 2

Roll No -----

THIRD SEMESTER **B.Tech EVENING(CEEE)**

END SEMESTER EXAMINATION (NOV-2022)

CEE -201 DIGITAL CIRCUITS AND SYSTEM

Time: 3Hrs *Max. Marks : 40*

Note : Attempt ***ANY FOUR*** Questions
Assume suitable missing data, if any.

1. For a given Boolean expression $(A+BC)(B+\bar{C}A)$
   [a] Design a circuit using gates to realize this function.
   [b] realize this function using only NAND gate
   [c] Simplify this equation and design a circuit using this simplified expression
   [d] compare the circuits obtained in part (a), (b) and (c) in terms of number of input for gates, number of gates and type of gates.
   (2.5X4=10)(CO1)

2. Reduce the Boolean expression
   (i) $Y=A[B+\bar{C}(\overline{AB+A\bar{C}})]$.
   (ii) $Y=AB+\overline{A\bar{Z}}+A\bar{B}C(AB+C)$
   (iii) $Y=(A+B)(\bar{A}+C)(B+C)$
   (3+4+3=10)(CO2)

3.(a) Make a K-map for the function
$Y = AB+A\bar{C}+C+AD+A\bar{B}C+ABC$
(b) Express Y in standard SOP form
(c) Minimize Y and realize the minimized expression using NAND gate Only.
(3+3+4=10)(CO2)

S 40

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4. Reduce using K-map the following expression and draw the logic diagram of the reduced expression using NOR gate only
   [a] $Y = \sum m(1,3,5,8,9,11,15) + d(2,13)$
   [b] $Y = \prod M(1,2,3,8,9,10,11,14) + d(7,15)$
   [c] With the help of truth table distinguish between half subtractor and full subtractor. (3.5+3.5+3=10) (CO3)

5. [a] Draw edge triggered JK flip flop and explain its operation with the help of truth table. How is the race around condition eliminated?
   [b] Distinguish between combinational and sequential logic circuits.
   [c] Draw the schematic circuit of a D flip flop with positive edge triggering using NAND gates. Explain its operation with truth table. (4+2+4=10)(CO3)

6. [a] Draw the circuit of serial-in serial-out shift register. Explain the working of serial-in serial-out shift register.
   [b] Data 0101 is entered in to 4-bit serial-in parallel-out shift register. Draw a time diagram to show the state of register after 1, 2, 3 and 4 clock pulses.
   [c] Discuss the application of register in design of storage/ memory device. (4+3+3=10)(CO4)

Total No. of Pages:03

Roll No. .....

FOURTH SEMESTER

B.Tech. (Evening)

END SEMESTER EXAMINATION NOVEMBER–2022

CEE-203 CONTROL SYSTEMS

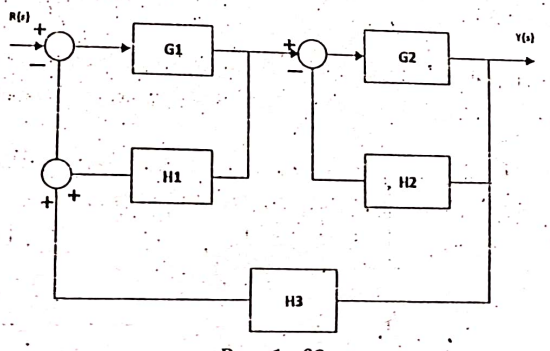
Time: 3:00 Hours Maximum Marks : 40

Note : Answer any *Five* questions.
Assume suitable missing data, if any. The symbols used are having their usual meaning.

1. (a) State the principle of Superposition and Homogeneity. Also define the Linear time-invariant and Linear time-varying systems with suitable examples. (4) (CO1)
   (b) Explain Synchro transmitter and synchro error detector with diagrams. (4) (CO2)

2. (a)Determine the Sensitivity S_K^T for a closed loop control system having transfer function, $T(s) = \frac{10K}{s(s+1)+10K}$. If K = 10, then evaluate S_K^T at s = j0.1 and j1. (6) (CO1,2)
   (b) Define absolute stability and relative stability for a control system. (2) (CO1)

3. Find out the Transfer Function, T(s) using Mason's Gain formula:
   (a)For the system represented by block diagram shown below: (4) (CO2)

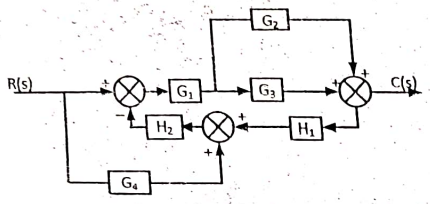


(b) For the system represented by the following equations:

$$y_2 = a_{12}\,y_1 + a_{32}y_3 + a_{42}y_4 + a_{52}y_5$$
$$y_3 = a_{23}\,y_2$$
$$y_4 = a_{34}y_3 + a_{44}y_4$$
$$y_5 = a_{35}y_3 + a_{45}y_5$$

Where y_1 is the input variable and y_5 is the output variable. (4) (CO2)

4. (a) By using the block diagram reduction technique, find the transfer function of the following block diagrams (4) (CO2,3)



(b) Explain the Type-0, Type-1, Type-2 feedback control systems. (4) (CO2)

5. (a) Determine the conditions which must be satisfied by the coefficients of the characteristic equation, $a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0$ for the system to stable. (4) (CO3)

(b) Define the Steady-state-error" for a system. Find the Steady- State- errors for a Type-2 system with unit-step, unit-ramp and unit-parabolic inputs. (4) (CO1)

OR

(b) Draw the Bode plot for the following transfer function and determine the system gain K for the gain cross-over frequency ω_c to be 5 rad/sec.: -

$$G(s) = \frac{Ks^2}{(1+0.2s)(1+0.02s)}. \quad \text{(CO3,4)}$$

6. (a) Explain the following terms: (i) Rise-Time, t_r (ii) Peak-Time, t_p (iii) Peak Overshoot M_p and (iv) Settling-time, t_s. Derive the expressions of peak-time and Peak-overshoot for a second-order underdamped system with unit-step input. (4) (CO1)

(b) Find the range of K for the system to be stable which is represented by characteristic equation, $s(s^2 + s + 1)(s + 4) + K = 0$. (4) (CO3)

OR

(b) Sketch the polar plot for a unity feedback system with open-loop transfer function $G(s) = \frac{K}{s(s+a)}$. (CO4)

7. (a) By means of Routh Criterion, determine the stability of the systems having characteristic equations, $s^6 + s^5 + 8s^4 + 6s^3 + s^2 + 8s + 16 = 0$. (4) (CO3)

(b) A feedback control system has an open-loop transfer function $G(s) = \frac{K}{s(s+a)}$. Find the root locus as K varies from 0 to ∞. (4) (CO4)

3rd SEMESTER

B.Tech.(Eve.)

END TERM EXAMINATION

COURSE CODE - EEE-205

TIME:- 3:00 HOURS

Answer any four questions

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Nov. 2022

COURSE TITLE - Communication System

Max. Marks: 40

1.

a) Find the power content of the DSBSC signal. 5 CO-2

b) With the help of proper block diagram explain the operation of quadrature amplitude modulation (QAM). 5 CO-2

2. What do you understand by vestigial-AM? What are its advantages and disadvantages. With suitable spectral diagram explain the symmetry condition of VSB filter 10 CO-2.

3. For demodulation of convention AM using a PN junction diode, show that 3+7 CO-2

i) $(R_s + R_f)C << \frac{1}{f_c}$

ii) $R_{LC} \leq \frac{1}{\omega_m}\left(\frac{\sqrt{1-a^2}}{a}\right) \quad 0 < a < 1$

Where R_s is the source resistance of the modulator, R_f is the forward resistance of the diode, ω_m is the single tone angular frequency of the modulating signal and 'a' is the modulation index.

5 CO-1

4.

a) Explain the basics of frequency division multiplexing.

b) Explain angle modulation. If we have a message signal m(t) whose bandwidth is ~~WHz,~~ is angle modulated with a carrier $A_c \cos(2\pi f_c t + \phi(t))$, then derive the expressions for FM and PM signals. What are the difference between FM and PM signal. 5 CO-2

5. Why quantization is required? Explain the characteristics of mid-tread type and mid-riser type quaintizer. Find the variance of quantization noise. 10 CO-3

6. State and prove Nyquist sampling theorem. Explain alasing. What is guard band? Why it is required? 10 CO-3

synchronized with an infinite bus of **400V, 50Hz**. All the losses are ignored. Determine the excitation voltage and load angle of the alternator when it delivers **rated kVA at upf**. Also find the armature currents of ac and dc machines when driving torque of the dc shunt motor is decreased till the **load angle becomes zero.**

Total No. of Pages: 04 Roll No.....

B.Tech (Eve.)

IIIrd Semester

END-SEMESTER EXAMINATION **(NOV/DEC-2022)**

CEE-205 Asynchronous & Synchronous Machines

Time: 3hrs *Max. Marks: 40*

***Note:** Q.1 is compulsory. Attempt seven (7) questions from Q.2 to Q.10. All questions carries equal marks.*
Assume any data if missing and clearly mention the assumption.
For the induction machine: X_{ls} is the leakage reactance of the stator, X'_{lr} is the leakage reactance of the rotor referred to stator. X_m is the magnetizing reactance . R_s is stator resistance & R'_r is the rotor resistance referred to stator.
For the synchronous machine: X_s is the synchronous reactance and R_a is the armature (stator) resistance.

