QUESTION PAPERS FOR END TERM THEORY EXAMINATIONS
MAY-2024



B.Tech, B.Tech (Evening), B.Design,
2nd, 4th , 6th & 8th SEMESTER

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B.TECH

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B.TECH [Eve.]

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SECOND SEMESTER
END-TERM EXAMINATION

Roll. No.....
B.TECH (Re-registered)
May 2024

AP 102: Physics-II

Time: 3:00 Hours

Max. Marks: 40

Note: Question 1 is compulsory.
Attempt any four questions from Question 2 to 7.
Assume suitable missing data, if any.

Q1. Write short notes on the following [2×4=8][CO#1-5]

[a] Twin Paradox
[b] Wave-particle duality
[c] Hall Effect
[d] Spontaneous and stimulated emission

Q.2 [a] Calculate the percentage contraction in the length of a rod in a frame of reference, moving with velocity 0.8c in a direction (i) parallel to its length and (ii) at an angle of 30° with its length. What is the orientation of the rod in the moving frame of reference in case (ii)? [4][CO#1]

[b] State and deduce the mathematical expression for the law of addition of relativistic velocities. Show that in no case can the resultant velocity of a material particle be greater than c. [4] [CO#1]

Q.3 [a] Derive an expression for the intensity distribution due to Fraunhofer diffraction from N slits. Also, plot the intensity distribution corresponding to N=4. [4][CO#2]

[b] Plane-polarized light of wavelength 5400 Å is incident perpendicularly on a quartz plate cut with faces parallel to optic axis. Find the thickness of quartz plate, which introduces phase difference of 45° between e- and o-rays. Given that μ_e=1.553 and μ_o=1.544. [4][CO#2]

Q.4 [a] Starting with the rate equations for matter-radiation interaction, show that the ratio of the Einstein's A and B coefficients is proportional to the third power of the frequency of radiation.

[4][CO#3]

[b] Describe different types of optical fibre on the basis of refractive index profile. Derive an expression for the numerical aperture for step index fibre in terms of refractive index of the core and cladding.

[4][CO#3]

Q.5 [a] What do you mean by Compton Effect? Consider an X-ray beam of wavelength 0.2 nm. If the radiation scattered from free electron is viewed 90° to the incident beam - (i) what is Compton shift, (ii) what kinetic energy is given to the recoiling electron and (iii) what percentage of the incident photon energy is lost in the collision.

[4][CO#4]

[b] What is the physical significance of wave function? Write down the time-dependent form of the Schrodinger equation and obtain the time-independent form of the Schrödinger equation from this.

[4][CO#4]

Q.6 [a] Discussing drift and diffusion current in semiconductors, Derive an expression for Einstein's relation.

[4][CO#5]

[b] What do you mean by intrinsic carrier concentration? Obtain an expression for the same. Show that the Fermi level in an intrinsic semiconductor is situated in the middle of the valence and conduction bands.

[4][CO#5]

Q.7 [a] Consider a particle trapped in an infinite potential box of width 'a',

$$V(x) = \begin{cases} 0, & 0 < x < a \\ \infty, & x \leq 0, x \geq a \end{cases}$$

Write the Schrodinger equation for this particle and hence get the expression for the energy eigen values and eigen functions for the particle. Draw the probability densities for the first three wave functions.

[4][CO#4]

[b] What is LASER? Explain the working principle of Ruby laser with the help of a suitable energy level diagram.

[4][CO#3]

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

SECOND SEMESTER **B.TECH**

END-TERM EXAMINATION **May 2024**

AP 102: Physics

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

Note: Question 1 is compulsory.
Attempt any four questions from Questions 2 to 6.
Assume suitable missing data, if any.

Q1. Answer the following questions. [2×4=8][CO#1-5]

[a] Differentiate between spontaneous and stimulated emission of radiation.

[b] What are the factors responsible for changing fringe width in wedge shaped film?

[c] What is Compton effect? Why Compton effect is not observed with visible light?

[d] Discuss length contraction and time dilation.

Q.2 [a] Derive the law of addition of relativistic velocities. Use it to prove that under the Lorentz transformation no two velocities can add upto more than the value of the speed of light. [4][CO#1]

[b] The mass of a moving electron is 11 times its rest mass. Find its kinetic energy and momentum. [4][CO#1]

Q.3 [a] Write condition for missing order or absent spectra with a diffraction grating. Which particular spectra would be absent if the width of the transparencies and opacities of grating are equal. Also, show that only first order is possible if the width of grating element is less than twice the wavelength of light. [4][CO#2]

[b] Explain the formation of Newton's rings in reflected monochromatic light. Prove that in reflected light diameters of bright rings are proportional to the square root of odd natural numbers. [4][CO#2]

Q.4 [a] A particle constrained to move along x-axis in the domain $0 \leq x \leq L$ has a wave function $\psi(x) = Sin\left(\frac{n\pi x}{L}\right)$, where n is an integer. Normalize the wave function and evaluate the expectation value of momentum of the particle. [4][CO# 4]

[b] Calculate the energy difference between the ground state and first excited state for an electron in a one dimensional rigid box of length 10^{-8} cm. (mass of electron= 9.1×10^{-31} kg and $h = 6.626 \times 10^{-34}$ J-s. [4][CO#4]

Q.5 [a] Explain the working principle of He-Ne laser with the help of a suitable energy level diagram. Why He-Ne laser is superior to Ruby laser? [4][CO#3]

[b] Calculate the numerical aperture, acceptance angle and critical angle from the following data n_1 (core refractive index) = 1.50 and n_2 (refractive index of cladding) = 1.45. [4][CO# 3]

Q.6 [a] What do you mean by Fermi level? Prove that Fermi level in intrinsic semiconductors lies midway in the forbidden band. [4][CO#5]

[b] What is Hall Effect? Derive an expression for Hall coefficient and discuss some of its important applications. [4][CO#5]

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Total no. of Pages: 2

Roll no.....

Re-Registered

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B.Tech.

END TERM EXAMINATION

May-2024

AC102 CHEMISTRY

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] Discuss the theory of indicators by taking any two suitable examples. [3 marks][CO1]

[b] Explain in detail scale and sludge formation in boilers with the help of diagrams and suitable chemical reactions. [3 marks][CO1]

[c] What is Priming and Foaming? Write down suitable methods to avoid them. [2 marks][CO1]

Q.2 [a] Draw block diagram of the double beam UV-Visible instrument and mark the parts. [3 marks][CO2]

[b] Write down all possible stretching and bending vibration of water molecule in IR spectroscopy. [3 marks][CO2]

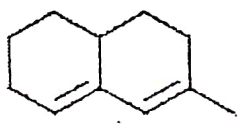
[c] What is the criterion for a compound to be IR active? Explain fingerprint region of IR spectroscopy. [2 marks][CO2]

Q.3 [a] What is the importance of thermal method of analysis? Explain TGA a with suitable thermogram. [3 marks][CO2]

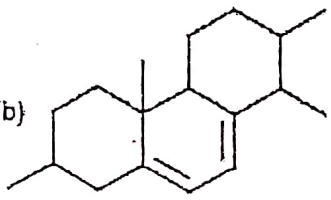
[b] Define chromophore and auxochrome with a suitable example. [3 marks][CO2]

[c] What is Homo-annular and Hetero-annular conjugated double bond? Calculate λ_{max} for the following molecules using Woodward-Fiesher rule. [2 marks][CO2]

(a)



(b)



Q.4 [a] What do you understand by the term conducting polymer? What doping and write down different possible methods of it. Draw th structure of different possible forms of PANI. [3 marks][CO3]

[b] Explain Ziegler-Natta catalytic polymerization mechanism. Classify and explain polymer on the basis of tacticity and give one example of each type. [3 marks][CO3]

[c] In a Polymer, there are 100 molecules of molecular weight 100; 200 molecules of molecular weight 1000; and 300 molecules of molecular weight 10,000. Calculate its number average molecular weight, weight average molecular weight and P.D.I . [2 marks][CO3]

Q.5 [a] Explain the working principle of lithium ion battery with charging and discharging reactions. [3 marks][CO4]

[b] What do you mean by fuel cell and elaborate the working of hydrogen-oxygen fuel cell. [3 marks][CO4]

[c] Define phase rule. [2 marks][CO5]

Q.6 [a] Explain the phase diagram of water in detail. [3 marks][CO5]

[b] Write down Any SIX principles of green chemistry. [3 marks][CO6]

[c] Calculate Atom economy of the following reaction

(At.Weight of Fe = 55.845 u)

$$Fe_2O_{3(s)} + 3CO_{(g)} \rightarrow 2Fe_{(s)} + 3CO_{2(g)}$$ [2 marks][CO6]

Total No of Pages...Two... *Roll No.....* 7

Second Semester **B Tech (Automobile Engineering)**

END SEMESTER EXAMINATION *(May – 2024)*

AE – 104 **ENGINEERING MECHANICS**

Paper Code **Title of the Subject**

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

Note: **Question No. 1 is Compulsory. Attempt four Questions more from the rest of the Question Paper. In total attempt Five Questions. All questions carry equal marks. Assume missing data, if any.**

Q No 01 Answer the following Questions in brief. **(2x04=08 CO 01 & 03**

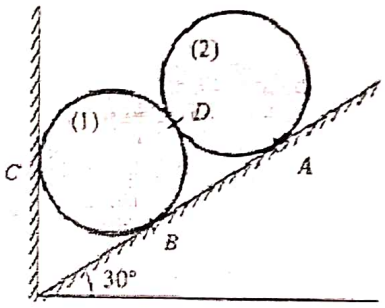
(i) – What is the Law of Transmissibility of Force?

(ii) – With an example, explain Addition of Couples.

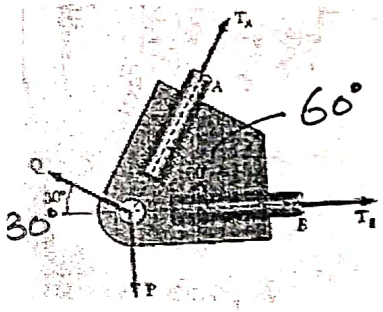
(iii) – What do you understand by Angle of Repose?

(iv) – Differentiate between linear and angular acceleration.

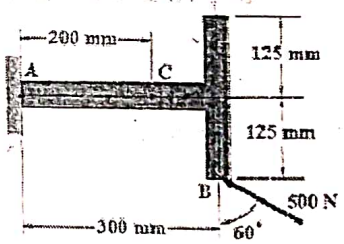
Q No 02 (a) Two identical rollers each of weight 50 N are supported by an inclined plane and a vertical wall as shown below. Determine the reactions at the points of support A, B and C, assuming all the surfaces of the contact to be smooth. Also find the reciprocal force between the rollers. **(04) CO 04**



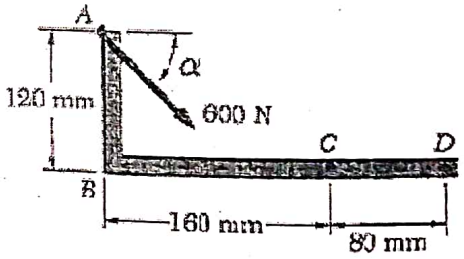
Q No 02 (b) Two forces P and Q of magnitude P = 600 lb and Q = 800 lb are applied to an aircraft connection as shown in the following figure. Knowing that the connection is in equilibrium determine the tension in rods A & B. **(04) CO 02**



Q No 03 (a) In the given diagram determine (a) – the moment about C of the force shown (b) – the perpendicular distance from C in the line of action of the force. **(04) CO 03**

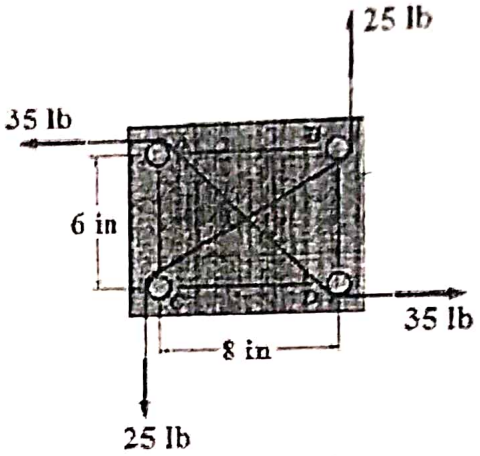


Q No 03 (b) Knowing that the line of action of the 600 N force passes through point A and $\alpha=30^{\circ}$, replace the 600 N force by an equivalent force couple system at D. **(04) CO 05**



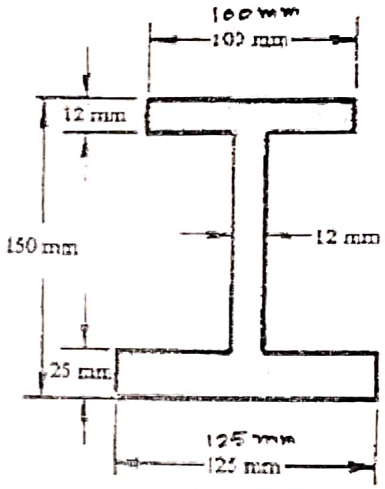
8

Q No 04 (a) Four 1 inch cm diameter pegs are attached to a board as shown. Two strings are passed around the pegs and pulled with the forces indicated. (a) – Determine the resultant couple acting on the board (b) – If only one string is used around which pegs should it pass and in what directions should it be pulled to create the same couple with the minimum tension in the string? (04) CO 02



Q No 04 (b) A stone *A* is dropped from rest down a well, and in 1 sec another stone *B* is dropped from rest. Determine the distance between the stones another second later. (04) CO 03

Q No 05 Find out the Moment of Inertia of the following I section about its centroidal x-x & y-y axis. (08) CO 04

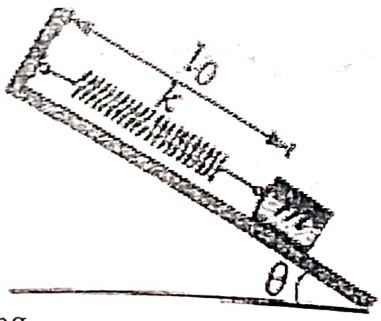


Q No 06 (a) One Ball A is thrown at a velocity of 10m/sec, at an angle of 60° to horizontal. If another Ball B is thrown at an angle of 45°, then find out its initial velocity if it has same (i) – Horizontal Range (ii) – Time of Flight, as that of the ball A. (04) CO 02

Q No 06 (b) A bus starts from rest at point A and accelerates at the rate of 0.75 m/s , until it reaches the speed of 9m/s. It then proceeds at 9m/s until the brakes were applied; it comes to rest at point B, 27 m beyond the point where the brakes were applied. Assuming uniform deceleration and knowing that the distance between A and B is 180 m, determine the time required for the bus to travel from A to B. (04) CO 01

Q No 07 (a) The motion of a particle is defined by the equations $120Sin\frac{1}{2}\pi t$ and $y = 40t^2$, where x and y are expressed in meters and t in seconds. Determine the velocity and acceleration of the particle when t = 1 sec. (04) CO 03

Q No 07 (b) A block of mass m is released from rest in the position, as shown in the following figure. The coefficient of static and kinetic friction between the block and surface is μ, and the free length of the spring is l_0. Find the maximum displacement of the block. (04) CO 01



Q No 08 Write Short notes on any two of the following. (2x04=08) CO 01 & 03

(i) – Analysis of Truss (ii) – SFD & BMD

(iii) – D Alembert's principle (iv) – Collision

Total No. of Pages: 02 9 Roll no.....

IV SEMESTER

B.Tech. Mechanical Engineering (Automobiles)

END TERM EXAMINATION *May-2024*

AE202 HEAT AND MASS TRANSFER

Time: 3 Hours *Max. Marks : 40*

Q-1(a): Explain followings with physical significance

(i) Shearwood Number(ii) Schmid Number(iii) Mass Stanton Number (iv) Diffusion Coefficient (4) (CO-6)

(b) Explain the methods of finding convection heat and mass transfer coefficients. Why Reynolds analogy and Coleburn analogy is used in convection heat and mass transfer problems. Under what condition these two analogies becomes the same (4) (CO-2,CO-6)

Q-2(a): Explain followings with physical significance.

(i) Intensity of Radiation (ii) Emissive Power(iii) Absorptivity (iv)Reflectivity, (v)Transmissivity (5) (CO-4)

(b) Derive the expression of radiation exchange between two surface and shape factors. Also proove the reciprocal theorm. (3) (CO-4)

Q-3(a): Discuss in detail the various regimes of boiling. (3) (CO-3)

(b):A performance is found dead at 5.PM in a room where temperature is 20°C. The temperature of the body is measured to be 25°C. when found and heat transfer coefficient is estimated to be 8 W/m^2K. Consider a healthy human body a 30cm diameter, 1.80 m long cylinder. Calculate actual time of death of the person Take thermo-physical properties of the human body

(i) Thermal conductivity=6.05W/mK (iii) specific heat=4200J/kgK (iii)Density=900kg/m^3 (5) (CO-1)

10

Q-4 Derive the expression for LMTD and Effectiveness of parallel/counter flow heat exchanger (3+5) (CO-5)

Q-5(a) A heat exchanger is required to cool 55,000kg/hr of alcohol from 66°C to 40°C using 40,000kg/hr of water entering at 5°C. Calculate exit temperature of water (ii) Heat transfer rate (iii) LMTD in parallel and counter flow arrangement (iv) surface area of heat exchanger (4) (CO-5)

(b)Derived the expression for fins, when fin is (i) two long (ii) fin is well insulated (2+2) (CO-1)

Roll no.....