Q.1 Justify the given statements. [5]

(a) Stator and Rotor magnetic fields are rotating at the same speed in the stationary reference frame. [CO1]

(b) The power factor and efficiency in a three-phase induction motor increases from no load to full load. [CO2]

(c) Single-phase induction motor is not self-starting. [CO3]

(d) If an alternator is connected to an infinite bus /grid, it will always deliver reactive power to the grid/infinite bus. [CO4]

(e) If a synchronous motor is connected to an infinite bus/grid, with variable excitation and constant driving torque, the motor is always at the variable power factor. [CO5]

Q.2 Explain the rotor resistance method of speed control of a three phase induction motor with torque-slip characteristics. [CO2] [2+3]

A **200-hp,3300-V,50Hz**, 3-phase, star-connected induction motor has the following equivalent circuit parameters per phase (Assume 1-hp to be 746W)

$R_s = R'_r = 0.8\ \Omega, X_{ls} = X'_{lr} = 3.5, X_m = \infty$

(a) Calculate the slip at full load if the friction and windage loss is **3000W**.

(b) How much **extra rotor resistance** would be necessary to increase the slip to three times this value with full-load torque maintained?

Q.3 A **440 V, 3-phase, 4-pole, and 50 Hz** squirrel cage induction motor develops a maximum torque of **three** times the full load torque at a speed of **1200 rpm** and at rated voltage and frequency. If this motor is now connected to a **400 V, 40Hz** a.c source, then neglecting the stator resistance, determine **[CO3] [2+3]**

(a) The magnitude of maximum torque.

(b) The speed at which maximum torque would now occur.

Q.4 A three-phase induction motor is **self-starting**. Explain different methods of **safe starting** of a three-phase induction motor in detail. **[CO2] [3+2]**

In the autotransformer starting, the starting current and the starting torque are reduced by how much factor.

Q.5 An **alternator** with the synchronous reactance of **0.8 pu**, is connected to an infinite bus at rated voltage. With its excitation EMF adjusted to **1.5 pu** the alternator delivers an output of **0.8 pu**. Neglect all losses. **[CO4] [2+3]**

(a) Determine the load angle, armature current in pu, and power factor of the alternator.

(b) The alternator is now made to operate at another value of excitation EMF which results in the same values of power output and armature current. Under these conditions, find the excitation voltages, load angle, and power factor.

Q.6 Draw the **phasor diagram** of a cylindrical rotor generator and develop the equivalent circuit. Also, discuss the effect of the armature reaction on the alternator with the help of pole and phasor diagrams. **[CO4] [2+3]**

Q.7 Explain **V-curves** in the synchronous machines. Whether the V-curves are different from inverted V-curves for the alternator. Discuss with phasor diagram for both generator and motor. **[CO3,5] [3+2]**

Q.8 Explain **different speed control** techniques of a three-phase induction motor for constant and variable load torques. Which of the speed control techniques are energy efficient and are mostly used? **[CO3] [4+1]**

Q.9 **A three-phase, 10kVA, 400V, and 50Hz star-connected alternator** supplies the rated load at **0.8 pf lagging**. If the per phase armature resistance R_a is **0.5 Ω** and synchronous reactance X_s is **10 Ω.** **[CO4] [3+2]**

(a) Derive the power expression of the alternator and find the active and reactive power delivered by the alternator and draw the **P-δ and Q-δ** curves.

(b) Find the torque/load angle of the alternator.

Q.10 (a) Explain the **procedure** to make a **synchronous machine works as an alternator** after synchronizing to the infinite bus/grid with the help of phasor diagrams. Comment on the power factor, the induced EMF, and the load angle/torque angle of the synchronous machine for all the stages. **[CO4] [3**

(b) **A three phase, 400V, 10kVA, star-connected cylindrical alternator** with the synchronous reactance X_s of **.7 Ω** per phase is driven by **220V, 10kW dc shunt motor.** The alternator is **[CO5]**

Total no. of Pages:2 78 Roll no. 546

V SEMESTER

B.Tech. [Evo]

END TERM EXAMINATION Nov/Dec-2022

COURSE CODE: CEE301 COURSE TITLE: POWER ELECTRONICS

Time: 03:00 Hours Max. Marks: 40

Note: All questions carry equal marks.
Attempt any *EIGHT* questions.
Assume suitable missing data, if any.

Q.1 The triggering circuit of a thyristor has a source voltage of 15V and the load line has a slope of -140V per ampere. The minimum gate current required to turn on the thyristor is 25mA. Determine
(i) required source resistance in the gate triggering circuit,
(ii) the triggering voltage and current for an average gate power dissipation of 0.4 Watts. [5M][CO 1,2,3]

Q.2 Explain the switching characteristics of the Insulated gate bipolar transistor. [5M][CO 3,4]

Q.3 The single-phase full bridge converter shown in fig. 3(a) has an RL load of L=6.5mH, R=0.5Ω and E=10V. The input voltage is Vs=120V(RMS) at 60 Hz.

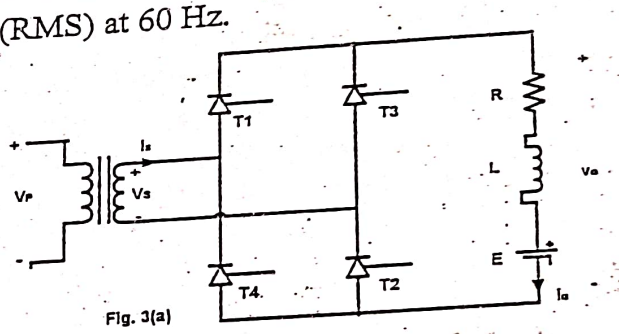


Fig. 3(a)

Determine:
(i) Load current (I_{LO}) at $\omega t = \alpha = 60°$;
(ii) Average thyristor current (I_A);
(iii) RMS output current (I_{rms}) [5M][CO 3,4]

Q.4 How does a Dual converter using two full converters gives four-quadrant operation? Also, draw the relevant waveforms for the circulating type dual converter. [5M][CO 3,4]

Q.5 Explain the single-phase AC voltage controller with R-load. [5M][CO 3,4]

Q.6 Describe the operation of a three-phase three-pulse converter and draw the load voltage waveforms for

(a) $0<\alpha<30°$

(b) $\alpha>30°$ [5M][CO 3,4]

Q.7 A single-phase bridge-type cycloconverter has an input voltage of 230V, 50 Hz, and a load of R=10Ω. The output frequency is one-third of the input frequency, for a firing angle delay of 30°. Calculate:

(i) Output RMS voltage,

(ii) RMS current of each converter,

(iii) RMS current of each thyristor,

(iv) Input power factor. [5M][CO 3,4]

Q.8 A DC-DC converter has a source voltage of 120Vconnected with a load resistance of 20Ω. If the voltage drop across the switch is 2V, then for a duty cycle of 0.6, determine:

(i) Average output voltage,

(ii) RMS output voltage,

(iii) Chopper efficiency. [5M][CO 3,4]

Q.9 Explain the working principle of a single-phase full bridge inverter and draw the relevant voltage and current waveshapes for R and RL loads. [5M][CO 3,4]

Q.10 Compare the 120° mode and 180° mode of the three-phase voltage source inverter and draw relevant waveshapes. [5M][CO3,4]

Total no. of Pages: 2

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Roll no.....

V SEMESTER

B.Tech. (Eve)

END TERM EXAMINATION Nov/Dec-2022

CEE303 POWER SYSTEM ANALYSIS

Time: 03:00 Hours Max. Marks: 40

Note : All questions carry equal marks.
Attempt and four questions.
Assume suitable missing data, if any.

Q.1 a) Compare Newton Raphson and Gauss Seidel method. [5][CO#2]

b) Using Gauss Seidel method calculate the bus 2 and 3 voltages. All impedances are in pu on a 100 MVA base in Fig. 1. [5][CO#2]

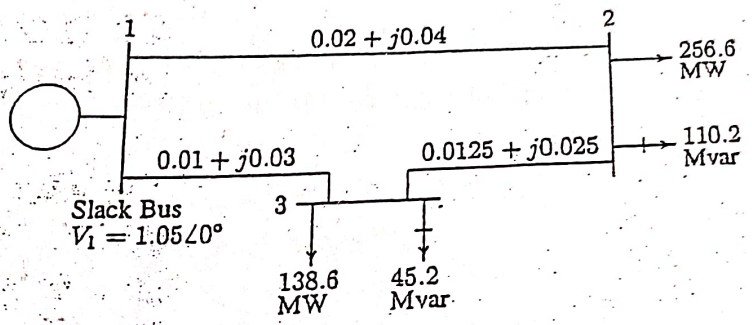


Fig. 1

Q.2 The load flow data for the sample power system are given below. The voltage magnitude at bus 2 is to be maintained at 1.04 p.u. The maximum and minimum reactive power limits of the generator at bus 2 are 0.35 and 0.0 p.u. respectively. Determine the set of load flow equations at the end of first iteration by using Newton-Raphson method. Bus parameters are: [10][CO#2]

Bus code	*Impedance*	*Line charging admittance*
1–2	0.08 + j0.24	0.0
1–3	0.02 + j0.06	0.0
2–3	0.06 + j0.18	0.0

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Schedule of bus load and generations is

Bus code	Assumed voltages	Generation MW	Generation MVAR	Load MW	Load MVAR
1	1.06 + j0.0	0	0	0	0
2	1.0 + j0.0	0.2	0.0	0.0	0.0
3	1.0 + j0.0	0	0	0.6	0.25