Total no. of Pages :03

IV SEMESTER B.Tech. - AE

May-2024

END TERM EXAMINATION

AE204 : THEORY OF MACHINES

Max. Marks : 40

Time: 3:00 Hours

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

1. A four bar chain mechanism has different links as shown in Fig.1 has AB=15 mm, BC=26 mm, CD=20 mm, AD=28 mm, BE=CE=20 mm, CG=10 mm and DG=14 mm. Draw the velocity and acceleration diagram when the crank makes 60° and rotates with uniform 500 rpm in counter clockwise direction. Determine the absolute velocity and acceleration of points E, C and G. Also calculate the velocity and acceleration of E with respect to G for the given instant. **[8][CO-1]**

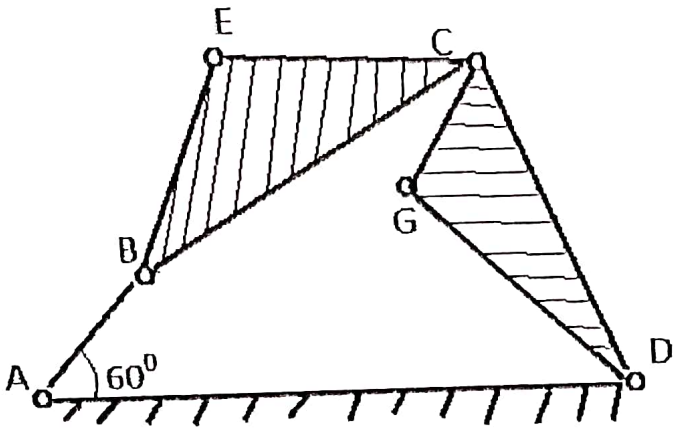


Fig.1

2. Draw the displacement curve and cam profile for the radial roller follower having radius 10 mm to attain the following specification of cam-follower mechanism for one rotation.
The base circle of cam has radius 20 mm and lift of follower is 24 mm.
The upward motion of follower is with Simple Harmonic Motion of 120°.
The dwell period at tot most position is 30°.
The return motion of follower is with uniform acceleration and retardation for 90°. **[8][CO-2]**

3 A motor boat has speed of 60 km/hr takes a turn towards right i.e. starboard end. The radius of circular path is 300 meter. A steam turbine fitted to it such that the axis of the rotating shaft is parallel to the length (longitudinal axis) of the boat. The radios of gyration of the revolving masses, which are revolving at 3000 rpm is 30 cm and their mass is 1500 kg. The revolving masses i.e. rotor of the turbine is supported on bearings 4 m apart. Direction of rotating of the masses looking from the stern of the vessel is clockwise. Determine the gyroscopic couple transmitted by the hull of the vessel and the manner in which this couple affects the balance of the vessel. Determine the maximum reaction at the bearings and the direction of the reaction forces. The centre of gravity of the rotor may be assumed at the mid span of the bearings. Describe all with the proper justification. **[8][CO-6]**

4 Fig.2 shows an epicyclic gear train. Pinion A has 24 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 16 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]**

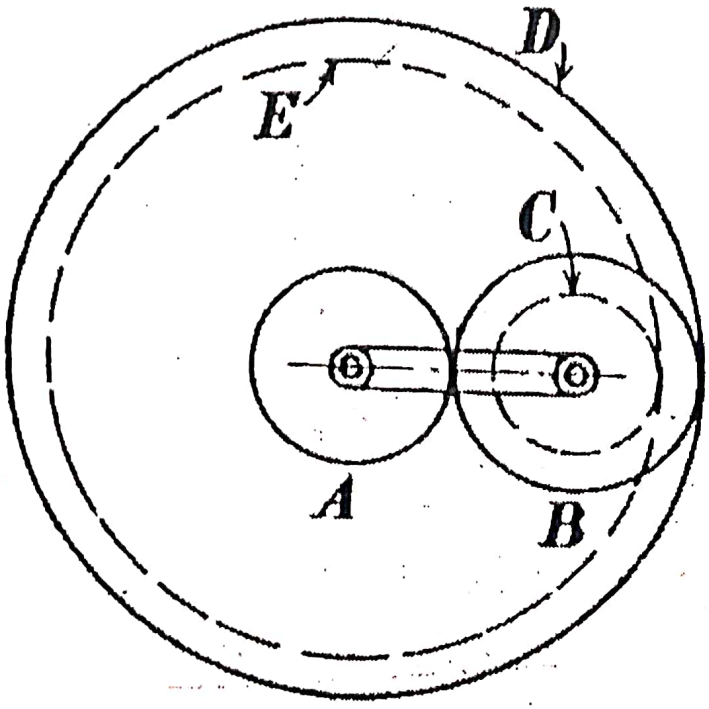


Fig. 2

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]**

6 [a] A vibratory system with viscous damping has mass 2.5 kg attached with spring having stiffness 3N/mm. It has observed that the amplitude decreases to 0.25 of the initial value after five consecutive cycles. Determine the damping coefficient ot the damper in the system.
[b] Derive and describe the whirling speed of the shaft with the help of derived expression. **[4x2=8][CO-6, 3]**

7 Attempt any two of the following:
[a] With the help of neat sketch and expressions, describe under, over and critical damping of the system
[b] With the help of neat sketch, derive and describe the law of gearing.
[c] Compare between primary unbalance and secondary unbalancing force of reciprocating. **[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] Derive and describe the law of steering for four whwheel vehicle.
[4x2=8][CO-4, 6]

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Total no. of Pages: 2

Roll no.....

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FOURTH SEMESTER

B.Tech. [AE]

END TERM EXAMINATION

May-2024

COURSE CODE AE 206 COURSE TITLE:MECHANICS OF SOLIDS

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. Derive the relation between Young's modulus and Bulk modulus for an elastic member [04][CO1]

b. A prismatic bar of dimensions 250mmx40mmx25mm is subjected to three axial loads of 10kN, 15kN and 18kN, 15kN is compressive load and the remaining are tensile loads. Assuming that the Young's modulus as $2.1X10^5 N/mm^2$ and Poisson's ratio as 0.30. Find the volumetric strain in the body. [04][CO3]

Q.2 a. Explain Mohr's circle for biaxial stress condition with suitable diagram. [04][CO2]

b. Ina biaxial stress state, two normal stresses acting on two perpendicular planes are $240N/mm^2$ and $150N/mm^2$ and accompanied by a shear stress of $60N/mm^2$. Find the magnitude and position of Principal stresses and the Maximum shear stress and its position. [04][CO4]

Q.3 a. A simply supported beam of span 3.6m is carrying two point loads of 2kN, 3kN and 2kN at a distance of 0.5m,1.8m and 3.1m from the left hand support. The beam is an eye section with flange sections having a dimension of 30mm x 4 mm and web section as 40mm x 4mm, Beam carries a UDL of 1kN/m on the entire span. Find the bending stresses under all the point loads and the maximum bending stress in the beam. [6][CO3]

b. Write a brief note on assumptions made in theory of simple bending [2][CO2]

Q.4 a. A shaft transmits a power of 25kW at a speed of 360 rpm. If the length of the shaft is 1.2 m and the shaft is having a hollow cross section with the inner diameter equals to 60% of the Outer diameter, find the dimensions of the shaft. Assuming that the permitted shear stress to be 50N/mm^2 and Modulus of rigidity as 1.1x10^{5}N/mm^2. If the permitted angle of twist is 1 degree. Find the dimensions of the shaft based on stiffness also. [M04][CO2]

b. A close coiled helical spring of wire diameter 8 mm, mean coil diameter 72mm is having 15 coils. The spring is subjected to an axial load of 500N. Calculate (a). the maximum stress induced (b). Stiffness of the spring (iii). Stiffness of the spring. Assume Modulus of rigidity as 1.1x10^5 N/mm^2 [M04][CO2]

Q.5 a. A simply supported beam of length 5 m carries two point loads of 2kN and 3kN from left and right hand supports. Find the deflection under these loads and the maximum deflection, assuming that the beam is a square beam of 25mm side. Young's modulus of may be assumed as 2.1x10^{5}N/mm^2. [M04][CO4]

b. A load of 2kN falls attached to a circular bar of 1.5 m length and 20mm diameter falls freely on a collar attached at the bottom. If the weight falls from a distance of 1.2m, assuming Young's modulus as 2.1x10^5 N/mm^2. [M04][CO2]

Q.6 a. A column with rectangular cross section of 30mmx60mm is subjected to an axial load of 10kN. Find the Buckling load on the column using Euler's criterion for(i). Both the ends hinged (ii). Both the ends fixed(iii). One end fixed and the other end is free (iv). One end is fixed and the other end is hinged. Young's modulus may be assumed as 2.1x10^5 N/mm^2. [04][CO4]

b. Briefly explain the assumptions made in the theory of long columns of Euler and explain how it is different from Rankine's column. [04][CO1]

Total No. of Pages 02

Roll no. 15

FOURTH SEMESTER

B.Tech. [AE]

END TERM EXAMINATION

May-2024

AE208 Material Engineering and Metallurgy

Time: 3:00 Hours

Max. Marks: 40

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

Q.1(a) Describe the mechanisms involved in the recovery process after plastic deformation. (4) (CO 2)

Q.1(b) Define critically resolved shear stress (CRSS) and explain its significance in the context of material deformation. (2) (CO 2)

Q.1(c) A material with a fracture toughness (KIc) of 30 MPa$\sqrt{m}$ has a critical crack length of 0.05 mm. Calculate the surface energy (γ) of the material. (2) (CO 5)

Q.2(a) Draw and discuss the Fe-Carbon diagram and explain its significance in the field of metallurgy. (6) (CO 3)

Q.2(b) Derive the equation for Gibb's phase rule. (2) (CO 3)

Q.3(a) Discuss any three types of case hardening methods commonly used in industry. (4) (CO 4)

Q.3(b) Define plain carbon steel and discuss its classification. How does carbon content influence its properties? (4) (CO 6)

Q.4(a) Discuss the reinforcement materials commonly used in polymer matrix composites and explain how their properties contribute to the overall performance of the composite. (5) (CO 7)

Q.4(b) Explain the various methods of powder production used in powder metallurgy. (3) (CO 7)

Q.5(a) How does the time and temperature of heat treatment affect eutectoid steel. Label different products formed on the diagram. (4) (CO 4)

Q.5(b) Write down the composition, properties and applications of bearing alloys. (2) (CO 6)

Q.5(c) Write the designation of (i) 25C6 (ii) 35Ni8Cr4Mo2 (2) (CO 6)

Q.6(a) Explain fatigue failure in materials. Draw S-N curve for ferrous material. (4) (CO 5)

Q.6(b) Define atomic packing factor (APF). Describe how APF is calculated for different crystal structures such as face-centered cubic (FCC), body-centered cubic (BCC), and hexagonal close-packed (HCP). (4) (CO 1)

Total No. of Pages: 01 *Roll No. .....17.....*

SIXTH SEMESTER [AE]

B. Tech.

END TERM EXAMINATION **May 2024**

AE 302 DESIGN OF MACHINE ELEMENTS

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

Note: Attempt any *FIVE* questions.
All questions carry equal marks.
Assume suitable missing data, if any.
Use of Design Data Handbook is permitted.

1.(a) What are the basic requirements for designing machine elements? [CO#1] 4

(b) Differentiate between Goodman's and Soderberg's analysis for fluctuating loads. [CO#2] 4

2. Design a knuckle joint for connecting two medium carbon steel rods to withstand a tensile load of 250 kN. The permissible stresses in tension, shear and crushing are 180 MPa, 100 MPa and 220 MPa respectively. [CO#3] 8

3. A line shaft is to transmit 30 kW at 160 rpm. It is driven by a motor placed below it by means of a belt running at 45° to the vertical on a 1000 mm diameter pulley keyed to the end of the shaft. The tension on the tight side of the belt is 2.5 times that on the slack side and the center of the pulley overhangs 150 mm beyond the center line of the end bearing. Design the shaft if the allowable shear stress is 55 N/mm^2 and the weight of the pulley is 1.6 kN. [CO#4] 8

4. Design completely a close-coiled helical spring to carry a fluctuating load varying between 500 N and 1000 N. The spring index may be taken as 6 and the factor of safety should be 1.5. [CO#5] 8

5. Design a pair of cut-teeth spur gears with 20° full depth teeth to be made of high carbon steel. The gears are to transmit 50 kW at 2500 rpm of the pinion with a velocity ratio of 1.5. [CO#6] 8

6. Design a friction clutch with hardened steel clutch plates of inner and outer friction surface diameters of 50 mm and 75 mm respectively. The clutch is to transmit 6 kW at 800 rpm in oil atmosphere. [CO#7] 8

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

VIth SEMESTER

B.Tech. (Automobile)

END SEMESTER EXAMINATION **May-2024**

AE-304 Internal Combustion Engines

Time: 3 Hours *Max. Marks: 50*

Note: 1. Attempt all questions by selecting any two parts from each question

2. Assume suitable missing data, if any.

1	(a)	Differentiate between Two stroke and Four stroke I.C.Engines	[CO2][5]
	(b)	Compare and contrast Valve Timing and Port Timing Diagram	[CO2,3][5]
	(c)	Describe the valve timing diagram of four stroke Petrol engine	[CO1,3][5]
2	(a)	Discuss the various operating variables which effect the combustion phenomenon in SI engine	[CO2,3][5]
	(b)	Explain the Pre ignition and abnormal combustion phenomenon in SI engines	[CO3,4][5]
	(c)	Describe the working and essential features requirements of surface ignition	[CO4][5]
3	(a)	With the help of a simple diagram, explain the essential features of combustion phenomenon in CI engine	[CO3,4][5]
	(b)	How do you determine the chemically correct air fuel ratio? Explain and specify how it varies with load variation.	[CO3,4][5]
	(c)	What is meant by Diesel knock? Discuss the methods to control the Diesel knock	[CO3,4][5]

4	(a)	Define and explain the functions and working of lubricating system in I C Engines	[CO3,4][5]
	(b)	How supercharging is carried out and what are the limits of supercharging? Explain	[CO4,5][5]
	(c)	List the methods to measure Power of IC engines and explain any one of them in detail	[CO3,4][5]
5	(a)	Classify Petroleum based fuels specifying their properties	[CO2,4][5]
	(b)	Describe the working of either Multi point Fuel Injection system or common rail direct Injection system	[CO3,4][5]
	(c)	Discuss the need of alternative fuels for I C Engines. Specify your answer based upon usage/knock rating/pollution control	[CO4,5][5]

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

VI/VIII SEMESTER B TECH

END SEMESTER EXAMINATION May. 2024 20

AE-306/ Elect-3 ALTERNATIVE FUELS AND ENERGY SYSTEMS

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

Note: *1.Answer ANY FIVE questions.*
2. Answer to each question (or its parts/Subparts) must start On a fresh page.
3. Draw properly labeled diagrams wherever required.
4. All questions carry EQUAL marks.

1. a. Explain the formation of exhaust emissions with conventional fuels and state how they affect the human health? [4][CO1]

b. Discuss the use of alcohol as alternative fuel in IC engines. Explain their performance and emissions. [4][CO2]

2. a. Explain the production of bio gas from wastes and briefly describe the processes for its purification. [4] [CO4]

b. Discuss the IC engine performance and emissions using biogas in dual fuel operation [4] [CO3]

3. a. Explain the various biodiesel production methods. Discuss the parameters affecting its production yield. [4] [CO5]

b. Explain the utility of biodiesel in IC Engines discuss, also describe its advantages and limitations. [4] [CO5]

4. a. Explain the modifications required to convert a CI engine for CNG operation. Discuss its advantages and limitations [4] [CO4]

b. Explain the process for production of producer gas and discuss its uses, advantages and limitations. [4] [CO4]

5. a. Describe the various layouts of an electric vehicle. Compare the utility of electric vehicles with hybrid vehicles. [4] [CO1]

b. What is the concept of Solar powered vehicles. Discuss the working of solar cells and their limitations. [4] [CO1]

6. Write short notes on the following: ANY FOUR

i. Twin problems of fossil fuels `ii) Flex fuel vehicles
iii) Surface ignition engines iv) Hydrogen storage
v) SVO use in IC engines vi) Automotive Batteries
vii) Fuel knock ratings viii) Hydrogen Production methods

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

6th/ SEMESTER
B.Tech. (AE)

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END SEMESTER EXAMINATION **(May–2024)**

AE-322 Reliability & Maintenance Engineering

Time: 3:00Hours *Maximum Marks: 40*

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

1. (a) Discuss practical applications of Reliability, Availability and Maintainability (RAM) Engineering to systems. (4) [CO#1]

   (b) A pressure gauge has been observed to have a Weibull failure distribution with a shape parameter of 2.1 and a characteristic life of 12,000 hr. Find the following:

   (i) R (5000 hr)

   ii) The B1 life (4)[CO#2]

2. (a) Probability density function given by with (t) hours

$$f(t) = \begin{cases} 0.002e^{-0.002t} & t \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

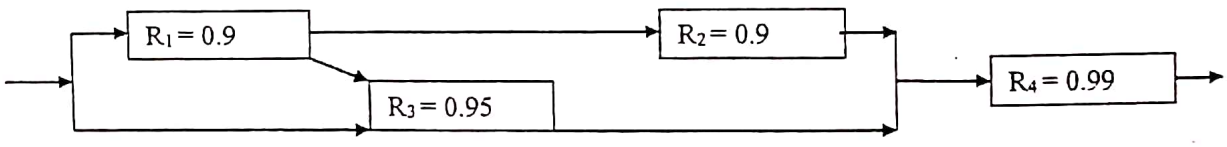
   Determine (i)Reliability for t hrs (ii) Median time to failure. (4)[CO#2]

   (b) The wearout of a machine part is normally distributed with 90 percent of the failures occurring between 200 and 270 hr of use (i.e., 5 percent below 200 hr and 5 percent above 270 hr).

   i) Find the MTTF and the standard deviation of failure times.

   ii) Determine the design life if no more than a 1 percent probability of failure prior to replacement is tolerated. (4) [CO#3]

3. (a) Determine the reliability of the following linked system using the decomposition method. (4)[CO#4]



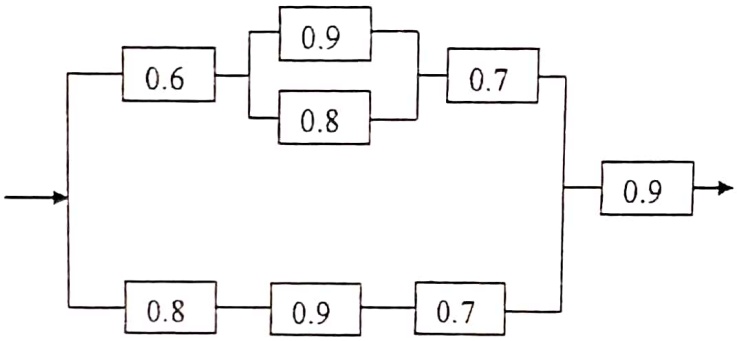
(b) Which system (i) or (ii), has the higher reliability at the end of 100 operating hours?

i) Two CFR components in parallel each having an MTTF of 1000 hr.

ii) A Weibull component with a shape parameter of 2 and a characteristi life of 10,000 hr in series with a CFR component with a failure rate o 0.00005. (4)[CO#3

4. (a) Discuss various reliability improvement techniques. (4)[CO#2]

(b) Find the system reliability for the following system configuration.



(4)[CO#3]

5. [a] Derive an expression for the steady-state availability for two active identical components having a constant failure rate and sharing a sing repair crew with a component repair rate of 'r'. (4)[CO#4]

[b] Mention various maintenance policies adopted in industri applications. Differentiate between condition based maintenance and opportunistic maintenance.
(4) [CO#1]

6. [a] Four units are connected in series, with reliabilities, R1=0.85, R2=0. R3=0.8 and R4=0.95. Calculate the system reliability. If the reliability to be increased to a value of 0.65, how this should be apportioned amon four units according to the minimum effort method.

(4) [CO#4

[b] A requirement exists for an engine fuel pump to be repaired (or replaced) within 3 hr 90 percent of the time. If the repair distribution is lognormal with s=0.45. What MTTR should be achieved to meet this goal? Find also tmode.

(4) [CO#3

7. Write shot notes on **any two** of the following topics (2X4) [CO#
[a] Monte Carlo simulation; [b] Bath tub curve; [c] Markov method.

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

VI Semester

B.Tech.

END-SEMESTER EXAMINATION MAY-2024

AE-326 PRODUCTION PLANNING & INVENTORY CONTROL

Time: 3 Hrs. Max.Marks:50

Answer any FIVE questions

Q1. (a) What are the main points on which decisions are made in production planning and control? (3)

(b) Discuss the major factors determining production planning procedures. (3)

(c) Discuss various stages of product development. (4)

Q2. (a) In a time study the observed time is 0.75 min., performance rating factor is 10% and allowances are 20% of the normal time. Determine standard time. (3)

(b) Break-even is no affected with changes in sales price per unit. Justify it. (3)

(c) Weekly production requirement of a product are 1000 items. The cycle time of producing one product on a machine is 10 minutes. The factory works on two shifts basis in which total time available is 16 hrs. out of the total available time 25% is wasted. The factory works for 5 days in a week. How many machines are required to fulfil the production requirement? (4)

Q3. (a) What are the Differences Between MRP and MPS? (3)

(b) What prerequisite information needed for process planning? (3)

(c) The demand for a commodity is 100 units per day. Every time an order is placed a fixed cost of Rs. 400 is increased. Holding cost is Rs. 0.08 per unit per day. If the lead time is 13 days, find the economic lot size and reorder point. (4)

Q4. (a) Write point wise differences between Periodic and Perpetual inventory control. (3)

(b) How Two-Bin Inventory control works? (3)

(c) A local car mechanic shop uses 36000 units of a part each year (A maximum consumption of 100 units per working day). It costs Rs 20 to place and receive an order. The shop orders in lots of 400 units. It cost Rs. 4 to carry one unit per year of inventory. Calculate (i) total annual ordering cost (ii) total annual carrying cost and (iii) Economic order quantity. (4)

Q5. (a) The table below gives details of an assembly line

Work station	I	II	III	IV	V	VI
Total Task time at workstation (in min.)	7	9	7	10	9	6

Find line efficiency of the assembly line. (3)

(b) A car engine assembly requires the following tasks in a given sequence

Task	A	B	C	D	E	F	G	H	I	J	K	L
Immediate predecessor	-	A	B	B	B	B	C,D	G	E	F,I	H,J	K
Task time (in min.)	12	6	6	2	2	12	7	5	1	4	6	7

The desired output is 140 engines per week. This assembly line operates for 1 shift/day (7 Hrs.), 5 days a week. Draw precedence diagram and calculate cycle time, Theoretical number of workstations with task allocation to each workstation. Also find idle time. (7)

Q6. Short Notes on: (2x5=10)

(a) JIT

(b) ABC Analysis

(c) Kaizen

(d) Cellular Layout

(e) Predetermined motion time standards

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Roll no.....