Q.3 a) Explain Economic load dispatch with and without transmission losses. [5][CO#3]

b) The fuel inputs per hour of plants 1 and 2 are given as

$F1 = 0.2\ P_1^2 + 40\ P_1 + 120$ Rs. per hr

$F2 = 0.25\ P_2^2 + 30\ P_2 + 150$ Rs. per hr

Determine the economic operating schedule and the corresponding cost of generation if the maximum and minimum loading on each unit is 100 MW and 25 MW, the demand is 180 MW and transmission losses are neglected. [5][CO#3]

Q.4 Write short notes on

a) Calculation of transmission loss coefficient [5][CO#3]

b) Unit commitment [5][CO#3]

Q.5 a) Explain Z bus building algorithm! [5][CO#5]

b) Obtain the Z bus for the system shown in Fig 2. [5][CO#5]

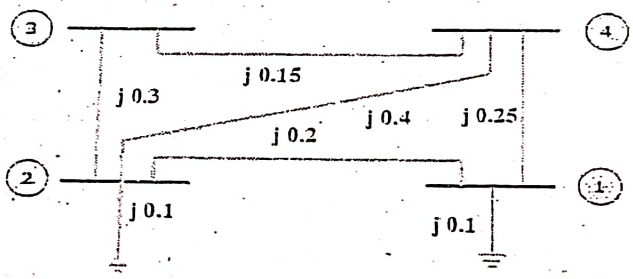


Fig. 2

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V SEMESTER

B. Tech. (Eve)

END TERM EXAMINATION Nov/Dec-2022

CEE 309 Special Electrical Machines

Time: 03:00 Hours Max. Marks: 40

Note : Attempt any Eight questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (a) Can shunt wound dc machine be operated with both dc and ac supply? Justify your answer.
(b) Draw the phasor diagram of universal motor with and without compensating winding. [3+2 = 5] [CO1]

Q.2 Obtain the speed – torque characteristic of hysteresis motor. Write potential applications of hysteresis motor. [5][CO 2]

Q.3 Draw and label asymmetric bridge converter and explain its operation with proper waveforms. [5][CO3]

Q.4 Derive expression of torque for synchronous reluctance motor. Also draw torque – angle characteristics for SyRM. [5][CO3]

Q.5 What is the difference between soft and hard permanent magnets. Draw demagnetization characteristic for soft and hard permanent magnets. [5][CO4]

Q.6 Differentiate between unipolar switching and bipolar switching in BLDC motor. Explain with neat diagrams. [5][CO4]

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Q.7 Explain the difference between different types of rotor construction in PM motors with neat diagrams. [5][CO4]

Q.8 Drive the transfer function of armature controlled dc servomotor. [5][CO5]

Q.9 Write the classification of stepper motor. Explain the following terms in reference to stepper motor :
(a) Slewing, (b) Ramping, (c) Start – stop mode [5][CO5]

Q.10 A 120 V, 60 Hz, 0.25 hp universal motor runs at 2000 rpm and takes 0.6 A when connected to a 120 V dc source. Determine the speed, torque and power factor of the motor when it is connected to a 120 V, 60 Hz supply and is loaded to take 0.6 A (rms) current. The resistance and inductance measured at the terminals of the machine are 20 Ω and 0.25 H respectively. [5][CO1]

Q.11 A small 60 Hz hysteresis clock motor possess 32 poles. In making one complete turn with respect to the revolving field, the hysteresis loss in the rotor amounts to 0.8 J.
Calculate,
a) The pull in and pull out torques
b) The maximum power output before the motor stalls
c) The rotor losses when the motor is stalled
d) The rotor losses when the motor runs at synchronous speed
[5][CO2]

SS 2

Roll No.....

Total no. Of Pages 2

FIFTH SEMESTER

B.Tech (Eve) Nov-2022

END SEMESTER EXAMINATION

CEE-313 Linear Integrated Circuits

Time: 3 Hours Max. Marks 40

NOTE: Attempt any 4 questions. All questions carry equal marks. Assume suitable missing data, if any

Q1 Find the transfer function (V_{out}/V_{in}) for the circuit given in figure1 [CO 4]

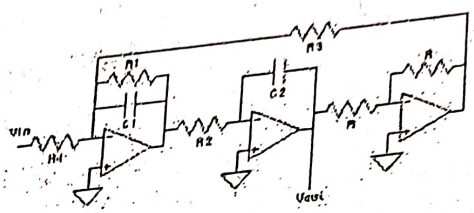


Figure 1

Q2 Explain the internal circuit of 555 timer and show how 555 timer can be used for frequency modulation. [CO 5]

Q3 Explain with the help of block diagram how will you find the square of an input voltage using op-amp. Draw the internal diagram of each block used. [CO 2]

Q4 For the circuit given in figure2 sketch the output voltage waveform if V_{in}= 500mV_{pp} sine wave at 100Hz and V_{ref}= 50mV. Given Ci= 0.1μF, R=4.7KΩ, RL=10KΩ and V_{sat}=15V [CO 3]

Pages : 2

R-11 No. . . . . -

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V Semester

B.Tech (Part-time)

End Term Examination, Dec 2022

COURSE CODE – CEE-355, COURSE TITLE – Instrumentation System

Time: 3:00 Hours

Max. Marks – 50

Note: Do any five questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 (a) A temperature alarm unit with a time constant of 120 seconds subjected to a sudden rise of temperature of 100°C due to fire. If increase of 30°C is required to actuate the alarm, what will be the delay in signalling the sudden temperature increase? [5][CO2]

(b) What is the principle of Hall Effect? With the help of neat diagram, explain and derive the procedure of obtaining hall voltage using horse shoe magnet. Write two uses. [1+3+1][CO2]

Q.2 (a) An electromagnetic flowmeter works on which law, explain using neat diagram? Derive the equation of output voltage using equivalent electrical circuit of electromagnetic flowmeter. [2+2][CO2]

(b) Explain how level of a liquid can be measured using a cylindrical capacitor transducer? While explaining, calculate capacitance for all three cases i.e. when tank is empty, when tank is completely filled and when tank if filled up to a height "h". [2+2+2][CO1]

Q.3 (a) A 10 bit DAC operated within the range of 0 to 5 volts. What are LSB and MSB values? [4][CO3]

(b) If resolution of 4-bit DAC is 1 volt, reference voltage is 16 volt. What would be the full scale output? [3][CO3]

(c) An analog signal is in the range of 0-5 volt, how many bits of ADC are required to convert this signal to any accuracy of 5mV? [3][CO3]

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Q.4 (a) For a 3-bit counter type ADC, having a step size of 0.25 volts. What is the digital output for the input of 1.28 volts? What is final quantization error? [2+2][CO4]

(b) For a 9-bit successive approximation type ADC, being operated with 500MHz, calculate the: [2+2+2][CO4]

(i) Conversion time for the input of 25Hz.
(ii) Conversion time for the input of 50Hz.
(iii) Total number of clocks needed.

Q.5 (a) Draw the block diagram of 4-bit counter type ADC and n-bit dual slope ADC. [2+2][CO4]

(b) A 4-bit successive approximation type ADC gives full scale output of 15 volts. For the analog input of 8.15 volt, what would be the correct conversion transition? Provided the initial transition is (1000). Calculate the quantization error. [5+1][CO4]

Q.6 (a) In a 4-bit weighted register type DAC, the resistor value corresponding to LSB is 32k ohms. What would be the resistor value corresponding to MSB? [3][CO3]

(b) In a potentiometer, the meter resistance is 2.5 times of potentiometer resistance. The slider corresponds to 50% of full scale travel. What is the percentage error? [3][CO1]

(c) Reference voltage of 10 volt is used in an 8-bit DAC. What is the analog voltage given by 10100001? [4][CO3]

556

No. of Pages: 2 *Roll No.....*

VII Semester

B.Tech. (Eve)

End Term Examination Nov/Dec-2022

CEE-401 UEE

Time: 3 Hours Max.Marks:40

Assume any missing data.

Attempt any four questions.

Q1. a) Define Current Efficiency, Voltage Required and Energy Efficiency when referred to electrolytic processes. Also state and explain Faraday's laws of electrolysis.

b) Calculate the ampere-hours required to deposit a coating of silver 0.05mm thick on a sphere of 5cm radius. Assume electrochemical equivalent of silver =0.001118gm/coulomb and density of silver to be 10.5gm/cc. [CO4] [5+5]

Q2. a) What is welding. Discuss its advantages and disadvantages.

b) If we want to make vessels that need to be airtight and waterproof. Suggest a suitable welding method and explain the method. Why do you prefer that method? [CO3] [5+5]

Q3. a) Write comparison of arc welding with DC and AC.

b) Write short note on:

i. Production of Caustic Soda

ii. Electrodeposition [CO3,CO4] [5+2.5+2.5]

Q4. a) Explain Luminous flux, Luminous Intensity, Illumination, Reduction factor, and waste light factor.

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b) Enumerate various properties of material to be chosen for heating element. Describe the indirect method of resistance heating. [CO1, CO2] [5+5]

P.T.O

Q5. a) Describe with help of diagram the vapour compression refrigeration system.

b) Explain the terms tonne of refrigeration (TR), refrigerant refrigeration, and air conditioning. [CO5] [5+5

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Total No. of Pages: 02

B.Tech.(EVE.)[EE]

SEVENTH SEMESTER

(Nov-2022)

END-SEMESTER EXAMINATION

CEE-403 Electrical Drives

Max. Marks:40

Time: 03 Hour

Q1. Write short notes [10][CO

a. If the starting torque of a DC series motor, separately excited DC motor and a 3- phase induction motor are compared under normal rated supply conditions, which one of them develops the largest starting torque (as a ratio of the rated torque) and why?

b. Hall Effect current sensors are extremely good for sensing AC as well as DC currents of all ranges. State TRUE or FALSE and justify

c. The critical speed for a particular value of firing angle for a single phase semi controlled separately excited DC motor drive will be less than the critical speed for a fully controlled converter case for the same firing angle assuming same magnitude of AC supply. Is this statement always TRUE? Justify.

d. The speed of a motor is being sensed by an encoder having 400 holes uniformly carved along the periphery of a disc coupled to its shaft. The number of pulses counted is 25 for 200 msec. what is the speed of the motor in rpm?

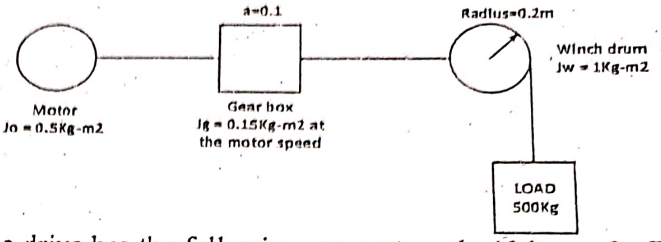
e. The short time duty rating of an electric motor is always higher that the continuous duty rating. for e.g. a motor rated for a nominal value of 10KW can be loaded for > 10KW if it is loaded for a short duration. Is this always TRUE? Explain.

Q2. A motor has a heating time constant of 65 minutes and cooling time constant of 80 minutes. When run on full load at 250KW, the steady state temperature rise is 40oC. The motor has maximum efficiency of 88% at 80% of full load. The motor is run on an intermittent load with 8 minutes on load and 16 minutes of shut down period. What is the maximum load the motor can take for an intermittent load duty without exceeding a temperature rise of 40oC? Derive any formula used. [5][CO2

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Q3. A paper cutting machine has a load torque requirement of 1000 KN-cm for 15 sec followed by a 100 KN-cm for 25 sec. the speed torque characteristics of the drive motor is given by T = 18000 – 20N. Where N is speed in rpm. The moment of inertia of the flywheel attached to the shaft + motor is 800 kgm2. Calculate the maximum and minimum values of torque and speed. Derive any formula used. [5][CO2]

Q4. In the mechanism shown , motor drives the winch drum through a reduction gear with a gear tooth ratio of 0.1. the friction torque at wich shaft is 15N-m and at motor shaft is 10N-m. motor speed is 1500rpm. Calculate the equivalent moment of inertia of the drive referred to motor shaft and motor torque if gears have an efficiency of 90%. [5][CO1]



Q5 The drive has the following parameters: J= 10 kg-m−2 , T = 15+0.005N, N-m and Tl = 5+0.006N, N-m, where N is the speed in rpm. [5][CO1]
Initially the drive is working in steady state. Now the drive is braked by electrical braking. Torque of the motor in braking is given by T = -10-0.04N, N-m. Calculate the time taken by the drive to stop.

Q6 Write short notes on any two 10[CO3]

a. Three point starter of DC machines

b. Braking of DC machines

c. Semiconverter fed DC motor drive

Xxxxxxxxxxxx

Total No. of Pages: 02

Roll No. 560

VII Semester
B.Tech (Evening)

End Term Examination

Nov/Dec-2022

CEE-411 POWER SYSTEM RELIABILITY

Time: 03:00
Time: 3 Hrs

Max. Marks:50

Note: Attempt Five questions, each question carry equal marks
Assume suitable missing data, if any

1. (a) Evaluate how many ways three books can be selected from seven books and placed on a shelf. [CO1]

1. (b) How many three digit numbers can be formed from the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 if zero cannot be used to fill the first place and if (i) each number can be repeated (ii) each number can be used once only. [CO1]

2. A machine cuts extruded copper into lengths of approximately 6 m. Using random sampling, a quality control engineer measures 20 of these cut lengths as 5.97, 5.97, 5.98, 5.98, 5.98, 5.99, 5.99, 5.99, 5.99, 5.99, 6.00, 6.00, 6.00, 6.00, 6.00, 6.01, 6.01, 6.02, 6.02, 6.02. Plot frequency distribution curve as separate data and grouped data, determine probability of occurrence of each length. Also plot cumulative probability distribution curve as separate data and grouped data. [CO2]

3. (a) A coin is tossed 5 times. Evaluate the probability of each possible outcome and draw the probability mass (density) function and the probability distribution function. [CO2]

3. (b) A die is thrown 6 times. Evaluate the probability of getting 2 spots on the upper face 0, 1, 2, 3, 4, 5, 6 times and draw the probability mass (density) function and probability distribution function. [CO3]

4. (a) A pumping station has 2x20 t/hr units and 1x30 t/hr units. Each has an unavailability of 0.1. Calculate the capacity outage probability table (COPT) for this plant and compare this with the unit outage probability table. [CO3]

4. (b) Consider a system consisting of 4 components having probability of 0.9 of each component. Determine individual probability table. [CO3]

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5. (a) Consider a system having 8 components each identical having reliability of 0.9, are connected in such a way that first 4 components are connected in series make one group and other 4 components are also connected in series make another group and finally these two groups are connected in parallel. Determine reliability of system. [CO3]

5. (b) A series system has 10 identical components. If overall system reliability must be at least 0.99, what is the minimum reliability required of each component. [CO4]

6. (a) The probability of success in a single trial is 0.1. Calculate the probability that in 10 trials there will be exactly two successes using (i) binomial distribution (ii) when the number of trials is 20 and probability of success in single trial is 0.005. [CO4]

6. (b) A simple electronic circuit consists of 6 transistors each having a failure rate of $1x10^{-6}$ f/hr, 4 diodes each having a failure rate of $0.5x10^{-6}$ f/hr, 3 capacitors each having a failure rate of $0.2x10^{-6}$ f/hr, 10 resistors each having a failure rate of $5x10^{-6}$ f/hr and 2 switches each having a failure rate of $2x10^{-6}$ f/hr. Assuming connectors and wiring are 100% reliable, evaluate the equivalent failure rate of the system and the probability of the system surviving 1000 hr and also 10000 hr if all components must operate success. [CO5]

7. (a) Consider a system comprising 4 identical components each having failure rate of 0.1 f/yr. Evaluate the probability of the system surviving 0.5 yr and yr if at least two units must operate successfully. [CO5]

7. (b) A control system consists of 3 separate subsystems, all components of which have reliabilities that are exponentially distributed. The subsystems are (i) a single component having a failure rate of $1x10^{-6}$ f/hr, (ii) two components each having failure rate of $8x10^{-6}$ f/hr and for which 1 component must operate for success (iii) 3 components having failure rate of $5x10^{-6}$ f/hr, $2x10^{-6}$ f/hr and $10x10^{-6}$ f/hr, for which 2 components must operate for success. If all subsystems must be successful for satisfactory system operation, evaluate the probability of surviving for a period of 5000 hrs. [CO5]

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VII SEMESTER B.Tech. (Evo)

MIDTERM EXAMINATION Nov-Dec 2022

COURSE CODE: CEE 423

COURSE TITLE: Power System Dynamics and Stability

Time: 3 Hours *Max.Marks:50*

Note : Answer any five questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1. (a) Discuss the classification of power system stability. [3][CO#1]

(b) Write the swing equation in per unit. [2][CO#2]

(c) Explain the difference between "clearing time" and "critical clearing time" [2][CO#2]

(d) For the s-domain block diagram small signal representation of the swing equation, write only the characteristic equation. [3][CO#3]

Q.2. (a) Explain in brief, the factors affecting power system transient stability. [5][CO#2]

(b) With neat diagrams, explain the equal area criterion for transient stability. [5][CO#2]

Q.3. (a) Explain in brief, the factors affecting power system small signal stability. [5][CO#3]

(b) Draw the s-domain block diagram of the small signal stability model for a single generator connected to infinite bus (grid). Also, from the block diagram, derive the expression for the damping ratio 'ζ'. [5][CO#3]

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Q4. (a) With neat diagrams, explain voltage stability. What are the ways to improve voltage stability ? [5] [CO#4]

(b) Explain the role of 'P-V' curves in voltage stability analysis [5] [CO#4]

Q5. (a) Explain, with neat diagrams, how power factor of the load affects the voltage stability ? [5] [CO#4]

(b) State which of the following is more prone to a voltage instability / voltage collapse and why ? [5] [CO#4]

(i) transmission systems

(ii) distribution systems

Q6. Write short notes on (any two):

(a) Power system stabiliser (PSS) [5][CO#3]

(b) Voltage collapse [5][CO#4]

(c) Eigenvalues of state matrix A [5][CO#3]

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Total no. of Pages:1

Roll no.....

1st SEMESTER

B.Des

END TERM EXAMINATION Nov/Dec-2022

COURSE CODE: DD101 COURSE TITLE: World of Design

Time: 03:00 Hours Max. Marks: 40

Note: Use diagrams/ illustrations to explain your arguments visually. Answer to the point and within the word limit. Crossing over the word limit will be penalized.

Q.1 Attempt any 2

a) Think of an instance/product/design where a lack of Empathy creates problems for everyone. Illustrate the problem and also suggest ways in which this problem could be solved/minimized by being empathetic. [100 words] [10][CO1]

b) From your experience or study, think of a product where a material causes a certain problem. Suggest a new design with a new material to mitigate this problem. [100 words] [10][CO1]

c) What do you understand by the word 'Culture'? Explain how Culture affects the design of a product, through an example. [100 words] [10][CO1]

Q.2 Explain how Industrial Revolution changed Society and Culture. [100 words] [10][CO1]

Q.3 As per your understanding, comment upon any two- [10][CO1]

a) Roles and Responsibilities of a designer in Society [60 words]

b) Qualities needed to be a good designer (specific to your chosen field) [60 words]

c) Your definition of Success as a designer. [60 words]

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Total No. of Pages: 01 *Roll No.....*

1st Semester
BDES

END TERM EXAMINATION Nov Dec-2022

DD103 Sketching 2D/3D & Rendering

Time:3:00 Hours Max Marks: 40

Note: All Questions are compulsory.
Assume suitable missing data, if any.