VIII SEMESTER

B.Tech.

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END TERM EXAMINATION

MAY-2024

AE416 **RENEWABLE SOURCES OF ENERGY**

Time: 03:00 Hours

Max. Marks:50

Note: Answer ANY FIVE Questions in all.
Assume suitable missing data, if any.

Q.1 Discuss the concept of Sustainable Development? What is the significance of the principal of Circular Economy and how can we apply this principal for the development of sustainable sources energy? [10] [CO2]

Q.2 Prepare a comparative note on the advantages and disadvantages of solar energy resources over the wind energy resources, with the help of suitable diagrams? [10] [CO1]

Q.3 Evaluate and comment on the following statement – **"Biogas energy is the simplest and most effective carbon neutral source of renewable energy"**? Explain the working of any three main component of a Biogas generation system using suitable diagram? [10] [CO3]

Q.4 Propose a integrated stand alone green energy power generation system for the coastal village of the state 'Goa', to make the village 100 % self reliant green energy village. The total energy requirement of the village of around 2000 families can be assumed to be 5 MW, the main occupation of the villagers is fisheries ? (assume suitable data if needed) [10] [CO6]

Q.5 Discuss the potential of using Hydrogen as a fuel for automotive sector? What are the limitations of Hydrogen storage for automotive applications? [10] [CO5]

Q.6 Write a short note on any **TWO** of the following: [05 x 2=10] [CO4]

i.) Thermal energy storage systems.
ii.) Geothermal energy resources.
iii.) UN Sustainable Development Goals.
iv.) Compressed Air Energy Storage System.

VIII SEMESTER

26

B.Tech (Auto/Other Branches)

END TERM EXAMINATION ***MAY-2024***

AE-420 **Vehicle Safety Engineering**

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 in one place
Assume suitably missing data, if any.

Q.1	(a) Write a comprehensive note on evolution of vehicle safety systems.	10 marks (5+5)	CO-1
	(b) Explain the concept of driving safety and conditional safety in detail.		
Q.2	(a) Discuss the various tests for different hydraulic braking systems?	10 marks (5+5)	CO-2
	(b) Explain the role of ECU in impact detection.		
Q.3	(a) Explain the influence of engine location on safety, with a neat sketch.	10 marks (5+5)	CO-3
	(b) Give the construction and working principles of central locking systems.		
Q.4	(a) Explain in details the emission test protocols for petrol and diesel engines.	10 marks (5+5)	CO-4
	(b) Describe the full load test for the engine with the help of supporting data		

Please Turn Over for remaining four questions

Q.5	(a) Explain the working principle of an MPFi system using the help of a diagram. (b) Outline the working of a typical Speedometer Calibrator.	10 marks (5+5)	CO-5
Q.6	(a) Describe the main provisions of the Indian Motor Vehicle Act 1988. (b) Explain the meaning and purpose of fitness of vehicle.	10 marks (5+5)	CO-6
Q.7	Write critical explanatory reasoning on the following with a comparative assessment to India and the USA: a) Motor Vehicle Act Amendments vis-à-vis Road Safety b) Seat Belts vis-à-vis Driver Safety	10 marks (5+5)	CO-6 CO-2
Q.8	Write short notes on any two of the following: a) CRDI System b) Crash Test c) Collapsible steering columns	10 marks (5+5)	CO-5 CO-1 CO-3

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

2nd SEMESTER

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Btech Biotechnology

END TERM EXAMINATION *May-2024*

COURSE CODE:BT102 Biochemical Engineering Principles

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

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

Q.1 Write short notes on any TWO: [10] [CO 1;2]

(i) Plasmid Instability

(ii) Synchronous culture

(iii) Microbial Death Kinetics

Q.2 Explain any TWO of the following briefly: [10] [CO 1;3;4]

(i) Scale up in bioprocess fermentation

(ii) Principles and mechanism of air sterilization

(iii) Microbial energetics

[10] [CO 4]

Q.3(i) What do you understand by "bioreactor". Explain the characteristic features of different types of bioreactors

(ii) Explain briefly the homogeneous and heterogeneous reaction system

Q.4 Explain any TWO of the following: [10] [CO 2;4;5]

(i) Critical and non-critical process parameters which should be controlled in a bioreactor

(ii) Bioreactor configuration

(iii) Kinetics of substrate utilization and product formation

Q. 5 Describe the following in brief: [10] [CO 5]

(i) Biochemical process variables and their measurements

(ii) Control principles and their applications in bioreactor

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

2nd SEMESTER

28

Btech Biotechnology

END TERM EXAMINATION *May-2024*

COURSE CODE:BT101 Biochemical Engineering Principles

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

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

Q.1 Write short notes on any TWO: [10] [CO 1;2]

(i) Plasmid Instability
(ii) Synchronous culture
(iii) Microbial Death Kinetics

Q.2 Explain any TWO of the following briefly: [10] [CO 1;3;4]

(i) Scale up in bioprocess fermentation
(ii) Principles and mechanism of air sterilization
(iii) Microbial energetics

[10] [CO 4]

Q.3(i) What do you understand by "bioreactor". Explain the characteristic features of different types of bioreactors

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Q.4 Explain any TWO of the following: [10] [CO 2;4;5]

(i) Critical and non-critical process parameters which should be controlled in a bioreactor
(ii) Bioreactor configuration
(iii) Kinetics of substrate utilization and product formation

Q. 5 Describe the following in brief: [10] [CO 5]

(i) Biochemical process variables and their measurements
(ii) Control principles and their applications in bioreactor

Total no of pages : 2

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B. TECH. (II Sem) 29

END TERM EXAMINATION 2024

BT104 INTRODUCTION TO BIOTECHNOLOGY

Time – 3:00 hour Max. Marks - 50

Note: Both the questions are compulsory.
1. Question 1 is fill in the blanks. Each blank carry half mark. 2. Question 2 is long answer type questions. Each question carry 6 marks. Attempt any 7 questions.

Que1: Fill in the blanks - (8) (CO#1,2)

1. In tautomerism, the ..... form is thermodynamically more stable than ..... form.
2. ..... refers to the process where a poly(A) tail, which is a sequence of adenine nucleotides, is added to the transcript.
3. .... are the backbone of the strands of nucleic acid present in the life existing on Earth
4. .... are the type of microorganisms that can live in both aerobic and anaerobic conditions.
5. ..... are chemotrophs that get energy from inorganic compounds, including hydrogen sulfide (H_2S) and reduced iron.
6. The body of a fungus is called a .....
7. Most fungi are filamentous, and contain individual filaments called ..... A network of hyphae is called a ....., and it is used for nutrient absorption.
8. Viruses that infect only bacteria are called ..... and those that infect only fungi are termed .....
9. Fatty acid β-oxidation is a multistep process by which ..... are broken down to ....

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10. ..... is the technique in which microorganisms are used to clean up pollutants in soil and water
11. pH of stomach acid is ..... while pH of human blood is .....

Ques2: Long answer type questions. Attempt any 7 questions. (42)(CO#3,4)

1) How DNA is packed inside the nucleus of the cell (packing strategy)? Support your answer with neat and clean diagram.
2) Discuss viral structure and characteristics in detail. Why most scientists do not consider viruses to be living things?
3) Pen down four types of structural organization in proteins in detail.
4) Make a neat and clean diagram of: a) Sucrose b) Maltose.
5) Write classification of enzymes with example.
6) What if, a cell lack golgi apparatus, cytoskeleton and centrosome?
7) Depict the nucleic acid structure and composition using flow chart only. Depict the central dogma of molecular biology using a diagram/flow chat only.
8) Write short note on a) mRNA, b) tRNA, c) lock and key model of enzymes.
9) Differentiate between a) saturated and unsaturated fatty acids, b) simple lipids and compound lipids, c) Essential and non-essential fatty acids.

Total No. of Pages: 3

Roll No. .....

FOURTH SEMESTER

B.Tech. [BT]

END SEMESTER EXAMINATION *May-2024*

BT 202 Molecular Biology

Time: 03.00 Hours *Max. Marks: 40*

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

Q.1 [A] Attempt any TWO of the following [2+2] [CO1]

(i) Prokaryotic replication starts at *ori* C. Give a diagrammatic representation of the structure of minimal *ori* C. Also, describe various iterative sequences located within this region

(ii) Explain the functioning of DnaA initiator protein in prokaryotic DNA replication. Clearly mention the roles of its binary complexes with ATP and ADP

(iii) Compare and contrast the structure and functions of prokaryotic DNA polymerase I and DNA polymerase III

[B] Answer the following [2+2] [CO2]

(i) Discuss the mechanism of DNA scrunching and its role in the process of transcription

(ii) Structurally, RNA polymerase (RNAP) is a multisubunit protein with several channels. Explain the roles of various subunits and channels of RNAP in detail

Q.2 [A] Attempt any TWO of the following [2+2] [CO2]

(i) Transcription in eukaryotes is coordinated with cleavage and polyadenylation. Explain the termination signal, cleavage step, and polyadenylation step in detail, giving details of enzymes involved

(ii) Give a diagrammatic representation of GU:AG intron, mentioning all the sites crucial for the two transesterification reactions. Explain the sites and mechanism of action of uracil-rich snRNPs and SR proteins in spliceosomal splicing

(iii) Enumerate various types of covalent modifications in prokaryotic tRNA. Explain two general roles of these covalent modifications

P.T.O.

(iv) Taking any one example, discuss the role of small nucleolar proteins (snoRNAs) in the post-transcriptional processing of eukaryotic pre-rRNA

[B] Taking suitable examples, give a descriptive account of two editing mechanisms in eukaryotic pre-mRNA. Clearly discuss the roles and actions of various proteins involved [4] [CO2]

Q.3 [A] Attempt any TWO of the following [2+2] [CO3]

(i) Enumerate various properties of genetic code. What is meant by wobbling? Also, explain the significance of wobble hypothesis

(ii) During prokaryotic translation, 30S and 70S initiation complexes are formed. Discuss their formation and the roles of various initiation factors involved

(iii) Explain the roles of various initiation factors involved in the initiation phase of eukaryotic translation in detail

(iv) Consensus sequences of inteins and exteins play crucial roles in four nucleophilic reactions involved in intein splicing. Explain these consensus sequences and the four nucleophilic/ rearrangement reactions catalyzed in brief

[B] Briefly describe the steps in prokaryotic translation involving the following proteins. Clearly explain the roles of these proteins in the process [4] [CO3]

(i) EF-Tu
(ii) EF-G
(iii) RF-1
(iv) RF-3

Q.4 [A] Attempt any ONE of the following [4] [CO4]

(i) Hammerheaded ribozyme has a catalytic central core and some sequence requirements in target mRNA. Explain the properties of central core and target mRNA for ribozyme action. How is an in-line nucleophilic attack facilitated?

(ii) MicroRNA (miRNA) directs target mRNA for cleavage. In a flowsheet/ diagrammatic representation, explain the mechanism of action of miRNA in post-transcriptional gene silencing. Clearly mention the roles of various proteins involved in the process

P.T.O.

[B] Attempt any TWO of the following [2+2] [CO4]

(i) Ubiquitination targets the substrate proteins to proteasome for degradation. Discuss the reactions catalyzed by three enzymes in the process of ubiquitination

(ii) Lac repressor blocks the transcription of *lac* operon. Explain its structure and mechanism of action in detail

(iii) Discuss nuclear inhibition and cytoplasmic inhibition mechanisms of action of antisense RNA

Q.5 [A] Attempt any TWO of the following [2+2] [CO5]

(i) With respect to Maxam and Gilbert's method of DNA sequencing, write a note on various base-modifying reagents and their actions

(ii) The blot is placed in hybridization buffer for Southern blot hybridization. Give a brief account of various components of the hybridization buffer

(iii) Explain the principle of real-time PCR. How is it more advantageous than standard PCR?

(iv) Reporter genes are used in gene cloning experiments. Explain their significance and analysis procedures, taking one suitable example

[B] Give a detailed account of the principle and procedure of Sanger's method of DNA sequencing. Why is it also called chain termination method? [4] [CO5]

* END *

Total No. of Pages 01

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Roll No. .....

4th SEMESTER

B.Tech.(BT)

END SEMESTER EXAMINATION

May-2024

BT 204: DRUG DESIGN AND DELIVERY

Time: 03:00 Hours

Max. Marks: 50

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

Q.1 Explain the history of traditional drug development along with examples. Why do we need to test the validated hit or lead compound? [5+5] [CO1]

OR

How lead compounds are generated and optimized in drug discovery? What are the different sources of drugs? [5+5] [CO1]

Q.2 (a) Explain phase 1 study in drug development and with aid of examples discuss the relevance of phase 1 studies. [5] [CO2]

(b) Explain clinical trials in drug development in details. [5] [CO2]

Q.3 (a) Why you should go for IPR. Explain the 3 conditions of patentability and mention the IPR status in India. [5] [CO3]

(b) Discuss patent in details. Explain geographical indication with 5 examples. [5] [CO3]

Q.4 (a) What are the fundamental theoretical fashions that strive to provide an explanation for the formation of enzyme substrate complex. [5] [CO4]

(b) Write short notes on any two of the following [5] [CO4]

1. Synthetic vaccine design
2. Agonist vs antagonist
3. Receptor theory

Q.5 (a) Define and classify molecular docking and discuss various steps involved in flexible docking. Also write down the algorithms used in docking. [10] [CO5]

OR

(b) Explain Wilson analysis and Hansch analysis with its advantages. Discuss the relationship between Wilson and Hansch analysis. [10] [CO5]

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Total No. of Pages 02

Roll No. .....

FOURTH SEMESTER

B.Tech [BT]

END TERM EXAMINATION

MAY-2024

BT 206: Microbiology

Time: 03:00 Hours

Max. Marks: 40

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

Q.1 (a) Write the difference between Primary and Secondary screening of microorganisms. [2] [CO1]

(b) Explain the different methods of preservation of microbial culture. [4] [CO1]

Q.2 (a) Classify bacteria according to the arrangement of flagella. [3] [CO2]

(b) Discuss the structure of cell wall in Mycobacteria along with diagram. [3] [CO2]

Q.3 (a) Explain Bacterial resistance against antimicrobial agents. [3] [CO3]

(b) What do you mean by Nitrogen mineralization. Discuss the steps involved in it along with examples. [4] [CO3]

Q.4 (a) Explain the difference between Bergey's Manual of Determinative and Systematic Bacteriology. [3] [CO4]

(b)Discuss any two molecular methods of Identifying and classifying microorganisms. [4] [CO4]

Q.5 (a) What is an infection? Explain the Port of entry of pathogens into a host cell. [1+2=3] [CO5]

(b) Differentiate any 2 of the following: [2x2=4] [CO5]

(i) Mutualism and Ammensalism

(ii) Viroid and Prion

(iii) Lytic and Lysogenic cycle

Q.6 (a) Calculate the sterilization time period for the bacteria whose specific death rate at 121°C was found to be 1.62 min^{-1}, if del factor for heating, cooling and overall are respectively 10, 9, 29.2 [3] [CO6]

(b) Write the principle of dry heat sterilization. How radiation plays role in controlling microbial growth. [1+3=4] [CO6]

Or

What do you mean by the term Design criteria. Explain the difference between Inactivation factor and survival factor for a microorganism.

[1+3=4][CO6]

Total No. of Pages: 02 36 Roll no.....

IV SEMESTER

B.Tech. [BIOTECHNOLOGY]

END TERM EXAMINATION *May-2024*

COURSE CODE BT208

COURSE TITLE Advances in Computational Biology

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

Note: Attempt any 5 questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q1. (a) You are tasked with building a recommender system for an online streaming platform that suggests movies to users based on their viewing history. Recommend which machine learning approach you would use for this task and justify your choice. Make a flowchart outlining the steps you would follow to build and train the model.

(b) Discuss the challenges and limitations associated with building a recommender system for an online streaming platform. How would you address these challenges to enhance the model's accuracy and robustness?

[4+4] [CO# BT-208.5]

Q2. (a) Explain the major types of genetic variations observed in human populations. How do these variations contribute to genetic diversity and disease susceptibility?

(b) Discuss the role and significance of the OMIM database in bioinformatics research. Provide examples of specific genetic disorders documented in OMIM.

[4+4] [CO# BT-208.1]

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Q3. (a) Discuss specific tools or features within PDB that enhance researchers' ability to analyze and interpret complex molecular data.

(b) Discuss the significance of visualization tools like PyMOL in understanding protein structures and interactions. How does PyMOL enable researchers to explore and analyze molecular features, such as binding sites and conformational changes?

[4+4] [CO# BT-208.2]

Q4. (a) Describe the design of a pharmacogenomics study aimed at investigating how genetic factors influence drug responses in a specific population. Outline the steps you would take to collect and prepare samples for analysis.

(b) Define personalized medicine and illustrate its importance in modern healthcare. How does it differ from traditional medical approaches?

[4+4] [CO# BT-208.3]

Q5. (a) Define SIFT and draw a detailed flowchart outlining the SIFT method used for predicting non-synonymous Single Nucleotide Polymorphisms (nsSNPs).

(b) Write the physicochemical property changes resulting from amino acid substitutions (AAS) in proteins. Create a flowchart illustrating the PASE algorithm.

[4+4] [CO# BT-208.4]

Q6. (a) Describe the three main types of machine learning algorithms: supervised, unsupervised, and reinforcement learning. Provide a real-world example for each type to illustrate how they are applied in different scenarios.

(b) Outline various practical applications of machine learning across different industries and domains.

[4+4] [CO# BT-208.5]

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B.Tech. VI SEMESTER

END TERM EXAMINATION

May-2024

COURSE CODE BT-302 COURSE TITLE Plant Biotechnology

Time: 03:00 Hours

Max. Marks: 40

Note: All questions carry equal marks. Attempt any 5 questions
Assume suitable missing data, if any.

Q.1 a) What are secondary metabolites? Discuss their role as therapeutics. Discuss factors affecting secondary metabolite production in culture (4)

b) Explain the process and significance of gene silencing by RNA interference. (4) [CO2,4]

Q.2 a) Explain the steps involved in protoplast isolation and culture. Give applications of protoplast culture in the field of biotechnology (4)

b) What is hairy root culture? Describe different types of bioreactors used in hairy root culture. (4) [CO2,3]

Q3. a) How PIPs (peptides acting as protease inhibitors) and Bt gene developed insect resistance in plants. Give an overview (4)

b) Explain Antisense RNA technology using example of Flavr Savr tomato (4) [CO4]

Q4. a) What is the role of cryoprotectants in cryopreservation? Explain steps involved in cryopreservation and give its applications (4)

b) Explain the steps in gene cloning? Give an overview of vectors used in r-DNA technology. (4) [CO1,3]

Q5 a) Explain the method of plant regeneration via organogenesis? How are plant growth regulators used to control organogenesis in tissue culture? (4)

b) What is molecular farming? How are plants used for vaccine production (4) [CO1,4]

Q6. a) Explain the concept of containment in laboratory? What are different containment facilities in a laboratory? (4)

b) Write a short note on National Biosafety Regulatory framework in India (4) [CO5]

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Total No. of pages-02

SIXTH SEMESTER **B.TECH. (BIOTECHNOLOGY)**

END SEMESTER EXAMINATION **MAY-2024**

BT 304: ANIMAL BIOTECHNOLOGY

Time: 3.00 Hours **Max. Marks: 40**

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

Q1. Answer all questions [0.5×8][CO-1,4,5]

a) Name the gene responsible for the proliferation in embryonic stem cells.

b) ES cells are generally grown on a feeder layer of fibroblasts which secrete_____into the culture medium.

c) The _____ subunit of integrin binds with _____ to adhere with ECM.

d) Bacteria (staphylo/strepto/pneumococci) secretes _____that breakdown cell matrix components.

e) Covishield is _____ type vaccine whereas Covaxine is _____ type.

f) Weak adhesions are_____ dependent and strong adhesions are _____dependent.

g) Name the indicator media for lactose fermenter and non-lactose fermenter bacteria.

h) Pseudorabies is caused by_____.

Q2. Briefly answer all questions [2×9] [CO-4,5]

a) Describe the exponential phase in a bioreactor using Monod batch kinetics.

b) Describe the structure and function of proteoglycans.

c) What are vaccine adjuvants, explain their role with a suitable example.

d) What is the Metabolic Shift in fed-batch culture?

e) What are Positive and Negative selection markers in gene knockout technology?

f) What is fomite, describe the indirect mode of transmission of infectious agents.

g) What is carrier, describe types according to carrier state and carrier time.

h) What is the role of trypsin in cell culture and how does it work?

i) What is the major difference between apoptosis and necrosis?

Q3. Answer all questions [3+3 =6] [CO-3, 4]

a) Define Transgenic Animals. Explain in brief the three modes of gene transfer employed to generate Transgenic Animals.

b) What is the significance of Transgenesis, how the Transgenic Animal study could benefit society, explain with examples.

OR

a) What are infectious agents, describe the clinical features of infectious disease.

b) Explain the biochemical manifestation methods of infectious diseases.

Q4. Answer all questions [3+3 =6] [CO-1, 5]

a) What are iPSCs, Explain the various methods involved in somatic stem cell reprogramming, and what are its applications in tissue engineering.

b) What are innate and acquired immunity, with suitable examples explain different classes of vaccines.

OR

a) What are mABs, briefly describe the process of mABs development and testing Methods.

b) What are the different types of mABs, briefly explain the diagnostic and therapeutic applications.

Q5. Answer all questions [3+3 =6] [CO-2, 4]

a) Define focal adhesion complex; briefly describe the functioning of Ca++ dependent cell adhesion molecules in the formation of adhesion complex.

b) How does the following influence the cell density of the material surface, explain.

i. Superhydrophobicity and superhydrophilicity.

ii. Nanostructures Rigidity of surface material

-END-

Roll No. .....

Total No. of Pages: 3

SIXTH SEMESTER

B. Tech. [BT]

May-2024

END SEMESTER EXAMINATION

BT 306 Genomics & Proteomics

Max. Marks: 40

Time: 03.00 Hours

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

Q.1 [A] Attempt any TWO of the following [2+2] [CO1, CO2]

(i) Explain the principle and procedure of an NGS method based on DNA synthesis and the release of pyrophosphate

(ii) Write a brief note on Human Genome Project. Clearly mention the contributors, procedures involved and the findings. Also, explain the significance of various findings

(iii) Conserved synteny can be used in gene function prediction. Explain the statement in brief

(iv) Give a diagrammatic representation of a phylogenetic tree and explain the significance of each part

[B] Design yeast hybrid systems for analyzing protein-protein interactions (PPI) and protein-small ligand interactions. With the help of well-labeled diagram(s), explain various steps involved in the process of PPI analysis [4] [CO5]

Q.2 [A] It is possible not to get any phenotype despite several genetic variations. Explain the statement and assign various reasons for it. What strategy can be adopted for analyzing such genetic variations? Explain its details [4] [CO2, CO5]

[B] Attempt any TWO of the following [2+2] [CO2, CO5]

(i) Devise any one method for functional characterization of insertional mutants in *Arabidopsis*

(ii) Write a brief note on NCBI

(iii) Specify five properties and utilities of linkers used in the SAGE technique

P.T.O.

(iv) Explain the strategy for protein-protein interaction analysis using *trans* inteins

[2+2] [CO3]

Q.3 [A] Attempt any TWO of the following

(i) Taking a suitable peptide sequence, explain how this sequence can be determined using a combination of trypsin and chymotrypsin

(ii) Explain the steps/ reactions involved in any one method for the determination of N-terminal amino acids, which is also exploited in an automated protein sequencer

(iii) Explain the principle of MALDI-ToF. Also, give a brief outline of its procedure with respect to protein identification

[B] Give a descriptive account of the procedure of two-dimensional gel electrophoresis (2-DGE). Clearly explain the principles of procedures used in two dimensions. How is this technique used in protein characterization [4] [CO3]

Q.4 [A] Attempt any TWO of the following [2+2] [CO4]

(i) How are antibodies used in DNA pull-down? Enumerate any two strategies with explanations

(ii) Explain a technique involving ELISA for DNA-protein interaction analysis

(iii) Compare and contrast the principles of modification interference assay and modification protection assay. Give one example of each

(iv) Give an analysis of zinc finger motif in protein-DNA and protein-protein interactions

[B] Give a descriptive account of chromatin immunoprecipitation assay to analyze both 'transient' and 'stable' DNA-protein interactions. Explain each step in detail. Also, give examples of transient and stable protein interactions *in vivo* [4] [CO4]

Q.5 [A] Attempt any ONE of the following [4] [CO5]

(i) Analyze the applications of following proteins in protein interactomics. Enumerate examples of these proteins. Explain how these are exploited in protein-protein interaction analysis

(a) Phage coat proteins

(b) Variants of green fluorescent proteins

P.T.O.

(ii) Briefly discuss <u>any two</u> of the following

(a) SH domains

(b) Dual affinity tags in tandem affinity purification method

(c) Capture agents in protein chips

[B] What are synthetic sick and synthetic lethal interactions? Design a strategy for the analysis of such interactions in yeast. Also, explain the significance of conditional mutations in the process [4] [CO5]

* END *

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6th and 8th SEMESTER

B.Tech.

May-2024

END TERM EXAMINATION

BT320 Genomics in Medicine

Time: 3:00 Hours

Max. Marks: 50

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

Q.1(a) Write down the characteristics of unicellular model organisms. [5] [CO1]

(b) What is RNA interference (RNAi)? [5] [CO2]

Q.2 (a) What are the different mechanism that bacteria use to gain access to their niche or to escape the host defences? [5] [CO3]

(b) What are the different novel routes to vaccine? [5] [CO3]

Q.3 (a) Write about the alternative of TaqMan assay. What is trinucleotide repeat expansion? [2.5+2.5=5] [CO4]

(b) What is model free linkage analysis? [5] [CO4]

Q.4 (a) What are the main cause and strong links of cervical, skin and lung cancer? Write about proto-oncogenes and tumor suppressor genes. [2.5+2.5=5] [CO5]

(b) Write new methods for the diagnosis of cancer. [5] [CO5]

OR

Q,5 (a) Write a detail note on Biotherapy. [5] [CO5]

(b) What is the impact of genomics on cancer research? [5] [CO5]

Q.6 (a)Write different ways of gene delivery to the heart? Give details of intramyocardial injection and intravascular route. [1+4=5] [CO6]

(b) Explain Gene therapy by controlling a patient's own genes? [5] [CO6]

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

VI and VIII SEMESTER **B.Tech.**

END TERM EXAMINATION 44 **May-2024**

COURSE CODE- BT328

COURSE TITLE- Bioinformatics Approaches in Complex Disorders

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

Note : All questions carry equal marks.
Attempt any 5 Questions.
Assume suitable missing data, if any.

Q.1 a) What is codon bias? What are the issues in identifying exon-intron boundaries? [5] [CO 2]

b) Analyze the role of homology search in sequence recognition. [5] [CO1]

Q.2 What is DBMS? Explain the classification of biological databases with example. [10] [CO4]

Q.3 Elaborate the software tools and their features used for gene identification. Explain different types of sequence database search algorithms. [5+5] [CO5]

Q.4 Describe with help of flow chart, different steps involved in identification of single residue variation and its role in disease identification. [10] [CO3,4]

Q.5 Explain in detail , all the types of predictive tools and their features. [10] [CO5]

Q6. Genotype-phenotype relationships is between two levels of variations. Explain the genetic part, the phenotypic part, and the differential part of gp relationship. [10] [CO3]

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B. Tech VIII SEMESTER 45

END TERM EXAMINATION May-2024

COURSE CODE BT426 COURSE TITLE Environmental Biotechnology

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

Note: All questions carry equal marks. Attempt any 5 questions.
Assume suitable missing data, if any.

Q1. a) Explain the anaerobic treatment of waste water. (5)

b) What are the causes and impact of water pollution on environment? (5) [CO4]

Q2 a) What are Xenobiotic compounds? Explain the impact of Xenobiotic compounds in detail? (5)

b) What do you understand by environmental management? Explain different approaches for environment management? (5) [CO4]

Q3. a) Describe Integrated water resources management (IWRM) (5)

b) What causes Acid rain. What are the harmful effects of acid rain on environment? (5) [CO3]

Q4. a) Explain the causes and effects of Ozone depletion in detail (5)

b) Explain the role of different treaty and protocols for Ozone protection. (5) [CO6]

Q5 a) Explain bioremediation of contaminated soil and waste land (5)

b) Explain the role of biopesticides in Integrated pest management. (5)[CO5,6]

Q6 a) Give a detailed overview of the strategies for Solid waste management? (5)

b) Discuss biotechnological approaches for managing air pollution? (5) [CO5,2]

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END TERM EAMINATION MAY-2024

CO102 - COURSE TTITLE- PROGRAMMING FUNDAMENTALS

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

Note: Answer all questions. Write pseudo codes for all algorithms asked. Assume suitable missing data, if any.

Q1 (a) Differentiate between Compiler, Interpreter and Assembler. [2] [CO1]

(b) Convert the number $(5062)_8$ to the Decimal and Hexa-Decimal Systems. [2] [CO1]

(c) What is the difference between the pre-increment operator (++x) and the post-increment operator (x++) in C? Give an example to support your claim. [2] [CO1]

(d) Write a C Program to find sum of even numbers which are divisible by 2,3 and 5 upto 'n' numbers where n is entered from user. [2M] [CO1,CO2]

Q2 Answer any TWO of the followings:

(a). Write a C program to implement the following string manipulation functions without using library functions:

- Concatenation of two strings.
- Conversion of a string to uppercase. [4 M][CO3]

(b) What a C program using loops to print following pattern. [4] [CO3]

```
      0
    1 0 1
  2 1 0 1 2
3 2 1 0 1 2 3
```

(c) Explain the relationship between pointers and arrays in C programming. Provide an example to illustrate your explanation. [4][CO3]

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Q3. Answer any TWO of the followings

(a) 2. Write a C program to swap two numbers using pointers and functions. [4] [CO3]

(b) What is the difference between a Structure and a Union? Is sizeof for a struct equal to the sum of sizeof of each member? [4] [CO2]

(c) How does dynamic memory allocation differ from static memory allocation? Describe the process of dynamically allocating memory in a C program with an example. [4] [CO3]

Q4(a). Write a C Program to sort a given array A = [64,25,12,22,11,45,3] in ascending order. [4M][CO3]

(b) A 5-digit positive integer is entered through the keyboard, write a function to calculate sum of digits of the 5-digit number: (1) Without using recursion (2) Using recursion. [4] [CO4]

Q5.(a)Write short notes on-

1. Inheritance
2. Data encapsulation [4M] [CO4]

(b) Describe the process of file handling in C programming. Include file opening, reading, writing, and closing operations. [4M][CO4]

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End Term Examination

May-2024

Fourth Semester

B.Tech. COE

Paper Code: CO 202 Database Management System

Duration: 03 Hours

Max Marks: 40

Note: All questions are compulsory.
Marks for questions are indicated alongside
Assume suitable missing data, if any.

Q1. Answer the following questions in brief. *(any four)* [8][CO1,2,3,5]

a) What is a checkpoint? How is the checkpoint information used in the recovery operation following a system crash?

b) What is query processor?

c) What is the scheme used by the database system to recover from the deadlock state?

d) What is functional dependency? Write down the rules for finding implied functional dependencies from a set of given FD's.

e) What is cascadeless schedule?

Q2. (a) Suppose that the schema R = (A, B, C, D, E) is decomposed into (A, B, C) and (A, D, E). Considering the following set of FDs prove that the decomposition is lossless but not dependency preserving.

$$A \rightarrow BC$$
$$CD \rightarrow E$$
$$B \rightarrow D$$
$$E \rightarrow A$$

[4][CO3]

(b) A relation R(A, B, C) has FDs AB→C, C→A. Is R in 3NF or in BCNF? Justify your answer. [2][CO3]

(c)Explain Rigorous locking protocol. [2][CO4]

Q3. (a) What do you mean by disjoint constraints of specialisation/ generalisation? Explain with an example. [2][CO2]

(b) In what instances and mapping cardinality ratios two entity set and a relationship set can be merged into a single relation? [2][CO2]

Q3. Answer any TWO of the followings

(a) 2. Write a C program to swap two numbers using pointers and functions. [4] [CO3]

(b) What is the difference between a Structure and a Union? Is sizeof for a struct equal to the sum of sizeof of each member? [4] [CO2]

(c) How does dynamic memory allocation differ from static memory allocation? Describe the process of dynamically allocating memory in a C program with an example. [4] [CO3]

Q4(a). Write a C Program to sort a given array A = [64,25,12,22,11,45,3] in ascending order. [4M][CO3]

(b) A 5-digit positive integer is entered through the keyboard, write a function to calculate sum of digits of the 5-digit number: (1) Without using recursion (2) Using recursion. [4] [CO4]

Q5.(a)Write short notes on-

1. Inheritance
2. Data encapsulation [4M] [CO4]

(b) Describe the process of file handling in C programming. Include file opening, reading, writing, and closing operations. [4M][CO4]

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Total no. of Pages: 02

End Term Examination **May-2024**

Fourth Semester **B.Tech. COE**

Paper Code: CO 202 Database Management System

Duration: 03 Hours **Max Marks: 40**

Note: All questions are compulsory.
Marks for questions are indicated alongside
Assume suitable missing data, if any.

Q1. Answer the following questions in brief. *(any four)* [8][CO1,2,3,5]

a) What is a checkpoint? How is the checkpoint information used in the recovery operation following a system crash?
b) What is query processor?
c) What is the scheme used by the database system to recover from the deadlock state?
d) What is functional dependency? Write down the rules for finding implied functional dependencies from a set of given FD's.
e) What is cascadeless schedule?

Q2. (a) Suppose that the schema R = (A, B, C, D, E) is decomposed into (A, B, C) and (A, D, E). Considering the following set of FDs prove that the decomposition is lossless but not dependency preserving.

$$A \rightarrow BC$$
$$CD \rightarrow E$$
$$B \rightarrow D$$
$$E \rightarrow A$$

[4][CO3]

(b) A relation R(A, B, C) has FDs AB→C, C→A. Is R in 3NF or in BCNF? Justify your answer. [2][CO3]

(c)Explain Rigorous locking protocol. [2][CO4]

Q3. (a) What do you mean by disjoint constraints of specialisation/ generalisation? Explain with an example. [2][CO2]

(b) In what instances and mapping cardinality ratios two entity set and a relationship set can be merged into a single relation? [2][CO2]

(c) What are the benefits of multilevel indexing? How B+ tree is different from B-tree? Draw a B-tree of order 4 created by inserting the following data arriving in sequence: 90, 20, 6, 7, 10, 8, 20, 4, 5, 16, 18, 19, 70. [4][CO7]

Q4. (a) If there are three transactions with 1,2,3 operations respectively. Then find: [4][CO4]

(i) Total number of schedules

(ii) Total number of serial and non-serial schedules

(b) Explain Time Stamp Based Protocol and how it is different from Thomas Write Rule. Write and Explain Multiple Granularity Locking Scheme matrix. [4][CO5]

Q5. (a) Explain the four kinds of Integrity Constraints in a Database Management System with examples. [2][CO1]

(b) Check whether the given schedule S is conflict serializable or not. If it is conflict serializable then give all of its topological sorting.

T1	T2	T3	T4
			R(A)
	R(A)		
		R(A)	
W(B)			
	W(A)		
		R(B)	
	W(B)		

[3][CO5]

(c) Explain Log based recovery and shadow paging technique for maintaining recovery and atomicity. [3][CO6]

END

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

IV Semester

B.Tech

END TERM EXAMINATION May-2024

CO204 Operating System Design

Time: 03:00 Hours Max. Marks: 40

Note: Attempt all the Questions.
Assume suitable missing data, if any.

Q.1 Apply knowledge of operating system services to analyze how they contribute to the efficient management of hardware resources and user interactions. [3] [CO1]

Q.2 Analyze the evolution of operating systems from batch processing to real-time systems, highlighting key milestones and technological advancements. [3] [CO1]

Q.3 Apply knowledge of semaphores and inter-process communication to propose solutions for managing concurrent processes effectively. [3] [CO2]

Q.4 What is the criterion used to select the time quantum in the case of a round-robin scheduling algorithm? Explain it with a suitable example. [3] [CO2]

OR

Q.5 Draw a Gantt chart illustrating the execution of the listed process using Round robin scheduling algorithm and also Calculate the average waiting time and average turnaround time. (Quantum Value 3). [3] [CO2]

Process	Arrival Time	Burst Time
P1	5	5
P2	4	6
P3	3	7
P4	1	9
P5	2	2
P6	6	3

Q.6 Analyze the performance implications of memory management techniques, including paging, segmentation, and virtual memory, in terms of system efficiency and resource utilization. [3] [CO3]

Q.7 A computer system uses demand paging with a page size of 4 KB. The system has 32 frames of physical memory available. Suppose a process requires 48 pages of memory, and the following page reference string is observed: 1, 2, 3, 4, 1, 5, 2, 1, 6, 7, 8, 9, 1, 10, 2, 5, 6, 1, 2, 3. Using the Optimal page replacement algorithm and the Least recently used (LRU), calculate the number of page faults encountered. [5] [CO3]

5 |

Q.8 Describe the SSTF and C-Look disk scheduling algorithm using the following data. The read/write head is initially at position-cylinder 53. The cylinder sequence of requests is 98, 183, 37, 122, 14, 124, 65. 67. Find the total head movement. [5] [CO4]

Q.9 Analyze disk I/O operations and discuss operating system design issues related to disk scheduling and optimization. [3] [CO4]

Q.10 Imagine you're hosting a workshop on computer literacy for a diverse audience with varying levels of technical expertise. During the workshop, you want to engage participants in a discussion about the fundamental concepts of file systems and their organization. Begin by explaining the basic idea of a file and its significance in storing and organizing digital information on a computer. Discuss how files are structured and managed within file systems, highlighting the role of directories in organizing files hierarchically. Next, delve into the specifics of file directories, explaining their purpose in providing a structured framework for organizing files into meaningful categories and subcategories. Discuss the practical implications of directory organization in facilitating efficient file management and navigation for users. Moving on, explore file-sharing mechanisms within file systems, explaining how multiple users or processes can access and modify shared files concurrently. Discuss the benefits and challenges of file sharing, including issues related to data consistency, access control, and synchronization. Lastly, address implementation issues in file systems, such as file system formats, storage allocation methods, and optimization techniques. Discuss common challenges faced by file system developers, such as ensuring data integrity, optimizing performance, and supporting various storage devices and file formats. Encourage participants to share their experiences with file management and to brainstorm potential solutions to common file system challenges. By fostering open discussion and collaborative problem-solving, empower participants to gain a deeper understanding of file systems and their practical implications in everyday computing.