Q.1 Attempt <u>any two</u> of the following questions:

a) Human figure at rest and in motion.
b) Street scene showing a 2-point perspective.
c) Sketch a household product from any two views.
d) An artwork using positive-negative space.

[10+10 Marks] [CO-1]

Q.2 Draw a comic strip taking inspiration from your happy experiences of college life at DTU. Use text information, dialogues, and visual effects to narrate the scenes.

Note:
Dimension: Use full A3 sheet, Min. of 6 panels.
Color : Any color/medium [20 Marks] [CO-1]

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Total no. of Pages: 01

1st SEMESTER

BDes_

END TERM EXAMINATION *Nov/Dec-2022*

DD107 Tinkering Studio

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions carry equal marks.
All questions are compulsory.

Q.1 Explain Damien Newman's Process of Design Squiggle and how this approach can produce radical solutions. (5 Marks)

Q2. Explain the Product Life cycle of (i) Walkman (ii) Pager. (5 Marks)

Q3. Based on your classroom assignment, "shoot the time-lapse video of the act of assembling and disassembling", pick those two products and make a write-up; the write-up should include 5 (Ws) 1-Who 2-What 3-When 4- Where 5- Why? (10 Marks)

Q4. Explain the product's fuzzy front/back end and categories with a suitable example. (10 Marks)

Q5. Explain the following terms- (10 Marks)

(i) Product Evolution
(ii) Tinkering
(iii) Innovation vs Invention
(iv) Role of Ideation in design process

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Total No. of Pages: 01

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1st Semester
B.DES Program

END TERM EXAMINATION Nov-Dec-2022

DD109 Computer Graphics 2D

Time: 3:00 Hours

Max Marks: 40

Note: All Questions are compulsory.
Use of Computer and Internet is allowed.
Assume suitable missing data, if any.

Q.1

a) Design a vector logo on <u>any one</u> of the themes mentioned below using Adobe Illustrator:
Smartwatch company
Footwears
Interior design firm
Color: Max. three colors
Size: 500px by 500px [15 Marks] [CO-1]

b) Write a concept note on the design you have created. (Max. 25 words) [5 Marks] [CO-1]

Q.2 Attempt <u>any one</u> of the following:

a) Design a website landing page (*size 1600 pixels by 2500 pixels*) on product/ service of your choice.

b) Manipulate a digital photograph on the topic of awareness of Dengue A4)

[20 Marks] [CO

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Total no of Pages: 02

Roll No._____

FIRST SEMESTER

(B.DES.)

END TERM EXAMINATIONS NOV./ DEC.- 2022

DD105 ELEMENTS OF DESIGN

Time: 3 Hrs

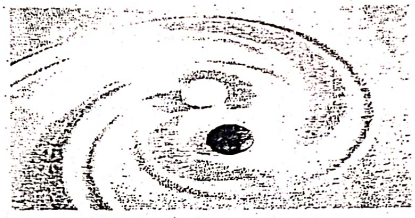
Max. Marks: 40

Note: All questions are compulsory.

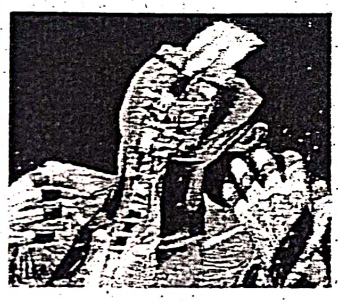
Q1. You are provided with list of words. Choose the most appropriate word from the given list to the images provided. **{5*2 Marks}**

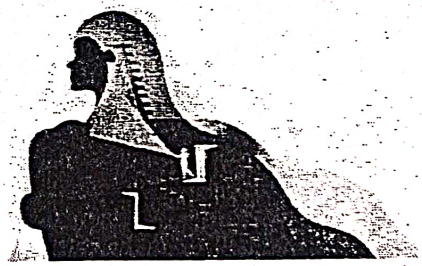
Serene	Soft	Peace
Constructive	Meditation	Introspective
Ecstasy	Prosperity	

a) 

b) 

c) 

d) 

e) 

Q2. Design a 3-D Art Installation for the front façade of your favorite brand. Discuss your though process & Design elements that you have used. Also, discuss how the form that you have designed in inclined with the brand image & its philosophy. **{1*30 Marks}**

NOTE: a) Size: 4x3 feet b) Form: Geometric / Organic / Combination of these two

b) Use of Color, pattern, texture or other elements of design are allowed

OR

Design a trophy for best design degree project for Department of Design, DTU. Discuss your though process & Design elements that you have used. Also, discuss how the form that you have designed in inclined with the DOD, DTU and the courses that have been offered.

{1*30 Marks}

NOTE: a) Size: 12x4 inch b) Form: Geometric / Organic / Combination of these two c) Use of Color, pattern, texture or other elements of design are allowed

END

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Total no. of Pages:2 Roll no.....

BDes_SEMESTER_III

END TERM EXAMINATION *Nov/Dec-2022*

DD201 PHYSICAL ERGONOMICS

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions carry equal marks.
All questions are compulsory.

Q.1 What is ergonomics in the workplace? What are the benefits of ergonomics? [5] [CO#1]

OR

Q.2 What are the principles of ergonomics? Explain with proper description and illustrations. [5] [CO#2]

Q.3 What are the different types of grips, and where are they used? Elaborate with sketches? [5] [CO#2]

Q.4 What are the design constraints and considerations while designing a hand held tool for rural farmer/gardener? [5] [CO#4]

Q.5 Define (a) Reference points (b) good posture (c) Carpel Tunnel syndrome (d) REBA & RULA Analysis (e) anatomical planes [5][CO#X]

Q.6 Explain the term Participatory Ergonomics. What are the keys factors associated with it? [5] [CO#3]

Q.7 Explain the various ergonomics factors to be considered while designing the workstation for computer users, and elaborate with sketches. [5] [CO#4]

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Q.8 India's textile sector significantly contributes to the country's exports and has an 8.7% share of GDP. The textile sector is also labour-intensive and employs about 15 million people in the country (30% of the total workforce). Like many other sectors, work-related musculoskeletal disorders (WMSDs) caused by awkward working postures, repetitive tasks, prolonged sitting or standing positions, bad workplace design, etc., have been commonly reported. To examine and analyse the prevalence of musculoskeletal disorders (MSDs) with the Ergonomics risk assessment tool (REBA, RULA).

[10] [CO#4]

Total no. of Pages: 01 — Roll no. 572

III SEMESTER
B.Des.

END TERM EXAMINATION — *Nov/Dec-2022*

DD203 Design and People

Time: 03:00 Hours — *Max. Marks: 40*

Note: All questions are compulsory.

NOTE:
ATTEMPT ANY ONE.

Q.1 *Ruchi/Arvind are opening a fine dine restaurant with all the amenities. Assume you're a creative business, consider visualizing your business's processes while showcasing how happy your client is with the final product.*

Takeaway: Highlight key components of Project through illustrations such as

a) Timeline
b) Challenges
c) Solutions
d) Outcomes
e) Mockup drawings

User-friendly designs that you created through analysis and the process from "Pen and Paper" to web.

(40 Marks)

Or

Q.2
There's nothing quite like a well-designed and colourful brand. Visually pleasing branding design has a positive effect on consumers and clients. Many businesses rely on a strong visual brand to differentiate them from their competitors. Assume you are a business that offers photography, doodles and renders to elevate a client's brands.

P.T.O

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10

Create a collection of your designs to support your client —and let the images speak for themselves.
Along with the custom photography, highlight, doodles and renders describe the client's challenges, the solutions your business have arrived at and the results of the collaboration

(40 Marks)

----------End----------

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Total no. of Pages: 01 H *Roll no.....*

III SEMESTER

B.Des.

END TERM EXAMINATION *Nov/Dec-2022*

DD205 Basics of Interaction Design

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions are compulsory.

During the course of the Semester there were numerous activities and tasks given to you. You are to attempt the following questions with an introspection of what you learnt and how you are going to apply that.

[20]

Q.1
What are the different data collection techniques that you have used in the entire semester? You are to describe the same with examples from your assignments along with samples of the data (eg. interviews, photos, sketches, sounds...etc). Each individual have used unique techniques to gather information and work on their projects. Please elaborate on the methods that you have used with the help of infographics, sketches etc.

[20]

Q2.
How have you processed the above mentioned information to converge on your project. You are to mention the cognitive process/ method / technique that you have developed to justify your answer.

Please keep the answers interesting, crisp and avoid writing long stories.

--End--

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DELHI TECHNOLOGICAL UNIVERSITY, DELHI
DEPARTMENT OF DESIGN

ODD 3RD SEMESTER

B.DES

END TERM EXAMINATION NOV-2022

COURSE CODE: DD 207, COURSE TITTLE: BASIC PHOTOGRAPHY AND VIDEOGRAPHY

Time: 3:00 Hours Max. Marks: 40

Q1. Attempt All [Two marks each, 2 x 10 =20 Marks] Marks: 20

a) What is the main purpose of making film?

b) What is the most important aspect of making a film?

c) What is the process of making film?

d) What are the benefits of film making?

e) What is the most challenging aspect of film making?

f) What materials are used in film making?

g) How does film impact society?

h) What are the 5 most important elements in filming?

i) What was the first movie you watched and what kind of movies do you like?

j) What are the similarities of film and Theatre Arts?