6 [CO5]

Q.11 Imagine you are a consultant advising a large multinational corporation on the selection of an operating system for their IT infrastructure. Using your expertise, provide a comprehensive comparative analysis of Windows, Linux, and Unix operating systems. In your analysis, delve beyond the surface-level features and architectures, and critically evaluate the strengths and weaknesses of each OS. Consider factors such as scalability, security, customization capabilities, community support, and total cost of ownership. Additionally, explore the market penetration of each OS in various industries and regions, and assess the implications for the corporation's specific needs and goals. Based on your analysis, provide informed recommendations on the most suitable operating system for the corporation, substantiating your choice with logical arguments and evidence. [6] [CO5]

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FOURTH SEMESTER

B.Tech [CSE] S2

END TERM EXAMINATION *May-2024*

COURSE CODE: CO206

COURSE TITLE: Computer Organisation and Architecture

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

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

Q1. a) Design and explain the 4-bit combinational circuit decrementer using four full-adder circuits. [5][CO-1]

b) Design and explain binary to gray code converter. [5][CO-1]

Q2. a) Explain logic micro operations in detail with their application. [5][CO-2]

b) Explain the difference between hardwired and microprogrammed control units. [5][CO-2]

Q3. a) Explain the step-by-step multiplication of Booth's algorithm with a flowchart and a suitable example. [5][CO-3]

b) What differentiates set-associative mapping from direct mapping and associative mapping in computer architecture? [5][CO-3]

Q4. a) Design and explain a parallel priority interrupt hardware for a system with four interrupt sources. [5][CO-4]

b) Explain the DMA data transfer mode and its respective block diagram. [5][CO-4]

Q5. a) Explain the different addressing modes with example. [5][CO-5]

b) The following program is stored within the memory unit of the basic computer. What will be the value of the accumulator after the program is executed? (All location numbers provided below are expressed in hexadecima

Location	Instructions
210	CLA
211	ADD 217
212	INC
213	STA 217
214	LDA 218
215	CMA
216	AND 217
217	1234H
218	9CE2H

[5][CO-

Q6. Write short note on any two:

a) BCD adder [5][CO-
b) Register transfer language [5][CO-1, CO
c) Instruction Cycle [5][CO-1, CO-
d) Stack organisation [5][CO-1 C

----------All the Best----------

Total No. of Pages- 03

Roll No-.....

END TERM EXAMINATION **May-2024**

COURSE CODE- CO208

COURSE TITLE- Design and Analysis of Algorithm

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

Note: Answer all questions. Write pseudo codes for all algorithms asked. Assume suitable missing data, if any.

Q1) (a) An array of 50 distinct elements is to be sorted using quicksort. Assume that the pivot element is chosen uniformly at random. Find the probability that the pivot element gets placed in the worst possible location in the first round of partitioning is? [CO2] [2M]

(b) Write an efficient algorithm to find prime numbers from 1 to n, where n is the input from the user. Discuss the time and space complexity. [CO1][2M]

(c) What is the order of the return value of k produced by following function

```
int foo (int n)
{
  int i, j, k = 0;
  for (i  = n/2; i <= n; i++)
     for (j = 2; j <= n; j = j * 2)
        k = k + n/2;
  return k;
}
```

[CO1][2M]

(d) How does the use of pruning techniques help reduce the search space and improve the efficiency of branch and bound algorithms? [CO6][2M]

(e) Let G be a connected undirected graph of 100 vertices and 300 edges. The weight of a minimum spanning tree of G is 500. When the weight of each edge of G is increased by 5 then what would be the weight of a minimum spanning tree? [CO3][2M]

Q2 (a) How can the backtracking algorithm be optimised for solving the 8-queen problem, and what are the key steps involved in implementing this algorithm to ensure that no two queens attack each other on an 8X8 chessboard? [CO5] [5M]

(b) You are given k sorted integer arrays (each array of size n) in a form of 2D integer matrix of size $k \times n$. Write an optimised algorithm to merge them into a single array and return it. Also discuss the time and space complexity of the

proposed algorithm. Example : Input: $k = 3$, $n = 4$, array = {{1, 3, 5, 7}, {2, 4, 6, 8}, {0, 9, 10, 11}}

Output: 0 1 2 3 4 5 6 7 8 9 10 11 [CO2] [5M]

Q3 (a) Rod Cutting Problem: We are given a rod of size 'N'. It can be cut into pieces. Each length of a piece has a particular price given by the price array. Our task is to find the maximum revenue that can be generated by selling the rod after cutting(if required) into pieces.

You are given a rod of 8 metres in length. You can cut the rod into smaller lengths and sell each piece at different prices depending on its length. Below is a table detailing the prices of different lengths of rods:

Length (meters)	1	2	3	4	5	6	7	8
Price (Rupees)	1	5	8	9	10	17	17	20

You can cut the rod into any number of pieces and of any length as long as they add up to 8 metres. Solve this problem using dynamic programming strategy. Determine the maximum profit that can be made by cutting the rod and selling the piece using the suggested approach. [CO5] [6M]

(b) Perform the matrix chain multiplication using the dynamic programming approach. Given four matrices A, B, C and D with order 40×20, 20×30, 30×10, and 10×30, respectively. Find the minimum number of multiplication required to produce the output. [CO5] [4M]

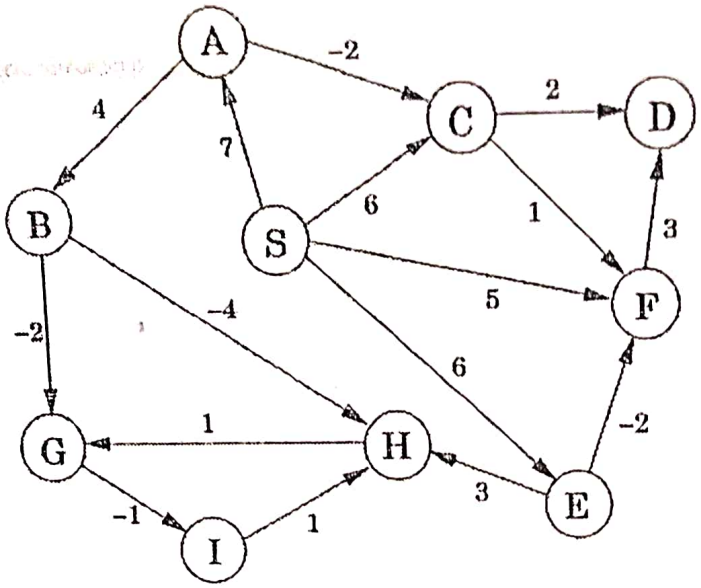
Q4. (a) Find the greedy solution for the following job sequencing problem with deadlines with a total number of jobs n = 7.

Job S. No	1	2	3	4	5	6	7
Profit	3	5	20	18	1	6	30
Deadline	1	3	4	3	2	1	2

[3M] [CO3]

(b) Solve the single source shortest path problem using Bellman-Ford Algorithm. Assume node 'A' as the source vertex. Show all intermediate steps in tables

mentioning the intermediate distance values of all the nodes at each iteration of the algorithm. Finally, produce the shortest-path tree. [7M] [CO3]



Q5 (a) Tower of Hanoi is a mathematical puzzle where we have three rods - S (source), D (destination) and T (temporary) and *n* disks. Initially, all the disks are stacked in decreasing value of diameter i.e., the smallest disk is placed on the top and they are on rod S. The objective is to move the entire stack to another rod (here considered D), obeying the following simple rules:

- Only one disk can be moved at a time.
- Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.
- No disk may be placed on top of a smaller disk.

Answer the following questions:

i). Write a recursive code to move all n disks from S (source) to D (destination).

ii). Write the recurrence relation for the recursive code and solve it. Discuss the time complexity for Tower of Hanoi.

iii). How many moves are required to move *n* disks from S (source) to D (destination).

[6 M] [CO3]

(b) The operation HEAP-delete (A, item) deletes the item in a binary heap A containing *n* element. Propose an implementation of HEAP-delete that runs in O(log n) time for a max heap.

[4M] [CO3]

Total no. of Pages:

Roll no.....

IV SEMESTER

B.Tech. (BT) 56

MAY-2024

END TERM EXAMINATION

CO252 DATA STRUCTURES AND ALGORITHM

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

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

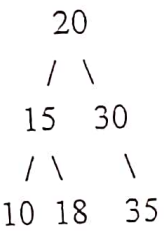
Q.1(a) How can you construct a binary tree when given its postorder and inorder traversals? For instance, if the postorder traversal is [4, 5, 2, 6, 7, 3, 1] and the inorder traversal is [4, 2, 5, 1, 6, 3, 7], how would you go about constructing the corresponding binary tree?

(b)write an algorithm to insert a node new at a specific position in a doubly linked list? [4+4] [CO#1#3]

Q.2(a)Explain how heapsort works(algorithm) and demonstrate its stepwise operation on the following array: [9,4,1,7,15,2,6,8,5].

(b)What is a queue? How does it delete a node? Provide examples of real-life situations where queues are used. [4+4] [CO#5#2]

Q.3(a)Given the following AVL tree, perform the necessary rotations to balance the tree after inserting the value 25.



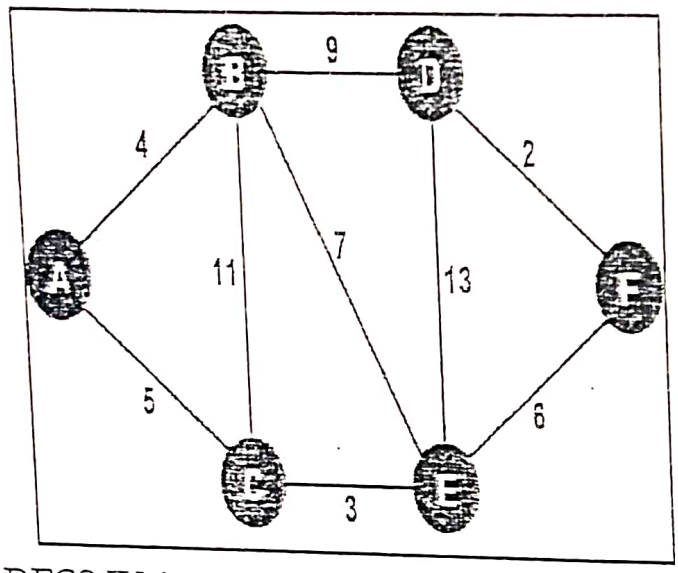
(b) How does the implementation of threaded binary trees differ from traditional binary trees, and what advantages does it offer in terms of traversal efficiency and memory usage? [4+4][CO#3]

Q.4(a) Describe the differences between sequential, direct, and indexed file organization techniques? What's hashing and how does collision occur explain with the help of example?

(b) Explain the concept of collision resolution in hash tables. Compare and contrast separate chaining and open addressing collision resolution techniques. Provide examples illustrating the advantages and disadvantages of each approach.

[4+4][CO#6]

Q.5(a) Consider the directed graph shown in the figure below. Using Dijkstra's algorithm, calculate the shortest path between vertices A and F.



(b) What is BFS? Write an algorithm Of BFS and explain with the help of an example

[4+4] [CO#4]

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Roll No.....

Total No. of Pages: 02

B.Tech.(CO)

VI-SEMESTER

May- 2024

END SEMESTER EXAMINATION

CO302 Compiler Design

Time: 3:00 Hours

Max. Marks: 40

Note: Attempt any Five questions

Q.No. 1

a. Construct SLR (1) parsing table and compute FIRST & FOLLOW for the following grammar: [4] CO4

S→aXb|aYb|aXc
X→ xS /d
Y→d

b. What is Lexical analyzer generator? Explain Implementation of Lexical analysers with suitable example. [4] CO1

Q.No. 2

a. Explain algorithm for predictive parsing and design predictive parsing table for the following grammar. [4] CO4

A→ aDbA
A→ aDbAdA
A→ f
D→ g (where 'A' is start symbol)

b. How LALR is different from CLR? explain and Construct LALR parsing table for the following grammar. [4] CO4

A → BB
B → 0B
B→ 1 (where 'A' is start symbol)

Q.No. 3

a. Translate the following expression into three address instructions a= -b * (x+y) and give quadruple and triple representation for the same. [4] CO2

b. What is the role of DFA in compiler design? What is the use of viable prefixes? Explain various phases of compiler using example. [4] CO1

Q.No. 4

a. Write three address code and construct program flow graph for the following program fragment [4] CO6

```
Fact(a) {
int f=1;
for(j=2; j<=a; j++)
f=f*j
return (f) }
```

b. What is the difference between the LEX and YACC? Create a cross compiler for X using C compiler, written in Y, producing code in Y and a X language producing code for DEL written in C. [4] CO3

Q.No. 5

a. Explain the midsquare method and folding method used for generating hash values. [4] CO3

b. What is the difference between Loop unrolling and Loop jamming? Explain with suitable example and create Syntax tree and DAG for expression if(x>0) then x= 3*(y+1) else y=y+1. [4] CO6

Q.No. 6

a. What is the role of Context free grammar (CFG) in Compiler Design? Construct a Context free grammar for language L= { a^n b^n c^m d^m | n≥1,m≥1} . [4] CO2

b. Explain following with suitable example [4] CO5

i. Syntax directed Translation(SDT) And Syntax directed Definition(SDD).
ii. Error recovery strategies in compiler design.

Total No. of Pages 2

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Roll No.....

VI SEMESTER

B.Tech.

END TERM EXAMINATION *May-2024*

CO304 ::Artificial Intelligence

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

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

Q.1 Answer the following questions in brief: [1x10=10][CO4]

i) Differentiate between plateau and local maxima.
ii) Why is Bayesian decision theory supervised?
iii) What is the significance of overfitting in predictive modelling?
iv) What are the characteristics of an expert system?
v) Mention any two activation functions for a neural network.
vi) What is conditional probability?
vii) Describe uniform cost search.
viii) Write any two fuzzy set operations.
ix) What is a Heuristic Function?
x) Describe any two quantifiers of your choice.

Q.2 a) List some rules of inference for propositional logic. [2][CO3]

b) Consider the following axioms:

1. Every coyote chases some roadrunner.
2. Every roadrunner who says ``beep-beep" is smart.
3. No coyote catches any smart roadrunner.
4. Any coyote who chases some roadrunner but does not catch it is frustrated.
5. (Conclusion) If all roadrunners say ``beep-beep", then all coyotes are frustrated.

Prove the conclusion using Resolution method. [3][CO2]

c) Differentiate between fuzzification and defuzzification with the help of an example. [2][CO4]

d) What do you mean by Constraint Satisfaction? Explain with an example. [3][CO1]

Q.3 a) The Missionaries and Cannibals problem illustrates the use of state space search for planning under the following constraints:

Three missionaries and three cannibals, along with one boat that fits at most two people (and requires at least one for operation), are on the left bank of a river. The most salient thing about missionaries and cannibals in "cohabitation" is that if ever the cannibals in any one spot (left bank, right bank, on the boat) outnumber the missionaries, the outnumbered missionaries will be consumed! The goal of this problem is to get all six individuals safely across the river from the left bank to the right bank.

Find an action sequence that brings everyone safely to the opposite bank using any strategy of your choice, write appropriate assumptions and draw a Search Tree depicting the states and steps from initial state to goal state. [8][CO4]

b) Discuss Hill Climbing in brief with an example. [2][CO1]

Q.4 a) Represent the following statements in predicate logic: [5][CO3]

i) Marcus tried to assassinate Caesar.

ii) All Pompeian's were Roman.

iii) All Romans were either loyal to Caesar or hated him.

iv) Everyone is loyal to someone.

v) People only try to assassinate rulers they are not loyal to.

b) Explain conceptual dependency with an example and build up the conceptual dependency structures for the following sentences: [3][CO3]

i) John pushed the cart.

ii) John took the book from Mary.

iii) While going home, I saw a frog.

c) Differentiate between the propositional logic and the predicate logic with the help of an example. [2][CO2]

Q.5 a) Three companies A, B and C supply 25%, 35% and 40% of the notebooks to a school. Experience shows that 5%, 4% and 2% of the notebooks produced by these companies are defective. If a notebook was found to be defective, what is the probability that the notebook was supplied by A? [4][CO2]

b) Describe the architecture of expert system. [3][CO1]

c) "A Prolog program consists of a collection of facts and rules", Comment on this statement using any example of your choice. [3][CO3]

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Total no. of Pages: 2 Roll no.....

SIXTH SEMESTER B.Tech. CSE

ENDTERM EXAMINATION May-2024

COURSE CODE CO306

COURSE TITLE COMPUTER NETWORKS

Time: 03:00Hours Max.Marks:40

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

Q.1 (a). What is the function of transmission media? Differentiate between guided and unguided media, and explain the three principal classifications of guided media. [4][CO 1]

(b). Explain the concept of Framing in the data link layer. Write the difference between bit stuffing and character stuffing.If a bit string, 01111011111101111110, needs to be transmitted at the data link layer. What is the string transmitted after bit stuffing given flag as 01111110? [4][CO2]

Q.2 (a). Describe the role of TCP's additive increase and muitiplicative decrease algorithm in congestion control. Considering an initial slow start phase followed by the congestion avoidance phase, how long does it take to reach the full transmission capacity on a network with a 10-millisecond RTT and no congestion, given a receiver window of 3200 KB and a maximum segment size of 200 KB? [4][CO 4]

(b). Explain the fundamental steps involved in performing a remote procedure call (RPC) and the respective roles of the client and server in this process. [4][CO 4]

Q.3 (a). Discuss the significance of firewalls in network security and the different types of firewalls employed to protect networks from unauthorised access and malicious activities. Describe the role of firewalls in filtering incoming and outgoing email traffic to prevent spam, malware, and other threats. [4][CO 6]

(b). Explain the three phases in TCP client-server communication. In TCP, the initial RTT is 20 ms. The ack for the first four segments are received in times 25 ms, 18 ms, 23 ms, and 21 ms. Using the basic algorithm, find the timeout timer value for the first five segments. Use $\alpha = 0.5$. [4][CO 4]

Q.4 (a).What role does cryptography play within the presentation layer? Describe the key selection algorithm in RSA and apply it to solve the following scenario: Given p = 13, q = 5, and e = 7 in the RSA algorithm, determine the value of d and the cipher value of '6' with the key (e, n). [4][CO 5]

(b). Give a diagram and explain the IPv4 header fields in detail. If a datagram of size 600 bytes is transmitted over a network with a Maximum Transmission Unit (MTU) of 200 bytes, and the header length is 20 bytes, what are the offsets of the first, second, and third fragments? [4][CO 3]

Q.5 (a). Describe IPV4 classful IP addressing. Discuss the limitations and the significance of subnetting. If a class B address is to be divided into subnets with a 6-bit subnet number, determine the maximum number of subnets and the maximum number of hosts in each subnet. [4][CO 3]

(b). Explain the difference between multicast and broadcast. Suppose there are n stations in a slotted LAN. Each station attempts to transmit with a probability 'p' in each time slot. What is the probability that only one station transmits in a given slot? [4][CO 3]

Q. 6 (a). Explain the concept of digital signatures in cryptography. What is the significance of digital signatures in ensuring data integrity, authenticity, and non-repudiation in electronic transactions? [4][CO 5]

(b). Discuss the flow control and error control collaboration in the Data Link Layer to ensure reliable data transmission. What is the minimum frame size needed to achieve a channel efficiency of at least 50% for a channel operating at 4 Kbps with a one-way propagation delay of 20 milliseconds, using the stop-and-wait protocol where the ack frame transmission time is negligible? [4][CO 2]

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

SIXTH SEMESTER **B.Tech. (CSE)**

END SEMESTER EXAMINATION *(May-2024)*

CO308 PARALLEL ALGORITHMS

Time: 3 Hours *Max. Marks: 50*

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

Q1. Answer the following questions:

a) Flynn's classification is based on multiplicity of instruction stream and data stream observed by the CPU during program execution. Explain in detail.

b) Explain graph coloring by accounting for the Welsh Powell algorithm with an example.

[5+5][CO1,CO5]

Q2. a) A p-processor PRIORITY PRAM can be simulated by a p-processor EREW PRAM with time complexity increased by a factor of θ (log p). Prove it.

b) Sort a list (C, D, B, H, E, G, F, A) using bitonic merge sort

[5+5][CO4,CO3]

Q3. a) Write a brief note on Handler's classification of parallel computers.

b) Let A = {5, 2, 4, 5} be a sequence and p = 16 where p is the number of processors. Sort this sequence using the Enumeration sort algorithm for the CRCW technique and show each step. Also, write the algorithm.

[3+7][CO1,CO4]

Q.4 a)Explain Fragment-and-Replicate Join Algorithm. How it is different from Partitioned Join [4][CO4]

b) What challenges are associated with developing and maintaining applications in a persistent programming language? [3][CO1]

c) You are designing a database for managing different types of employees in a company. There are two main types of employees: full-time employees and part-time employees. Both types of employees have common attributes such as name and hire date, but they also have specific attributes. Full-time employees have a specific attribute called "salary," while part-time employees have a specific attribute called "hourly rate."

(i) Design a schema for this database using table inheritance.

(ii) Write a query to retrieve the names of all employees. [3][CO1]

Q.5 a)What form of parallelism (interquery, interoperation or intraoperation) is likely to be the most important for each of the following tasks?

(i) Increasing the throughput of a system with many small queries

(ii) Increasing the throughput of a system with a few large queries, when the number of disks and processors is large [3][CO4]

b) Explain how TP monitor manages memory and processor resources more effectively than a typical OS. [3][CO6]

c) With pipelined parallelism, it is often a good idea to perform several operations in a pipeline on a single processor, even when many processors are available. Explain the reason. [2][CO4]

d) Explain the concept of multi-database. [2][CO5]

END

Roll No.....

Total No. of Pages: 4

B. Tech.

SIXTH SEMESTER/8th

May-2024

END TERM EXAMINATION

CO324 PATTERN RECOGNITION

Max. Marks: 50

Time: 3:00 Hours

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

Q.1 [a] Consider a machine learning model trained on a dataset comprising handwritten digit images. Upon evaluation, the model exhibits a training error of 78% and a validation error of 93%. Critically analyse the implications of these results on the model's performance and propose appropriate strategies to rectify any identified shortcomings. [4] [CO1, CO2]

[b] A factory produces electronic components, of which 5% are defective and 95% are non-defective. A quality control inspector randomly selects a component and tests it. The test correctly identifies defective components 98% of the time and correctly identifies non-defective components 96% of the time. Given that the component tested is found to be defective, what is the probability that it is actually defective? [4] [CO1, CO4]

[c] Explain the problem of dimensionality and an approach to solve the problem. [2] [CO2]

Q.2 [a] Consider a dataset representing the performance of students in five subjects: Mathematics (M), Physics (P), Chemistry (C), Biology (B), and Computer Science (CS). The dataset contains the following scores for each student:

8

Students	M	P	C	B	CS
S1	85	90	88	92	95
S2	89	92	85	88	90
S3	82	95	91	89	92
S4	91	87	84	83	86
S5	88	86	90	85	89

Perform Principal Component Analysis (PCA) to reduce its dimensionality while retaining as much information as possible. Show the steps involved and compute the principal components along with their corresponding eigenvalues. [5] [CO3, CO4]

[b] Consider a dataset representing the heights (in inches) of students in a class. The dataset contains the following observations:

{65,68,70,72,73,66,67,69,71,68}

The heights follow a normal distribution, use maximum likelihood estimation (MLE) to estimate the mean and standard deviation of the population heights. Derive the suitable expression for MLE.

[5] [CO2, CO4]

Q.3 Attempt *any TWO* of the followings:

[a] Consider a dataset comprising 10 data points: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}. Perform Parzen window-based density estimation to estimate the probability density function (PDF) of the dataset using a Gaussian kernel with a bandwidth of h=2. Compute the PDF at x=5 using Parzen window estimation. [5] [CO3]

[b] Consider a dataset of 8 data points represented as follows:

{(1,2), (2,3), (2,5), (3,2), (4,1), (6,2), (7,3), (7,5)}

Perform Hierarchical Clustering on this dataset using the single-linkage method. Provide the dendrogram illustrating the clustering process. [5][CO3]

[c] Consider a dataset of 6 data points in two dimensions, represented as follows: {(1,2), (2,3), (3,4), (7,8), (8,9), (9,10)}

Perform Fuzzy K-means clustering on this dataset with k=2 clusters and m=2. Initialize the cluster centers {(2,3), (8,9)} and iterate until convergence. Provide the final cluster centers and the fuzzy partition matrix. [5][CO2, CO3]

Q.4 Attempt *any TWO* of the followings:

[a] Consider a simple neural network with one input layer, one hidden layer, and one output layer. The network is trained to predict the performance of students based on their study hours. The dataset contains the following data:

Study hours	2	3	4	5	6
Performance	60	75	85	90	95

Using the backpropagation algorithm with stochastic gradient descent, train the neural network to predict the performance of a student who studies for 7 hours. Assume the following initial weights and biases:

Weights: Input to Hidden Layer: 0.5; Hidden Layer to Output: 0.7

Biases: Hidden Layer: 0.3; Output Layer: 0.4

Learning Rate: 0.01 [5] [CO3, CO4]

[b] Derive the expression of gradients for backpropagation in the output layer and hidden layers. [5] [CO2, CO3]

[c] Compare and contrast different activation functions such as sigmoid, tanh, ReLU, and Leaky ReLU. [5] [CO2, CO3]

Q.5 Attempt *any four* of the followings [2.5x4=10]

[a] Explain how Simulated Annealing can improve feature selection in pattern recognition. [CO1]

[b] How does Boltzmann Learning facilitate unsupervised feature learning in pattern recognition? [CO1]

[c] How does stochastic search contribute to robustness in pattern recognition tasks? [CO2]

[d] Explain the problem of premature convergence in genetic algorithm. [CO2]

[e] Describe exploration in Particle swarm optimization with appropriate expressions. [CO2]

---Best of Luck---

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

SIXTH SEMESTER **B. Tech.**

END SEMESTER EXAMINATION **May-2024**

CO326 Object Oriented Software Engineering

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

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

Q.1 (a) Explain the static and dynamic structure of RUP with an example? **[4][CO1]**

(b) How does object-oriented software engineering facilitate code reusability, and what are some common techniques for achieving it? **[4][CO2]**

Q.2 (a) Consider the following bookshop automation system (BAS) software. BAS should enable the shop clerk to enter the details of various books the shop deals with and change the inventory level of various books when new stocks arrive. BAS should help the customers query whether a book is in stock. The users can que the availability to a book either by using the book's title or by using a partial name of the author. If a book is in stock, the exact number of copies available and the rack number in which the book is located should be displayed. If a book is not in the stock, the query for the books is used to increment a request field for the book. The manager can periodically view the request field of the books to roughly estimate the current demand for different out-of-stock books. BAS should maintain the price of various books. As soon as a customer selects a book to purchase, the sales clerk would enter the ISBN number of the book. BAS should decrement the stock to reflect the book sale and generate the sales receipt for the bookUpon request, BAS should generate sales statistics (viz. book name, publisher, ISBN number, number of copies sold and the sales revenue) for any period. BAS should enable the manager to view publisher-wise sales (e.g. sale of all books of any given publishing house) over a period.

A software system is required to be developed to maintain telephone directory and billing system. The software should be able to update/modify billing system and be able to maintain the directory of the subscribers.

(i) Draw the use case diagram for the BAS software.

(ii) Write the use case description of any two use cases

[2*2] [CO3]

(b) Consider the following case study of Medicine Shop Automation (MSA)

software to be used by the owner of a retail shop of medicine.

- The medicine shop consists of various types of medicines purchased from different vendors. These medicines are kept in numbered racks in the shop. The software should be able to maintain the vendor name and address.
- The inventory is maintained by the owner of the shop. The shop owner faces a problem of placing order as soon as the number of medicines starts reducing in the inventory below a threshold limit. The medicine shop owner wants to maintain inventory of medicines for about one week for each of the medicine. The limiting value must be calculated by the software by analyzing the average sales per oneweek for each medicine.
- The software must be able to generate the items ordered at the end of each day. The items must consist of the number of items to be ordered along with the vendor name.
- The software must be able to maintain the description about each item with item no., name, vendor no., quantity, expiry date, etc.
- The software should be able to maintain the items sold to each customer, and should print a cash receipt. At the end of the day, the software should be able to generate a list of expired items.

For implementing the MSA software,
Identify the classes and their interrelationships and represent them using the class diagram. **[2*2][CO5]**

Q.3 (a) What is significance of state chart diagram in Object Oriented Software Engineering? Consider the University Registration System . The students are registered in the beginning of each semester. The registration must be completed by the students within 15 days of the start of the registration process. Draw the statechart diagram showing the states of registration. **[2*2][CO4]**

(b) What are the basic components of an activity diagram? Draw a Activity diagram process of checking in luggage and boarding a passenger using a flight boarding system. **[4] [CO3]**

Q.4 (a) Consider a program that determines a previous date and the next date.Its inputs are a triple of day,month and year with its values in the following range:

1<=month<=12
1<=day<=31
2011<=year<=2024

The possible outputs are "next date". Design boundry value analysis test cases,robust test cases,worst test cases and robust worst test cases. [4] [CO4]

(b) Write short notes on:

i. Software testing tools.

ii. State based testing and Class testing [2*2] [CO2]

Q5. (a) Consider a course scheduling system (CSS) for scheduling courses in Delhi

Technological University. The purpose of CSS is to:

(i) enable entering data of courses, faculty members, the available facilities.

(ii) calculate and propose schedule for courses.

(iii) enable to manually update the proposed schedule, but keep track of the consistent schedule.

- Entering programs and courses: An administrator should be able to enter new program and its running period. A data entry operator should be able to enterdetails of courses with their examiners. The examiner should be able to upload lecture, tutorials, projects, etc.
- Entering resources: An administrator should be able to enter information aboutlecture rooms and laboratories in which classes will be taken place.
- Scheduling: It provides schedule proposal, the days and time, and places where they can be scheduled. The scheduler allows some manual predefinition of the schedule. It shows if there are any conflicts.

Draw a collaboration diagram of any two use cases. [2*2=4][CO3]

(b) Consider the railway reservation system and draw sequence diagram of reservation and cancellation of tickets for this system. Make the necessary assumptions. [2*2=4][CO4]

Q6. (a) Consider a program to multiply and divide two numbers. The inputs may be two valid integers (say a and b) in the range of [0, 100]. Develop the decision table and generate test cases. [2*2=4][CO4]

(b) Write a program for finding the roots of a quadratic equation. Draw the activity diagram and calculate the cyclomatic complexity. [2*2=4][CO5]

END

Total No. of Pages: 04

Roll No. .....

SIXTH SEMESTER

B.Tech. (CSE)

END TERM EXAMINATION *May, 2024*

CO328 DEEP 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] A manufacturing company uses various heavy machines which are critical for production. The maintenance of these machines is crucial to avoid unexpected breakdowns and costly downtimes. Discuss how deep learning can be implemented to predict equipment failures before they occur. What types of data would be necessary to train such a model, and how can the model improve the efficiency and reduce the costs of maintenance operations? **[4] [CO1]**

[b] Consider a neural network layer that uses the ReLU activation function. Assume the input to this ReLU layer is **x** and the upstream gradient (the gradient of the loss with respect to the output of the ReLU layer) is **g**. Calculate the output of the ReLU activation layer. Aditionally Determine the gradient of the loss with respect to the input vector **x** using the ReLU derivative and the provided upstream gradients. **[4] [CO1]**

Given: $\mathbf{x} = \begin{bmatrix} -1 \\ 2 \\ 0 \end{bmatrix}$, and $\mathbf{g} = \begin{bmatrix} 0.5 \\ -0.3 \\ 0.2 \end{bmatrix}$

2.[a] Suppose, you are given a batch of feature maps resulting from a convolution operation in a neural network. This batch contains two samples, each with two channels of size 2x2 pixels. Perform Batch Normalization on these feature maps. The feature maps for the first sample and second sample, respectively, with two channels each, are provided below:

Sample 1: channel 1: $\begin{bmatrix} 1 & -1 \\ 1 & -1 \end{bmatrix}$, channel 2: : $\begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix}$

Sample 2: channel 1: $\begin{bmatrix} 2 & -2 \\ 2 & -2 \end{bmatrix}$, channel 2: : $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

Calculate the values of sample 1 after batch normalization. Use scale $\gamma = 1$, and shift $\beta = 0$. **[4] [CO3]**

[b] Assume, you are a healthcare data scientist tasked with developing a machine learning model to predict the risk of developing Type 2 diabetes based on factors like age, weight, exercise frequency, blood sugar levels, and family history of diabetes. You have developed two different predictive models using the same set of patient data. The models' performance is evaluated based on their accuracy metrics, both during training and on a separate validation dataset. The results are as follows:

Model X: Training Accuracy = 95%; Validation Accuracy = 70%

Model Y: Training Accuracy = 75%; Validation Accuracy = 72%

Evaluate which model shows signs of high bias and which model exhibits high variance. Additionally, analyze whether these models are overfitting or underfitting. **[4] [CO3]**

3.[a] Consider a CNN architecture with the following layers: an input layer (3x32x32), a convolutional layer (Conv1) with 10 filters of size 3x3 (stride 1, padding 'same'), Conv2 with 10 filters of size 3x3 (stride 1, padding 'same'), a skip connection from the output of Conv1 to a point after the Conv2, an addition operation that merges the outputs of the skip connection and Conv2, another convolutional layer (Conv3) with 20 filters of size 3x3 (stride 2, padding 'same'), and a fully connected layer with 128 units. How many activations are generated at each layer, and how many parameters are present in this model? **[4] [CO2]**

[b] What are the causes of vanishing gradients in deep Convolutional Neural Network (CNN) architectures? Suggest a modifications to the network architecture or training process to effectively address this issue. **[4] [CO1]**

4. Answer any TWO of the followings.

[a] Consider a character-level RNN designed for language modeling. The vocabulary consists of three characters: {F, O, X}, encoded as one-hot vectors. The RNN has one hidden layer with two neurons. The initial hidden state $h = [0, 0]^T$ and the sequence input to the RNN starts with the character 'F'. The biases for the hidden layer and output layer are $[0, 0]^T$ and $[0, 0, 0]^T$ respectively. The weight matrices are given as:

$$W_{hi} = \begin{bmatrix} 0.1 & 0 & 0 \\ 0 & 0.1 & 0 \end{bmatrix}, W_{hh} = \begin{bmatrix} 0.05 & 0 \\ 0 & 0.05 \end{bmatrix}, W_{oh} = \begin{bmatrix} 0.2 & 0 \\ 0 & 0.15 \\ 0.1 & 0.05 \end{bmatrix}$$

Calculate the output probabilities for each character in the vocabulary after processing the character 'F'. **[4] [CO2]**

[b] Discuss the functions of the different gates in an LSTM network in relation to its long-term memory capabilities. Use a clear diagram and relevant mathematical equations of the LSTM architecture and provide brief explanations (to the point) of how these gates facilitate the processes of remembering and forgetting information. **[4] [CO1]**

[c] Imagine a Transformer model is training on a dataset with minibatch size 1. The phrase being processed is "Clouds drift slowly." The initial embeddings for the tokens are: Clouds=[3,0], drift=[1,2], slowly=[2,1]. The transformation matrices for Query (Q), Key (K), and Value (V) are defined as $W^Q = W^K = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $W^V = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$. Calculate the query, key, and value vectors for each token and find the attention weights for slowly across all tokens. Discuss the role of attention weights in the given context. **[4] [CO2]**

5. Answer any TWO of the followings.

[a] You are optimizing a variational autoencoder (VAE) for medical image reconstruction, specifically MRI scans. The VAE's loss function is composed of reconstruction loss (Mean Absolute Error, MAE) and KL divergence, with a tunable parameter β to balance these components. The table below summarizes the MAE and KL divergence results from three different β settings tested on a validation set:

Setting	β	MAE	KL Divergence
A	0.1	0.032	0.015
B	1.0	0.045	0.010
C	5.0	0.065	0.005

Analyze the impact of the β parameter on balancing high-quality reconstructions with a well-regulated latent space. **[4] [CO4]**

[b] The discriminator loss of a Generative Adversarial Network (GAN) is given as $L_D = -\frac{1}{n}\sum_{i=1}^{n}\log(D(x_i)) - \frac{1}{m}\sum_{j=1}^{m}\log\left(1 - G\left(D(z_j)\right)\right)$, where where x_i are real images, z_j are noise vectors. During a particular training epoch, $n = 100$ real images and $m = 100$ generated images are used. The probabilities $D(x_i)$ and $G\left(D(z_j)\right)$ are normally distributed with a standard deviation of 0.05 (for both) and mean of 0.8 and 0.3 respectively. For generated images, the probabilities $G\left(D(z_j)\right)$ are normally distributed with a mean of 0.3 and a standard deviation of 0.05.

Estimate the expected discriminator's loss L_D using the given distributions. **Hint:** Approximate the expectation using $\mathbb{E}[\log(D(x_i))] \approx \log(\mathbb{E}[D(x_i)])$, $\mathbb{E}\left[\log\left(1 - G\left(D(z_j)\right)\right)\right] \approx \log\left(1 - \mathbb{E}\left[G\left(D(z_j)\right)\right]\right)$. **[4] [CO4]**

[c] With referece to 5[b], discuss how changes in the means of probabilities $D(x_i)$ and $G\left(D(z_j)\right)$ might affect discriminator's loss L_D. **[4] [CO4]**

---Best of Luck---

Total No. of Pages- 02

74 Roll No-.....

END TERM EAMINATION

MAY-2024

CO408

INTELLECTUAL PROPERTY RIGHTS

Time-3:00 Hours

Max. Marks-50

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

Q1 (a) What are the mandatory criteria for getting Plant Variety Rights?

[2.5] [CO1, CO2]

(b) Why one should access the patent literature? What are the various on-line databases available that provide access to patent documents while conducting patent search? [2.5][CO2]

(c) What are the essential requirements for the registration of design under the Designs Act, 2000? [2.5] [CO5]

(d) If a T-shirt contains a label of "Made in India", is it a Geographical Indication? Explain. [2.5] [CO1, CO5]

Q2 Answer any TWO of the followings:

(a). What are the grounds for refusal of registration of a trade mark? [5][CO4]

(b) What is TRIPS Agreement? Outline the main three features of the TRIPS Agreement. [5] [CO1]

(c) Differentiate between Continuation and Continuation in Parts Applications? How is Patent of Addition different? [5][CO2]

Q3. Answer any TWO of the followings

(a) Discuss about 'Fair Use' Exception in Copyrights with an example. [5] [CO3]

(b) Examine the implications of the "first-to-file" system versus the "first-to-invent" system in patent law. How do these different approaches impact the incentives for innovation and the dynamics of patent disputes? [5] [CO2]

(c) Consider a scenario where a company discovers that its trade secrets have been misappropriated by a former employee who has joined a competitor. How would you advise the company on pursuing legal action to protect its trade secrets, considering issues such as evidence preservation, confidentiality, and remedies available? [5] [CO1, CO2]

Q4(a). Discuss the concept of "patent trolls" and their impact on innovation and competition in the tech industry. How can patent laws be reformed to prevent abusive litigation practices while still protecting legitimate patent holders? [5M][CO2]

(b) How did the case Alice Corp. v. CLS Bank International impact the software patents? [5] [CO2]

Q5.(a)Write short notes on- [5M] [CO1, CO2]

- Bolar Exemption
- Burden of Proof

(b) Differentiate between the followings [5M][CO1, CO3]

- Validity vs Invalidity Searches
- The Berne Convention vs Universal Copyright Convention

Total no. of Pages: 02 76 Roll no.....