Q2. Must attend. Marks: 10

Where do you see yourself in five years?
Write a story of 500 words and show this story through story board, make at least ten frames.

Q3. Choose between a) and b). Marks: 10

a) What is your favourite movie/Web Series? Who is your favourite Director? Write the name of five Directors with their films, why did you choose their name, also write the reason for it.
Directors with their films, why did you choose his name, also write the reason for it.

b) What are the three most important qualities you think a filmmaker must have? What have you learned from the films you have made? How important is the team while making a film?

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Total no. of Pages: 01 13 Roll no.....

3nd SEMESTER

B.Des

END TERM EXAMINATION Nov/Dec-2022

COURSE CODE: DD209 **COURSE TITLE: Visual Design**

Time: 03:00 Hours *Max. Marks: 40/50*

Note : Research topic may be floated 24hrs beforehand to allow time to conduct the necessary research.

Q.1 Choose any one of the following [40Marks] [CO1]

a) A Museum
b) An Archaeological Site
c) An Art Galley
d) A Historic Monument

Design a pamphlet for the same in order to brand it as a tourist destination/ place to visit.

Size = A3. Design both the front and back. It should fold in the middle, like a booklet.

Submit the pdf and printout of the same.

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Total no. of Pages: 01 Roll no.....

BDes_SEMESTER V

END TERM EXAMINATION **Nov/Dec-2022**

DD301 Universal Design

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions carry TEN marks each.
Attempt any four questions.

Q1 Explain Universal Design (UD) principles with a suitable example Identify three key areas of a shopping complex where Universal Principles are to be applied the most.

Q2 List FIVE health conditions (disabilities/illness) and find out one activity limitation and one UD or Assistive Technology solution f each condition.

Q3 Briefly explain the Universal Design features of Delhi Metro with Sketch.

Q4 What is the Internet of Things (IoT)? List the name of five IoT devices used in daily life.

Q5. What is an Accessibility Audit? Imagine the college canteen as a built-up environment and prepare an Access Audit report to make accessible for all.

Explain following terms

a. Shared Design
b. Inclusive Design
c. Assistive vs Universal Design
d. User Exclusion

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Total no. of Pages: Roll no.....

BDes_SEMESTER_V

END TERM EXAMINATION Nov/Dec-2022

DD303 Design Thinking

Time: 03:00 Hours Max. Marks: 40

Note: All questions are compulsory.

Q1. Applying the learnings of Design Thinking process, design optimum policy initiatives for recuperation of lost learning due to school closures during the pandemic of 2020 & 2021. [20]

- Please clearly enumerate each phase/process with appropriate mapping and tools used. [10]
- A visual flowchart of how the policy will be executed. All stakeholders have to be identified in each phase/part and their motivations identified. [10]

You can choose either a country or a city or a village if you want to.

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Total No. of Pages: 01

Roll No.....

5th Semester

B.Des

End Term Examination

Nov/Dec-2022

DD 321 Research Techniques in cognition perception and creativity

Time: 03 Hours

Max. Marks: 40

Note: Attempt any Four questions
Each question is ten marks
Assume suitable missing data; if any

Q1: Explain the following along with their importance in research

1) Topic selection
2) Hypothesis
3) Primary and Secondary Data
4) Data Analysis [10]

Q2: Discuss any four methods of your choice for Data Collection. [10]

Q3: Discuss any method of your choice for data validation in scientific research. [10]

Q4: What is the difference between probability and non-probability sampling? Which of the two sampling methods would be more likely to give as a representative sample and why? [10]

Q5: A research paper is summarized in a sequence of steps defining a systematic process to achieve the research objective. Discuss th series of steps involved in research paper writing. [10

Total No. of Pages: 01 *Roll No.....*

5th Semester

B.DES Program

END TERM EXAMINATION Nov Dec-2022

DD331 Typography- 2

Time:3:00 Hours **Max Marks: 40**

Note: All Questions are compulsory.
Use of the internet is allowed.
Assume suitable missing data, if any.

Q.1 Prepare your Typographical resume with the following attributes:

Emphasis on name, contact number, email, website, or expertise.
Highlighted small text in a Box
Some text in Reverse
Some text Underlined
Some text center-aligned
Footer in small size text
Graphics or pictures can also be used

Note: Size A4, Digital file (Pdf), Multiple colors.
[30 Marks] [CO-1]

Q.2

a) Write your friend's name in freehand style:
Use upper and lower case
Use Colours
Do not use font
Give 3D effect

OR

b) Design your visiting card using the following points:
Use Typographic skills.
Use Graphics or images to show your profession, if needed.
Colorful or Black and white.
[10 Marks] [CO-1]

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5th Semester
BDES Program

END TERM EXAMINATION Nov Dec-2022

DD341 Animation- 2

Time:3:00 Hours **Max Marks: 40**

Note: All Questions are compulsory.
Use of the internet is allowed.
Art materials: paper, pencil, eraser, colors, etc.
Assume suitable missing data, if any.

Q.1 Draw an 8-frame animation of a character in Side View on <u>any one</u> of the topics mentioned below:

a. doing a somersault
OR
b. jumping forward
OR
c. doing Surya Namaskar [20 Marks] [CO-1]

Q.2 Draw a storyboard of any 6 frames of the following story:

"At 40, Franz Kafka (1883-1924), who never married and had no children, walked through the park in Berlin when he met a girl who was crying because she had lost her favorite doll. She and Kafka searched for the doll unsuccessfully.

Kafka told her to meet him the next day, and they would return to look for her.

The next day, when they had not yet found the doll, Kafka gave the girl a letter "written" by the doll, saying, "please don't cry. I

took a trip to see the World. I will write to you about my adventures."

Thus began a story that continued until the end of Kafka's life.

During their meetings, Kafka read the letters of the doll carefully written with adventures and conversations that the girl found adorable.

Finally, Kafka returned the doll (she had bought one) that had returned to Berlin.

"It doesn't look like my doll at all," said the girl.

Kafka handed her another letter in which the doll wrote: "my travels have changed me." the little girl hugged the new doll and brought her a happy home."

Note: The storyboard must contain a description of the Audio, Visual, Camera, Light, and Duration of each shot

[20 Marks] [CO-1]

Total no. of Pages: 01 — Roll no. 5823

V SEMESTER
BDes_

END TERM EXAMINATION — *Nov/Dec-2022*

DD 351 Exploring Taxonomy of Product Design

Time: 03:00 Hours — *Max. Marks: 50*

Note: All questions are compulsory.
You can do web searches on your mobile.
Illustrate your answers where necessary.
Assume suitable missing data, if any.
State assumptions you make.

You have been working on your final term exploring a specific category of products. These were

- Products we continuously operate during the use
- Products that two or more operate together and use.
- Products that require intermittent attention
- Products we play with.
- Products we live in
- Products that are slaves
- Products that collaborate with users and upgrade them self
- Products that augment or create a virtual reality
- Products that passively enfold with time
- Products that record, store, compile, retrieve,

Q1. List ten or more examples of products in each of the above categories. (10Marks)

Q2. Plot 10 graphs, one for each category plotting the preponderance of that product category along the time axis covering the last 1000 years. Write a line or two of justification for each (10 Marks)

Q3. For each category, describe how its use affects the making of a being. What type of temperament and capabilities will it develop in the user? (10 Marks)

Q4. For each category, describe how its use will affect the environment (10 Marks)

Q5. For each category, describe the design investigation you would make to better understand the design requirements/uncertainties/challenges. (10 Marks)

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Total no. of Pages: Roll no.....

BDes_SEMESTER_V

END TERM EXAMINATION Nov/Dec-2022

DD361 Pattern-Drafting & Draping

Time: 03:00 Hours Max. Marks: 40

Note: All questions are compulsory.

Q.1 Do a front and back bodice draping using methods learnt. [40]

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SPS

DELHI TECHNOLOGICAL UNIVERSITY, DELHI
DEPARTMENT OF DESIGN
ODD SEMESTER

B.DES

END TERM EXAMINATION NOV-2022

COURSE CODE: DD 361, COURSE TITLE: CLAY, CERAMICS AND GLASS MOULDING

Time: 3:00 Hours Max. Marks: 40

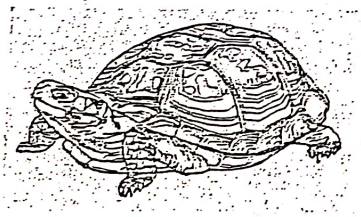
Q1. THEORY - ATTEMPT ANY FOUR [EACH- FIVE MARKS, DURATION 80 MIN] MARKS: 20

a) Explain in detail various properties of glass? Mention different applications of glass.
b) Show the packing of atoms in BCC structure, calculate packing factor of a BCC crystal structure.
c) Give brief introduction about ceramic material and also explain various properties of ceramic material.
d) Explain different types of clay minerals in detail and also highlight various application of clay.
e) Name various types of glass and explain manufacturing of glass material.
f) Write short notes on any two:
   i. Fiber reinforced metal matrix composite
   ii. Ceramic Matrix Composite
   iii. Graphite Matrix composite

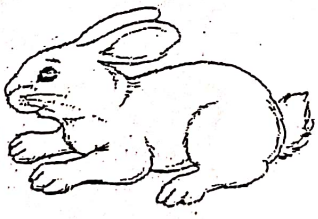
Q2. PRACTICAL - ATTEMPT ANY TWO [EACH- TEN MARKS, DURATION 100 MTS] MARKS: 20

a) Make a Tortoise with Clay, size: H- 4 inches
b) Make a Rabbit with Clay, size: H- 6 inches
c) Make a Frog with Clay, size: H- 4 inches

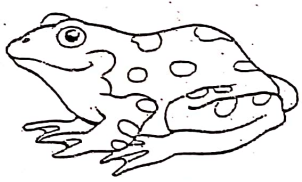
References



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DELHI TECHNOLOGICAL UNIVERSITY, DELHI

DEPARTMENT OF DESIGN

ODD SEMESTER

B.DES

END TERM EXAMINATION NOV'2022

COURSE CODE: OED 363 COURSE TITLE: METAL, PLASTIC & MIX MATERIAL

Time: 3:00 hours Max. Marks: 40

Q1. THEORY –

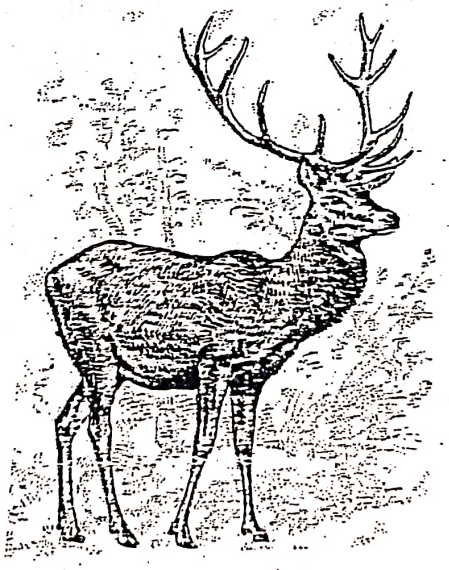
ATTEMPT ANY FOUR QUESTIONS [EACH FIVE MARKS - DURATION 80 MIN] MARKS: 20

a. Give brief introduction about various properties of cast iron. Explain in detail various types of cast iron with suitable applications.
b. Show the packing of atoms in BCC structure, calculate packing factor of a BCC crystal structure.
c. Explain in detail different types of plastic. Write down various properties of plastic.
d. Explain in detail various types of steels with their applications.
e. Give brief introduction about aluminum alloy and copper. Write down their different applications and various properties.
f. Write short notes on any five:
   i. Zinc ii. Nickel iii. Lead iv. Cobalt v. Tin vi. Magnesium

Q2. PRACTICAL –

ATTEMPT TO MAKE A SCULPTURE. [20 MARKS - DURATION 100 MIN] MARKS: 20

4 mts of metal wire is provided to you to create 3D product of size 6 inches height and length will be in accordance of the proportion of the animal.
Find a image of a deer shown below for developing the product.



REF. DEER

Total No. of Pages: 01

Roll No. 587

7th Semester

B.Des

End Term Examination

Nov/Dec-2022

DD 401 DESIGN RESEARCH

Time: 03 Hours

Max. Marks: 40

NOTE: Attempt any four questions
All questions carry equal marks.

1. Explain Qualitative research and Quantitative research in detail with suitable example. [10]

2. Give brief introduction about shadowing and Elito methods with suitable examples. [10]

3. Describe following terms in brief [10]
a) Generative Research
b) Behavioral Mapping
c) Cognitive Mapping
d) Brain storm graphic organizers
e) Affinity Diagramming

4. Give brief introduction about usability testing and competitive testing. [10]

5. Write a short note on A/B Testing. Explain in detail with suitable example how A/B Testing helps in optimization. [10]

6. Discuss Kano Analysis in detail. How it helps in improving customer satisfaction? Explain with suitable examples. [10]

SPB

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DELHI TECHNOLOGICAL UNIVERSITY, DELHI

DEPARTMENT OF DESIGN

ODD SEMESTER

B.DES

END TERM EXAMINATION NOV'2022

COURSE CODE: OED 363 COURSE TITLE: METAL, PLASTIC & MIX MATERIAL

Time: 3:00 hours Max. Marks: 40

Q1. THEORY –

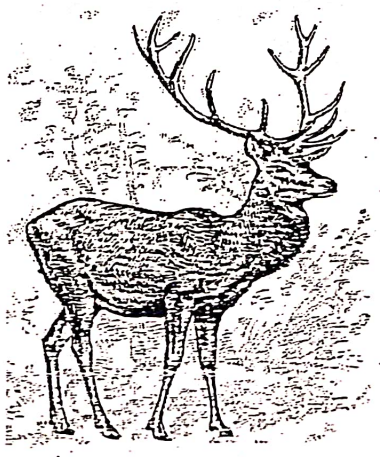
ATTEMPT ANY FOUR QUESTIONS [EACH FIVE MARKS - DURATION 80 MIN] MARKS: 20

a. Give brief introduction about various properties of cast iron. Explain in detail various types of cast iron with suitable applications.
b. Show the packing of atoms in BCC structure, calculate packing factor of a BCC crystal structure.
c. Explain in detail different types of plastic. Write down various properties of plastic.
d. Explain in detail various types of steels with their applications.
e. Give brief introduction about aluminum alloy and copper. Write down their different applications and various properties.
f. Write short notes on any five:
   i. Zinc ii. Nickel iii. Lead iv. Cobalt v. Tin vi. Magnesium

Q2. PRACTICAL –

ATTEMPT TO MAKE A SCULPTURE. [20 MARKS - DURATION 100 MIN] MARKS: 20

4 mts of metal wire is provided to you to create 3D product of size 6 inches height and length will be in accordance of the proportion of the animal.
Find a image of a deer shown below for developing the product.



REF. DEER

Total No. of Pages: 01

Roll No. 587

7th Semester

B.Des

End Term Examination

Nov/Dec-2022

DD 401 DESIGN RESEARCH

Time: 03 Hours

Max. Marks: 40

NOTE: Attempt any four questions
All questions carry equal marks.

1. Explain Qualitative research and Quantitative research in detail with suitable example. [10]

2. Give brief introduction about shadowing and Elito methods with suitable examples. [10]

3. Describe following terms in brief [10]
a) Generative Research
b) Behavioral Mapping
c) Cognitive Mapping.
d) Brain storm graphic organizers
e) Affinity Diagramming

4. Give brief introduction about usability testing and competitive testing. [10]

5. Write a short note on A/B Testing. Explain in detail with suitable example how A/B Testing helps in optimization. [10]

6. Discuss Kano Analysis in detail. How it helps in improving customer satisfaction? Explain with suitable examples. [10]

Total no. of Pages: 02 25 Roll no. 508

BDes SEMESTER VII

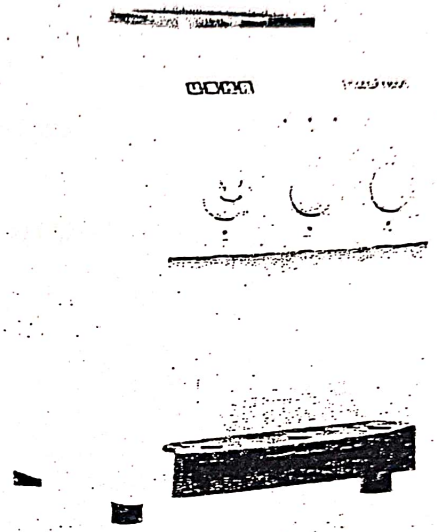
END TERM EXAMINATION *Nov/Dec-2022*

DD421 MODEL MAKING AND PROTOTYPING

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions carry FOUR marks each.
All questions are compulsory.

Q1 Consider the following table top water dispenser. The manufacturer hires you as a designer to give it a fresh look. What factors will you consider to decide on the visual theme of the product? Briefly explain each factor with suitable illustrations.



Q2 Explain with the help of suitable example how to conduct competitor styling analysis.

Q3 What is a Mood board and why and how it is created?

Q4 What is silhouette and why a designer mostly start the process of styling with it? Explain with suitable illustrations taking a product as an example.

Q5 What is proportion in a product? With the help of suitable example and illustrations explain how proportions can be used to create focus?

Q6 Illustrate the final design of your final assignment and explain how will you model it? Provide a list of materials, processes, and tools likely to be used in modelling the product.

Q7 What is 'stance' in a product form? How do you decide on the 'stance' of any product? Use flower vase as a product example and illustrate 3 'instance' of the product.

Q8 State 10 workshop safety measures that every designer should follow

Q9 State how prototyping and model making is used in the process of product development.

Q10 State 3 properties of MDF as a material for prototyping.

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Total No. of Pages: 01 *Roll No.....*

7th Semester

B.Des

End Term Examination Nov/Dec-2022

DD 423 Mobility Design

Time: 03 Hours Max. Marks: 40

JURY

1. End Semester project (30 Marks)
   Presentation
   A3 size poster (4 A3 as single poster and other a3 posters can be realistic renders or designers choice).

2. Physical Model- Display. (10 Marks)

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Total no. of Pages: 01

Roll no.....

VII SEMESTER
BDes

END TERM EXAMINATION Nov/Dec-2022

DD425 Applied Ergonomics

Time: 03:00 Hours Max. Marks: 40

Note: All questions are compulsory.