2nd SEMESTER **B.Tech.**

END TERM EXAMINATION *May-2024*

CH102 *Mechanical Engg. Concept for Chemical Engineers*

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

Note: Answer Part A and Part B separately in the same answer sheet. Answer any 5 questions from each Part. Assume suitable missing data, if any.

Part A

Q.1 Give schematic diagram with labelling, working principle and advantages and disadvantages of (a) Thermal Power Plant (b) Hydro Power plant. [5][CO3]

Q.2 Derive SFEE for turbine and state assumptions made. A chilled water of 15 kg/s enters the system for air conditioning a tall building with a velocity of 60 m/s at a height of 40m from the ground. The water leaves the system with a velocity of 20 m/s at a height of 70 m. The enthalpies of water entering in and leaving out are 30 KJ/kg and 50 KJ/kg respectively. The rate of work done by a pump in the line is 40 KW. Find out the rate at which heat is removed from the building. [5][CO1]

Q.3 [a] State and prove Pascal's law.

[b] Give the statement of Bernoulli's equation with their units.

[c] Derive an expression for continuity equation. [2,1,2] [CO4]

Q.4 [a] What is the Carnot cycle? Why is the Carnot cycle considered an ideal cycle? What is the efficiency of a Carnot engine? [2.5] [CO2]

[b] An engine operates between 727°C and 127°C. The engine's heat input is 6000 Joule. What is the efficiency of the engine and work done by the engine each cycle? [2.5] [CO2]

Q.5 [a] Draw the P-V and T-S diagram of the Otto cycle with all notations. [1] [CO2]

[b] In a standard OTTO cycle, the compression ratio is 7 and the compression begins at 1 bar and 313 K. The heat added is 2510 kJ/kg. Find (1) Maximum pressure and temperature of cycle;(2) Work done per kg of air (3) Cycle efficiency (4) Mean effective pressure [4] [CO2]

Q.6 Define any five properties of Fluids. [5] [CO4]

Part B

Q.1 [a] Define weldability. Describe the various flames used in Oxy-acetylene gas welding. [2.5] [CO6]

[b] Give differences on the basis of advantages and disadvantages between AC arc welding and DC arc welding. [2.5] [CO6]

Q.2 [a] Write the difference between blanking and Piercing operation in sheet metal. Explain with diagrams. [2.5] [CO6]

[b] Discuss various defects in Casting Process. [2.5] [CO6]

Q.3 [a] What is line and End standards? Briefly explain. [2.5] [CO7]

[b] Explain the followings [a] Micrometre [b]Comparators [2.5] [CO7]

Q.4 Define Pattern. Discuss the material used for pattern making. Discuss the various types of Pattern allowances. [5] [CO6]

Q.5 [a] Discuss the classification of Engineering materials and the factors which should be considered for the same. [2.5] [CO5]

[b] Discuss the mechanical properties of the metals. [2.5] [CO5]

Q.6 Discuss the effects of following alloying elements on steel:

[a] Nickel [b]Chromium [c]tungsten [d] Cobalt [e] Silicon [2.5] [CO5]

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Roll no.....

Total no. of Pages:02

SECOND SEMESTER

B.Tech

END TERM EXAMINATION

May-2024

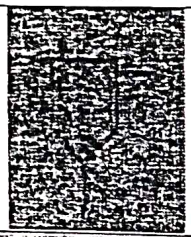
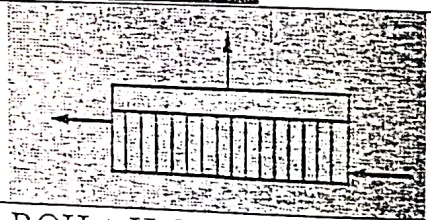
CH104 INTRODUCTION TO CHEMICAL ENGINEERING

Time: 03:00 Hours

Max. Marks: 50

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

Q.1	a) What are the various job options for a Chemical Engineering graduate. Explain the various work activities of a Production Engineer in a Chemical Industry. b) Enlist the raw materials for the manufacturing of cement. How it is produced.	[5+5] [CO1,CO4]
Q.2	a) Write a brief note on the role of Chemical Engineering in the use of Renewable Energy. b) Identify among the unit operations and unit processes from the following and mention their names:	[5+5] [CO2, CO5]

(i)	$HC{:}CH + HCN \longrightarrow CH_2{:}\,CH.CN$
(ii)	
(iii)	
(iv)	$ROH + H_2SO_4 \longrightarrow RHSO_4 + H_2O$ $ROH + R'COOH \longrightarrow R'COOR + H_2O$
(v)	$Ca(OH)_2 + H_2SO_4 \longrightarrow CaSO_4 + 2H_2O$

<table>
<tr><td>Q.3</td><td>a) What do you mean by the term "Choice of Process Technology". Explain the various factors that need to be considered during the start of a Chemical Industry.

b) Why we are more concerned about renewable sources instead of petroleum based chemical products.</td><td>[5+5]
[CO4,CO5]</td></tr>
<tr><td>Q.4</td><td>a) With the help of neat diagram Explain the process for the production of C from A and B in Lab scale and automated industrial process.

b) What do you mean by Qualitative flow diagram. Provide example with the help of neat diagram.</td><td>[5+5]
[CO2,CO1]</td></tr>
<tr><td>Q.5</td><td>a) Draw the symbols of the following used in process flow diagram.

<table><tr><td>(i)</td><td>Centrifugal compressor</td><td>(vi)</td><td>Shell and tube Heat Exchanger</td></tr><tr><td>(ii)</td><td>Grinder</td><td>(vii)</td><td>Packed Column</td></tr><tr><td>(iii)</td><td>Spray condenser</td><td>(viii)</td><td>Heater</td></tr><tr><td>(iv)</td><td>Gas Holder</td><td>(ix)</td><td>Coil in tank</td></tr><tr><td>(v)</td><td>Tray Dryer</td><td>(x)</td><td>Turbine</td></tr></table>
b) What do you mean by Chemical Plant. Explain with the help of Example.</td><td>[5+5][CO3]</td></tr>
</table>

Total no of pages 03
FOURTH SEMESTER
END SEMESTER EXAMINATION

Roll No.....
B.TECH[CHE]
May-2024

CH202 Fluid Mechanics

Time: 3 Hours

Max. Marks - 40

Instructions to the candidates:

1) Attempt all questions
2) Assume any missing data

Q.1 Write answers in one word. (10×1)

(i) Viscosity of_____ types of non-Newtonian fluid decreases with increasing shear rate. [CO1]

(ii) Continuous Decanter is used for separating the two _____ fluids. (Miscible/ Immiscible). [CO1]

(iii) Viscosity of a Newtonian fluid is _____ with increasing temperature. (Increasing/Deceasing/Constant) [CO1]

(iv) If a Newtonian fluid is flowing inside a pipe, the local velocity of fluid will be minimum at the _____ of the pipe. [CO1]

(v) Equation of Hagen–Poiseuille equation is valid for _____ types of fluids. [CO1]

(vi). A fluid is flowing between two parallel plates. One plate is moving with the velocity V_1 and second plate is in rest position. If no-slip condition is applicable, what will be the velocity of fluid at the solid surface of both plates? [CO1]

(vii) If value of "n" is greater than one for a Non-Newtonian fluid the viscosity of fluid will _____ with increasing shear rate of fluid. (Increase/Decrease/Remain constant). [CO1]

(viii) Write the types of drag forces exerted on a solid body by a flowing fluid. [CO5]

(ix) What is the range of Reynolds number for Stokes' law? [CO5]

(x) Write the mathematical expression of Reynolds Number for particle in external flows? [CO1]

(5×2)

Q.2 Write short answer

(i) In a food processing plant, vegetable oil having density 2000 kg/m^3 and viscosity 0.005 Pa.s is flowing at the average velocity of 3 m/s through a circular pipe of diameter 80 mm. Calculate the Reynolds number. Determine the behaviour of flow (laminar/transition/turbulent). [CO2]

(ii) Write the mathematical expression of Stocks' law. [CO5]

(iii) A fluid having density 3000 kg/m^3 is flowing with an average velocity 2 m/s through a circular tube. At study sate and fully develop flow, the shear stress applied on the wall due to flow is 10 N/m^2. Calculate the value of friction factor. [CO3]

(iv) Write the difference between pneumatic fluidization and bubbling fluidization. [CO6]

(v) Write the boundary condition for liquid air interface when a fluid is freely falling on an inclined surface. [CO2]

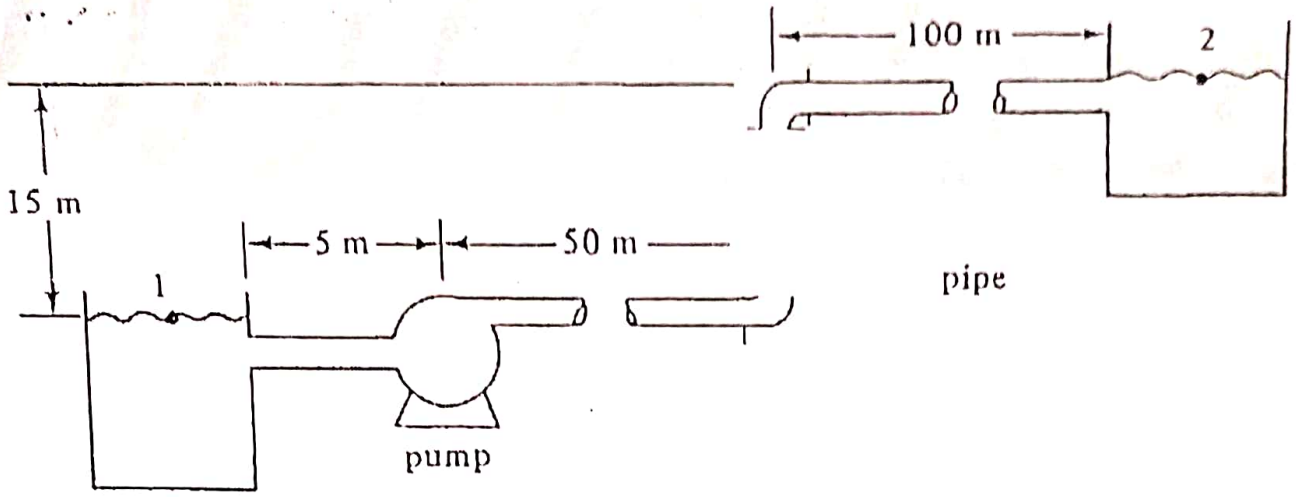
Q.3 (i) Write the mathematical expression of the Bernoulli's equation. What are the assumptions used in Bernoulli's equation? (3) [CO3]

(ii) Which type of fluid flow (Laminar/Turbulent) is more efficient in industrial scale operations. Give the reasons of your answer. (3) [CO1]

(iii) Write the mathematical expressions of Eyring model and Ellis model with limiting cases. (4) [CO1]

Q. 4 (i) Define the Wall Drag, Form Drag and Drag Coefficient. How does the values of drag coefficient vary with the different range of Reynolds number? (5) [CO5]

(ii) Water at 20 °C is being pumped from a tank to an elevated tank at the rate of 8.0×10^{-3} m^3/s as shown in figure below. The pump has the efficiency of 75 % calculate the power needed for the pump. (5) [CO6]
(Internal diameter of pipe 0.1023 m; cross sectional area 8.219×10^{-3} m^2; Fluid properties: density 998.2 kg/m^3; viscosity 1.005×10^{-3} Pa.s; Fanning friction factor 0.0051; Friction factor for elbows 0.75)



END

Total no. of Pages: 02

Roll no..... 82

B.Tech – 4th Semester

END SEMESTER EXAMINATION *May 2024*

CH-204 Chemical Reaction Engineering-I

Time: 3 Hours *Max. Marks: 40*

Note : All questions are compulsory, Assume suitable missing data, if any. Use pencil to draw diagram (s) Graph Papers will be provided if asked for

Q.1 (a) What is a 'Variable Volume Reactor'? Give example. Write the expression for Fractional Conversion, $\in_A$ in terms of fractional change in volume of the reaction system.

(b). Calculate $\in_A$ for gas phase reaction 2A→R, starting with 50 mole % A and 50 mole % inerts. (3+2)=[5] CO-1

Q. 2 (a). Derive an Integral rate expression in terms of conversion for an irreversible tri-molecular reaction of type 3A→ R .

(b). For a reaction, A→Products, the following data were obtained at 25 ^{0}C, in which the concentration of A is given at different intervals of time:

t, min	0	10	20	30	40
C_A, mol/l	0.860	0.740	0.635	0.546	0.405

Find the order of reaction and calculate the rate constant. Also calculate the half-life period.

(4+4)=[8] CO-2

Q. 3 (a). What are 'Competing Reactions'? Explain with suitable example.

For competing reactions $A \xrightarrow{k_1} R$ and $A \xrightarrow{k_2} S$, find out the values of $k_1 + k_2$ and $\frac{k_1}{k_2}$.

(b). Liquid A decomposes by 2nd order kinetics. In a batch reactor, 50% of A is converted in 5 minutes. How long it would take to reach 75% conversion.

(4+4)=[8] CO-3

Q. 4 (a). What is a "Semi-batch' Reactor? What are the advantages of Semi-batch reactor over the batch and continuous reactor.

(b). Assuming a stoichiometry A→R for a first order gas reaction, we calculate the size of the plug flow reactor needed for a given duty (99% conversion of the pure feed) to be V=32 litres. In fact, however, the reaction stoichiometry is A→3R. With this corrected stoichiometry, what is the required reactor volume?

(c). For an ideal C.S.T.R., prove that $\tau = \frac{(CA0-CA)}{-rA}$.

(3+3+3)=[9] CO-3

Q. 5 (a). Differentiate Mixed Flow and Plug Flow behaviours.

(b). In real reactors, what are the reasons for the deviation of the flow behaviour from ideality.

(c). What is Residence Time Distribution (RTD). How RTD is determined? What should be the characteristics of a Tracer?

(3+3+4)=[**10**] CO-5

.....END.....

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

IV SEMESTER

B.Tech

END TERM EXAMINATION *May-2024*

CH206: Mechanical Operations

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

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

Q.No.		Marks	CO
1 [a]	Derive the general equation for settling ratio for spherical particles.	3	5
[b]	Filter aids are essential for slimy or very fine particle filtration. Justify the statement with suitable example.	3	4
2	A sponge iron industry uses a reciprocating screen of 5 mm aperture to separate oversize from undersize fines which is then recycled to the furnace. The screen analysis of the furnace output was found to contain 25% fines. The screen effectiveness was known to be 50%. The underflow from the screen contains around 95% fines. If the furnace production rate is 100 tonne/h, find the (a) Product rate (b) the amount of fines present in the product.	3+2	3
3 [a]	A feed of gypsum with 80% of material passing through a 50 mm screen is crushed to a product with 80% passing a 5 mm screen. If power required for crushing is 80kW, what is the capacity of the crushing unit? Work index for gypsum is 6.73 kWh/tonne.	3	3

[b] For producing oil and water emulsion, two portable three bladed propeller mixers are available. The specifications are as follows. 3 1

Propeller	Diameter (m)	Rotational speed (rpm)
A	0.5	60
B	0.35	120

Assuming turbulent conditions are prevailing, which propeller is suitable in terms of power consumption? Consider K_T is same for each propeller.

4 Data for laboratory filtration of $CaCO_3$ slurry in water at 25°C are reported as follows for constant pressure of 340kN/m^2. The filter area of plate and frame filter was 0.186 m^2. The slurry concentration was 20 kg/m^3. The viscosity of the filtrate was 8.9 x 10^{-4} Pa.s. Calculate the (a) specific cake resistance (b) filter medium resistance from the experimental data given 3+2 2

Filtrate Volume $(10^3)m^3$	1.0	2.0	3.0	4.0	5.0
Time (s)	9.5	24.6	46.1	73.6	107.3

5 [a] Derive the equation for rate of filtration operated under batch condition. 3 4

[b] Differentiate between dead end filtration and cross flow filtration. 3 4

6 [a] In a mixture of quarts (Specific gravity=2.65 and galena (specific gravity=7.5), the size of particles ranges from 0.0002 cm to 0.001 cm. On separation in a hydraulic classifier using water under free settling conditions, what are the size ranges of quartz and galena in the pure product? Viscosity of water=0.001 kg/m s, density= 1000 kg/m^3 3 5

[b] Differentiate between free settling and hindered settling of particles. Write the correlation between them. 3 5

7 [a] Limestone from a quarry is to be transported at the rate of 900 tonne/h by belt conveyor at an incline of 16 to the stockyard. The particles of limestone are dry and are of size 15-30 mm. A belt conveyor of 1200 mm width is available for transportation. Check whether the available conveyor is suitable for service. Bulk Density of limestone= 2500 Kg/m^3, Ci= 0.9, Ka= 0.067 and belt speed = 1.6 m/s 3 1

[b] Write the merits and demerits of hydraulic and pneumatic transport of solids. 3 1

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Roll No:_____

Total No of Pages: 2pg

4th Semester

B.Tech

END TERM EXAMINATION

MAY 2024

CH208

HEAT TRANSFER

Time: 3:00 Hours

Max. Marks: 40

Note: Attempt any 5 Questions.
All the questions carry equal marks.
Assume suitable missing data, in any.

Q1 a) Define temperature gradient. Explain the concept of co-current and counter-current temperature gradient with suitable example. [5][CO5]

b) What is drift factor? How it is to be accounted for the calculation of overall heat transfer coefficient? Explain. [3][CO5]

Q2 a) Starting from general heat conduction equation derive the equation for heat transfer for a single layer hollow sphere. [5][CO2]

b) A steam boiler furnace is composed of two layers, fire clay 120mm thick and red brick 480mm thick. The thermal conductivity of fire clay and red brick are 0.53W/m.K and 0.71W/m.K respectively. If the temperature inside and outside wall of the boiler furnace are 1365K and 320K, determine the amount of heat loss per m^2 of the furnace. [3][CO2]

Q3 Explain the following in detail:

a) Climbing Film Evaporator [4][CO5]

b) Different laws of heat transfer [4][CO1]

Q4 a) Define condensation. With neat diagram explain the dropwise condensation process. [5][CO3]

b) Saturated steam at 355K condenses on vertical tube of 1.2m length and 25mm outside diameter is maintained at 345K. Determine the average heat transfer coefficient of the condenser where, λ=2300 KJ/kg, ρ=977kg/m^3, K=0.673 W/m.K, μ=0.381x10^{-3}kg/m.s. [3][CO3]

Q5 a) Define dimensionless group and dimensional analysis. Explain in brief the significance, application and limitation of dimensionless group and dimensional analysis. [5][CO3]

b) Calculate the net change of radiation energy per square of very large planes of temperature 420°C and 52°C. Emissivity of the hot and cold planes are 0.87 and 0.77 respectively. [3][CO4]

Q6 a) What are the different modes of heat transfer? Explain in brief the mechanism of heat transfer of these modes. [4][CO2]

b) Define insulation. Classify the insulation materials. Explain the factors influences the property of insulation material. Discuss the application of insulation material. [4][CO1]

Q7 Discuss the following: (Any two)

a) Different boiling regimes [4][CO3]

b) Radiation between two surfaces [4][CO4]

c) LMTD [4][CO5]

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Total no. of Pages: 02

SIXTH SEMESTER

B.Tech.