Q1. Briefly outline the physiological principles of importance for the ergonomics of posture and movement. (5 Marks)

Q2. Briefly outline the ergonomic principles of importance for hand and arm postures related to design of hand tools. (5 Marks)

Q 3. Imagine you are conductive a descriptive method to understand why car users`s jump a red light at a traffic signal in different situations. What would be the independent and dependent variables for the same that could provide the data to understand behavior pattern of the users. (10 Marks)

Q 4. Sketch preferable sitting for the situations below. The design of the sitting should be relevant to the furniture ht mentioned. Mention the dimensions of sitting in your sketch. (5 Marks)

A. Wood workshop table with ht. 3' 0"
B. Bar table with ht. 3' 6"
C. Kids school desk with ht. 2' 0"

Q 5. Out of all the electronic appliances / control devices that you have used (except mobile phone and any touch control based devices), which appliance control provides the least cognitive load according to you? Sketch the appliance / control device with tentative dimensions. Highlight the control points. Describe why do you feel the cognitive load to be the least in this appliance / control device in max. 10 points. (10 Marks)

Q 6. Briefly outline the cognitive ergonomic principles related to design of the physical controls for physical products. (5 Marks)

Total no. of Pages: 01 Roll no 592

VII SEMESTER

BDes

END TERM EXAMINATION *Nov/Dec-2022*

DD427 Medical Equipment Design

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions are compulsory.

Q1. Please explain in your own words the significance of bio design innovation process and differentiate it with conventional design process. (10 Marks)

Q2. Please explain the process of Needs screening and Need filtration with example. (10 Marks)

Q3. Explain the risk classification of Medical Devices with examples. (5 Marks)

Q4. Please define "business model innovation" in your own words with examples. (5 Marks)

Q5. Explain different methods of concept generation and method of concept selection. (10 Marks)

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Total no. of pages: 01

7th Semester
BDES Program

Nov/Dec-2022

END TERM EXAMINATION
DD431 Graphic Design

Max Marks: 40

Time: 3:00 Hours

Note: Attempt any one question.
The use of the internet is allowed for research.
Assume suitable missing data, if any.

Q.1

a) Create a digital Corporate Identity for your Design Studio. Deliverables of the design created will be as follow:
   i) Logo for Design studio
   ii) Business Card (Size 3.5"x 2.0")
   iii) letterhead document (Size 8.5"x 11")
   iv) Envelop (Size 9.5"x 4.5")

[30 Marks] [CO-1]

b) Explain why your design should be a good choice for the company. (Word limit: 250) [10 Marks] [CO-1]

OR

Q.2

a) Create a digital concept of 'food menu design' with an original logo for clients such as restaurants, bistros, bars, or fast-food chains of your choice: [30 Marks] [CO-1]

Note:
Use text, Images, and photographs that are consistent with the branding.
Keep in mind the readability factor, consistent color palette, and accuracy of illustrations used.

b) Explain why your design should be a good choice for the company. (Word limit: 250) [10 Marks] [CO-1]

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Total no. of Pages: 01 ~~3~~ 1 Roll no.....

7th SEMESTER

B.Des

END TERM EXAMINATION *Nov/Dec-2022*

COURSE CODE: DD433 COURSE TITLE: New Media Studies

Time: 03:00 Hours *Max. Marks: 40/50*

Note:

Q.1 Prepare a digital campaign to promote your newly developed idea, services, business or event. [20] [CO1]

Following points to be kept in mind

a) Prepare two or more posts in series.

b) Posts should have brief information about the subject.

c) Highlight the name of the subject.

d) Date, venue, address should be mentioned.

Q.2 Attempt any one [20] [CO1]

a) Prepare a post to promote the 'Clean Yamuna' campaign.

OR

b) Prepare a social media advertisement for 'Amul Butter'

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Total No. of Pages: 01 Roll No.....

7th Semester

BDES Program

END TERM EXAMINATION Nov Dec-2022

DD435 Advance Animation and Moving Images Design

Time:3:00 Hours Max Marks: 40

Note: All Questions are compulsory.
Assume suitable missing data, if any.

Q.1 Show **any four** of the below-mentioned Nav Rasa through human expressions (face and body language) and describe them in max. 100 words:

a. Shringara – Love/beauty
b. Hasya – Laughter
c. Karuna – Compassion
d. Raudra – Anger
e. Veera – bravery/heroism
f. Bhayanaka – Terror/fear
g. Bibhitsya – Disgust
h. Adbhuta – Wonderment
i. Shantam – Peace

[4x5=20 Marks] [CO-1]

Q.2 Draw a storyboard of **any six** frames for the following poem by Rabindranath Tagore:

"Art thou abroad on this stormy night on thy journey of love, my friend? The sky groans like one in despair.

I have no sleep tonight. Ever and again, I open my door and look out into the darkness, my friend!

I can see nothing before me. I wonder where lies thy path!

By what dim shore of the ink-black river, by what far edge of the frowning forest, through what mazy depth of gloom art thou threading thy course to come to me, my friend?" [20 Marks][CO-1]

Total No. of Pages: 01 37 *Roll No.....* 596

7th Semester
B.DES Program

END TERM EXAMINATION Nov-Dec-2022

DD437 Branding-2

Time:3:00 Hours **Max Marks: 40**

Note: All questions are compulsory.
Internet is allowed for research and reference.

Q.1

a) Create a new digital identity (branding) on <u>any one</u> of the themes mentioned below:
Health services
Public awareness on road safety
Right to vote (Election awareness)
Deliverables for branding will be
i) Logo design
ii) Social media post [10+10Marks] [CO-1]

b) Write a brief note on your design process. [10 Marks] [CO-1]

Note: Color: Max. four colors
File format: PDF

Q.2 Attempt <u>any two</u> of the following:

a) Why is branding important in advertising? Justify your answer by giving at least two examples. (Max. 250 words)[10 Marks] [CO-1]

b) How does branding play a crucial role in public awareness? Give at least two examples. (Max. 250 words)[10 Marks] [CO-1]

c) "A well-researched branding exercise elevates the image and perception of a product/ service to a whole new level" Do you agree or disagree? Give two examples to justify your answer. (Max. 250 words) [10 Marks] [CO-1]

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Total no. of Pages: 01 | 34 | Roll no.....

VII SEMESTER

B.Des.

END TERM EXAMINATION *Nov/Dec-2022*

DD441 Augmented Reality and Virtual Reality

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions are compulsory.

Note: Answer any Four

Q.1 Define immersive technology write benefits of the AR and VR for human. (10 Marks)

Q.2 Propose use of AR / VR technology. Describe in detail with the help of user persona, wireframes, sketches and user flows. (Draw at least 5 wireframes to explain the concept). (10 Marks)

Q.3 What are prototypes? Write the possible uses of prototypes with suitable examples. (10 Marks)

Q.4 Write a paragraph on virtual reality headset (head- mounted device). Also mention its harmful effects on human. Write names of the brands working on head-mounted devices. (10 Marks)

Q.5 Explain 3DoF and 6Dof in virtual reality. Use sketches to describe different degrees of freedom. (10 Marks)

Q.6 Why do we need 3D models? Discuss the software used for creation and manipulation of objects/ assets for virtual environments. (10 Marks)

35 598

Total no. of Pages: 01 *Roll no.....*

BDes_SEMESTER_VII

END TERM EXAMINATION ***Nov/Dec-2022***

DD443 Advance Material Processes and Finishes

Time: 03:00 Hours ***Max. Marks: 40***

Note: All questions are compulsory.

Q1. What is shell moulding process? Write the application, advantages and disadvantages. [CO1](10)

Q2. Discuss the classification of polymer materials? [CO2](5)

Q3. What is the difference between thermoplastic and thermosetting plastic? [CO3](10)

Q4. Explain the types materials and their applications for designers? [CO2](5)

Q5. What is investment or lost wax process? Write the application, advantages and disadvantages. [CO3](10)

Total no. of Pages: 01 36 Roll no.....

VII SEMESTER

B.Des. 599

END TERM EXAMINATION *Nov/Dec-2022*

DD445 Design for UX

Time: 03:00 Hours *Max. Marks: 40*

Note: All questions are compulsory.

This paper is all about 2032 and your strategies to reach there.

We started this conversation on the interaction we had in Lodhi Garden. Please think of your scenarios on the basis of continuing with the discussion on Environment, Sustainability, Circular and Blue Economy. There were many points discussed on resource sustainability, carbon trapping, carbon credit etc. Keeping these meta themes in mind please answer the following questions.

Originality of idea, multi layered, multi-disciplinary thought process and depth of thinking will be given weightage.

[15]

Q1.

We have seen many new careers emerging in the cyber age. List down the emerging ones based on your priority.

a. How are you going to upgrade your skillsets as well as philosophy to keep yourself updated. (5)
b. Define your experience strategy in a timeline by listing down these career paths and how you want to apply them for your holistic development. (10)

P.T.O

600

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Q2. [25]

Define the immediate concerns on environment that you feel need to be addressed.

a. How these concerns are going to change and impact your life in the next 10 years. Explain with the help of examples and sketches. (10)
b. What are the various UX laws/ Technologies/Strategies that can be applied to mitigate the above mentioned concerns. Dig deeper into these thoughts and document with the help of infographics. (15)

Please keep the answers interesting, crisp and avoid writing lo stories. Answer in 2nos of A3 sheets.

--End--

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Total no. of Pages: Roll no.....

BDes_SEMESTER_VII

END TERM EXAMINATION Nov/Dec-2022

DD447 Service Design

Time: 03:00 Hours Max. Marks: 40

Note: All questions are compulsory.

Q.1 What is Customer Journey Map? Please enumerate a real life example through a visual chart. [12]

Q.2 What is a Value proposition design. Enumerate a real life example from your own experience and draw linkages. [12]

Q.3 Applying your own class room learnings, design a seamless service for hostel accommodation for students enrolling in to DTU and draw out the differences between your devised service and the existing one.
[16]