END TERM EXAMINATION *May-2024*

CH302 CHEMICAL REACTION ENGINEERING-II

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

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

Q.1 What do you mean by Heterogeneous reactions? Explain the various types of Heterogeneous reactions. Provide Examples. [1+1+3] [CO1]

Q.2 a) Gaseous reactant A diffuses through a gas film to the surface of solid B where it reacts with B according to a reversible first order rate. [3+2] [CO2,CO1]

$$-r''_A = k'''(C_{As} - C_{Ae}), mol/(m^2.s)$$

where C_{Ae} is the concentration of A in equilibrium with the solid surface.
Derive an expression for the rate of reaction A that accounts the mass transfer steps and reaction steps.

b) Define Liquid holdup and specific interfacial area.

Q.3 A solid catalysed first order reaction A ⟶ R takes place with 55 % conversion in a basket type mixed reactor. Find the conversion if the reactor size is trebled-all else, i.e., temperature, composition, etc. remains unchanged. [5] [CO3]

Q.4 a) Drive the expression for plug flow G and Plug flow L when mass transfer and reaction occurs in counter current tower. Write down the steps to find V_r. [5+2] [CO4]

b) Spherical solid particles containing B are roasted at constant temperature in an oven by gas of constant composition. Solids are converted to give a firm non-flaking product according to the shrinking-core model (SCM). From the following conversion data determine the rate controlling mechanism for the transformation of solid. [3] [CO1]

Data:

dp, mm	X_B	t, s
1	0.5	3
1	0.75	5

Q.5 a) Explain the mechanism of solid catalyzed reactions. [5+5] [CO3,CO5]

b) Define the term Bioreactor? Draw a well labelled neat diagram of bioreactor. Enlist the different types of bioreactor based on the mode of operation.

Q.6 Gaseous A absorbs and reacts with B in liquid according to [5] [CO4]

$$A\ (g \rightarrow l) + B\ (l) \rightarrow R\ (l),$$

$$-r_{Al} = kC_AC_B$$

in a packed bed. At a point in the reactor where $p_A = 100$ Pa and $C_B = 1$ mol/m^3 liquid. Calculate

(i) the rate of reaction in mol/(h.m^3 of reactor)
(ii) The resistance offered by the main body of liquid.

Data: $k = 10$ m^{3}liquid/(mol.h)
$H_A = 10^5$ (Pa.m^{3}liquid)/mol
$k_{Ag}a = 0.10$ mol/(h.m^3 of reactor.Pa)
$k_{Al}a = 100$ m^3 liquid/(m^3 reactor.h)
$f_l = 0.01$ m^{3}liquid/m^3 reactor
$a = 100$ m^2/m^3 reactor
$D_{Al} = D_{Bl} = 10^{-6}$ m^2/h

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B.Tech – 6th Semester

END SEMESTER EXAMINATION

May- 2024

CH304 Mass Transfer-II

Time: 3 Hours

Max. Marks: 40

Note : All questions are compulsory, Assume suitable missing data, if any. Use pencil to draw diagram (s) Graph Papers will be provided if asked for

Q.1 (a) What is steam distillation? What are the necessary conditions to use steam distillation?

(b) Draw a neat diagram of "Fractionating Column" and label its parts.

(2+3) = [5] (CO-1)

Q. 2 (a) Derive the q-line Equation.

(b) A bubble cap fractionating column consisting of 12 plates working at an average efficiency of 75% is being used to distill 1000 kg/hr of aqueous methanol at its boiling point entering the tower. The feed, overhead product and bottom product are 50 mole %, 90 mole % and 10 mole % methanol respectively. A total condenser is provided. The reflux is sent at its saturation temperature. If the reflux ratio is 1.7 times the minimum reflux ratio, check whether the column available is satisfactory. The VLE data are:

x_1	8	10	20	30	40	50	70	80	95
y_1	36.5	41.8	57.9	66.5	72.9	77.9	87.0	95.8	97.9

(3+8) = [11] (CO-2)

Q. 3 (a) What criterion defines the 'degree of separability' in Liquid- Liquid Extraction?

(b) Carbon disulphide (CS_2) is used to extract iodine from its saturated aqueous solution. The distribution of iodine between $CS_2$and water at equilibrium is given by

$$K = \frac{Y}{X} = \frac{g\ iodine/1\ l\ of\ CS_2}{g\ iodine/1\ l\ of\ H_2O} = 502.8$$

Calculate the concentration of iodine in the aqueous phase if 1 *l* of a saturated aqueous solution of CS_2 at 20 ^{0}C containing 0.5 grams of iodine per 1 *l* of water is stirred with 80 ml of CS_2.

(c). Draw a neat diagram of 'Pulse Column'. How the oscillating pulse is introduced in the column and how it benefits the functioning of the packed bed/plate column in LLE.

(1+3+3) = [7] (CO-3)

Q. 4 (a). Define the term "Leaching". What are the main factors affecting the rate of Leaching How Leaching is different from Dissolution?

(b). What is the mechanism of the "Crystallization"? What are the different methods t achieve supersaturation?

(c). Explain the working of the following with neat and clean diagrams (Any 2):

i. Dorr Agitator
ii. Swenson -Walker Crystallizer
iii. Fixed Bed Adsorber (CO-5)

(4+3+5)=[12] (CO-4)

Q. 5 With a neat diagram, discuss the role of adsorption in heterogeneous catalysis.

[5] (CO-5)

.....END.....

Total No. of Pages: 02 92 Roll No. .....

Sixth *Semester*

B.Tech. (Chemical Engineering)

End Semester Examination ***May-2024***

CH306 Chemical Process Technology

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

NOTE: ***Answer any Four questions.***
Assume suitable missing data if any.

1. (a) What is a Conceptual Process flow sheet? Which attributes constitute the Conceptual Process flow sheet? **5 [CO1]**
   (b) How the pressure-temperature parameters are controlled to produce the different varieties of hydrogenated oils? **3 [CO4]**
   (c) Explain the problem of Sugar inversion encountered during sugar manufacture. How this problem can be overcome? **2 [CO4]**

2. (a) Describe the Electrolytic process producing chlorine and sodium hydroxide with a process flow diagram. **5 [CO1,3]**
   (b) What is the best temperature range that meets kinetics and thermodynamics requirements for high yield in the synthesis of SO_3? What will be the effect on the conversion of SO_2 to SO_3, if the temperature is too high or low? **3 [CO4]**
   (c) What are the quantitative requirements of raw materials required for the production of Ammonia? **2 [CO2]**

3. (a) Develop the Process flow diagram for the manufacture of Urea and explain the process. **5 [CO2]**
   (b) Comment on the process design modifications with process parameters for the ammonia manufacturing plant. **3 [CO4]**
   (c) Evaluate the current scenario of the Indian Chemical industry. **2 [CO5]**

4. (a) What are the functional roles of Shell & Tube heat exchangers? **2 [CO1]**
   (b) Develop the flow diagram and explain the manufacture of Soap. **5 [CO2]**
   (c) What are the raw material sources for sulphuric acid manufacture? **3 [CO4]**

5. (a) What are the different grades of Phosphate fertilizer? 2 [CO3]

(b) If bagasse to be used for pulp production instead of wood-based material, suggest a modification in the sulfate pulp process. 3 [CO4]

(c) Which measures are adopted by Pulp and Paper industries to cope up with stringent pollution laws? 2 [CO5]

(d) Which improvements in the paper manufacturing process you will suggest to increase the wet strength of paper products? 3 [CO4]

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Total no of pages 2 Roll No.....

FOURTH SEMESTER B.TECH[CHE]

END SEMESTER EXAMINATION May-2024

CH410 Process Engineering and Design

Time: 3 Hours Max. Marks - 50

Instructions to the candidates:

1) Data book along with formulas and graphs required for designing will be provided by examination centre
2) Assume any missing information
3) Attempt all questions

Q.1 A lube-oil cooler for 2 MW steam turbine is to be designed for following operating conditions: Lube-oil, conforming to ISO VG-46 grade, flows at the rate of 450 L/min and is to be cooled from 65°C to 45°C with cooling water.

Kinematic viscosity of lube oil = 45.5 cSt at 40°C
Density of lube oil = 869 kg/m^3
Specific heat of lube oil = 2.1413 kJ/(kg .°C)
Thermal conductivity of lube oil at 55°C = 0.13 W/(m.K)
Viscosity of lube oil at 55°C = 15 cP or m Pa.s
Cooling water inlet/outlet temperatures = 35°C/39°C

(20) [CO2, CO3]

Q.2 Carbon dioxide gas (> 99.5% pure) from ammonia plant at 1.01 atm a and 40°C is washed with cooling water in a packed column before compression in urea plant. Cooling water from bottom of the column is pumped back to cooling tower. Solubility of carbon dioxide in water is 0.0973 kg/100 kg water at 1 atm and 40°C. Find the volume fraction of carbon dioxide over cooling water. Also calculate artificial liquid vapour pressure. Molar mass of carbon dioxide, M = 44.0095. vapour pressure of water at 40°C is 0.07375 bar (0.0728 atm)

(10) [CO1]

Q.3 Benzene at 37.8°C is pumped through the system at a rate of 9.09 m^3/h with the help of a centrifugal pump. The reservoir is at atmospheric pressure. Pressure at the end of discharge line is 345 kPa g. The discharge head is 3.05 m and the pump suction head is 1.22 m

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above the level of liquid in reservoir. The friction loss in suction line is 3.45 kPa and that in the discharge line is 37.9 kPa. The mechanical effi ciency of the pump (h) is 0.6. The density of benzene is 865 kg/m3 and its vapour pressure at 37.8°C is 26.2 kPa. Calculate (a) $(NPSH)_A$ and (b) power required by centrifugal pump. (10) [CO1]

Q.4 What are the desirable solvent properties in liquid-liquid extraction process explain in detail. (10) [CO3, CO4]

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

MSc Chemistry/B.Tech CH$_2$

END SEMESTER EXAMINATION **May 2024**

Course Code: CH406

Course Title: Catalysis

[Time: 3H] [Max. Marks: 50]

Instructions: Attempt any 10 questions. Part A is for M.Sc students and Part-B is for B.Tech students

Ques1, Is it possible to synthesize the following aldehyde from an appropriate 5-carbon alkene by using an appropriate transition metal catalyst? (5) [CO1]

$H_3C\text{-}CH_2\text{-}CH_2\text{-}CHO$

Ques2. Describe all the steps involved in the working principle of Wilkinson's Catalyst in hydrogenation reaction. (5) [CO1]

Ques3. Zeolites are a class of important industrial catalysts. Highlight the important characteristics and industrial applications of zeolites. (5) [CO2]

Ques4. Explain the following terms (5) [CO2]

a) 1,2-Insertion
b) Hydride Elimination
c) Catalytic Cracking
d) Catalytic Converter
e) Tolman Cone Angle

Ques5. A solution of $TiCl_4$ in hydrocarbon solvents in the presence of $Al(C_2H_5)_3$ is a heterogeneous catalyst for polymerization of ethylene. Describe the mechanism of the reaction. (5) [CO3]

Ques6. The rate of substitution of the phosphine ligand in the following reaction highly depends upon the substituents on the ligand

$$cis\text{-}Mo(CO)_4L_2 + CO \longrightarrow Mo(CO)_5L + L \quad (L = \text{phosphine})$$

Justify the above statement with suitable examples. (5) [CO3]

Ques7. What is Turnover Number? Calculate the turnover number (TON) and turnover frequency (TOF) of a homogeneous catalytic reaction containing 1.0 M of a substrate using 1.0 μM of a catalyst yielding 1.0 mM of a product in 10s? (5) [CO4]

Ques8. Describe the significance of surface area and adsorption in terms of heterogeneous catalysis. (5) [CO4]

Ques9. Provide examples of reactions involving loss of ligands and ligand modification in organometallic catalysis. (5) [CO4]

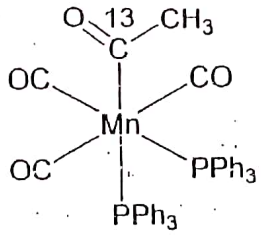
Ques10. Give a brief discussion of the use of heterogeneous catalysis in selected industrial manufacturing processes. (5) [CO4]

Ques11. Find out the number of electrons on metal centre in the following complexes;

a) $Rh(PPh_3)_3Cl$; b) $HCo(CO)_4$; c) $Ni(\eta^3\text{-}C_3H_5)_2$; d) $Fe(CO)_4PPh_3$; e) $[Rh(CO)_2I_2]^-$

(5) [CO5]

Ques12. The complex shown below loses carbon monoxide on heating. Would you expect this carbon monoxide to be ^{12}CO, ^{13}CO or a mixture of both? Why? (5) [CO5]



Part-B

Ques1. Explain the fundamental concepts of both homogeneous and heterogeneous catalysis and highlight their respective applications and limitations. (5) [CO1]

Ques2. [a] Define the following terms with suitable examples: **(Any two)** (4) [CO1]

(i) Catalytic cycle (ii) Catalyst support (iii) Selectivity

[b] Describe a catalytic reaction which degrades the environment (1) [CO1]

Ques3. Discuss the following with suitable example: (5) [CO3]

(i) Oxidative addition (ii) Reductive elimination

Ques4. In a homogeneous catalytic reaction, 1.0 M of a subtract using 1.0 μM of a catalyst yields 1.0 mM of a product in 10s calculate the turnover number (TON) and turnover frequency (TOF) of the reaction? (5) [CO1, CO2]

Ques5. Which of the following compounds undergoes oxidative addition reaction faster? Give explanation. (5) [CO3]

(i) $Rh(CO)(PPh_3)_2Cl$ or $Ir(CO)(PPh_3)_2Cl$ (ii) $Rh(PPh_3)_3Cl$ or $Rh(PPh_3)_2(CO)Cl$

Ques6. According to the given thermodynamic data, is it feasible to find a catalyst to produce H_2O_2 by bubbling O_2 into water according to the following equation? (5) [CO4]

$$O_2 + 2\,H_2O \longrightarrow 2\,H_2O_2$$

$$O_2 + 2H^+ + 2e^- \longrightarrow H_2O_2 \quad E^0 = +0.70V$$

$$H_2O_2 + 2H^+ + 2e^- \longrightarrow 2H_2O \quad E^0 = +1.4V$$

Ques7. Write the short note on the effect of temperature and pressure on adsorption. Draw the adsorption isotherm and adsorption isobar. (5) [CO5]

Ques8. The adsorption of the gas is described by the Langmuir isotherm with the equilibrium constant $K = 0.9\ kPa^{-1}$ at 25 °C. Find the pressure (in kPa) at which the fractional surface coverage is 0.95. (5) [CO5]

Ques9. Write the plausible mechanism for the catalytic hydrogenation of alkenes using Wilkinson's catalyst, $Rh(PPh_3)_3Cl$. Identify the reaction type of each step. (5) [CO3, CO4]

Ques10. The adsorption of gases on solids can be described by Freundlich's empirical equation:

$$\frac{x}{m} = kp^{1/n}$$

define the terms involved and the possible values of 'n'. draw the relation between **x/m vs p** at constant temperature (5)[CO5]

Ques11. Draw the catalytic cycle for the Zeigler-Natta polymerization of propene. Comment about the polymer that formed. (5) [CO4]

Ques12. Write the short note on the catalytical properties of transition metal elements? (5) [CO3]

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B.Tech (VI/VIII Sem), M.Sc. (II Sem)

END TERM EXAMINATION May-2024

COURSE CODE: CH416

COURSE TITLE: Industrial Waste Management

Time: 3 hrs *Max. Marks: 50*

Note : 1. Question no. 7 is compulsory.
2. Attempt any 5 questions from rest.

Q.1 Define E-waste? What are its sources? Discuss the effects of E-waste on human health and environment. What are the responsibilities and role of Industries and citizens to reduce e-waste. [7][CO4]

Q.2 What are small scale industries SSIs? Discuss various issues related to SSIs. How can industrial waste from SSIs be managed. [7][CO3]

Q.3 What are different levels of waste generation in a typical industrial setup? Explain in detail the waste generated by any industry and impact of that waste. [7][CO2]

Q.4 What are different types of waste generated in a Pharma Industry. Explain with examples. Discuss different waste disposal methods used in a pharma industry in detail [7][CO3]

Q.5 Discuss the selection procedure for physical, chemical & biological methods of industrial waste treatment. What are the advantages of Joint Treatment of Industrial Waste and Domestic Sewage. [7][CO2]

Q.6. What is reverse osmosis? Discuss it's advantages and disadvantages. [7][CO2]

Q.7. Write short notes on any THREE; [3 x 5=15][CO1,2,4]

(i) Sequential Batch Reactor.

(ii) Waste product disposal procedure in a pharma industry.

(iii) Recycling of E-waste and its advantages.

(iv) Various processes in a Textile industry and the waste generated.

Total no. of Pages: 02

Roll no.....

VIII SEMESTER

B.Tech. Chemical Engineering

END TERM EXAMINATION MAY-2024

CH 424 SAFETY AND HAZARD IN CHEMICAL INDUSTRY

Time: 3 Hours

Max. Marks: 50

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

Q.1[A] 1. What is your view on Safety aspect in chemical industries keeping in view technological advancements in chemical industries? [2][CO1]

[B] A chemical industry has 1500 full-time employees. In a particular year this industry had 38 reportable lost-time injuries with a resulting 274 lost workdays. Compute the OSHA incidence rate based on injuries. [3][CO2]

[C] What Fundamental principles are laid down in the American Institute of Chemical Engineers Code of Professional Ethics? [2][CO1]

[D] Suggest an Organization and Administration control of Noise in an Industry? [3][CO5]

Q.2[A] A process has a reported FAR of 2. If an employee works a standard 8-hour shift 300 days per year, compute the deaths per person per year. [3][CO2]

[B] What are the Delayed Somatic Effects & Genetic Disorder of radiations on human beings? [2][CO2]

[C] Why is there so much concern about chemical plant safety? Explain with an example. [3][CO4]

[D] In which conditions hearing protectors are used. Discuss the types of individual hearing protectors used in industries. [2][CO2]

Q.3[A] What are the guidelines for storing acids? [2][CO3]

[B] What are the possible causes of accidents while transporting chemicals by rail and how can be prevented? [3][CO3]

[C] List down the Safety Precautions for Transporting Chemicals and Proper Storage. [2][CO3]

[D] Draw the flowchart that illustrates the procedure for using hazards identification and risk assessment. [3][CO4]

Q.4[A] Explain the procedure for completing the Hazards and Operability (HAZOP) Studies. [4][CO4]

[B] Draw the symbols for the following Logic transfer components used in a fault tree: [2][CO5]

(1) OR gate (2) AND gate (3) Basic Event (4) Intermediate event

[C] Write any four Human factor evaluation topics in Human Error analysis. [2][CO2]

[D] Which ministries in India are responsible for framing Occupational Safety & Health rules? [2][CO1]

Q.5[A] What is a Safety audit? What purposes does it serve? [4][CO5]

[B] If you are an Audit Team member, what steps will you follow to conduct an Effective Safety Audit in a plant? [3][CO5]

[C] What is Process Hazard Checklist? Develop a Checklist for driving away car for vacation. [3][CO2]

Q.6[A] What is MSDS? Which information is present in eight sections of MSDS? [5][CO1]

[B] Who are involved in Formal Safety Audit? [1][CO5]

[C] What are the advantages of transportation of chemicals by road? [2][CO3]

[D] What information you can find on a Warning Label while storing and transporting hazardous chemicals? [2][CO3]

Total no. of Pages: 01

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VIII Semester
B.Tech.

ENDTERM EXAMINATION May 2024

CH426 Biofuel Engineering

Time: 3:00 Hours Max. Marks: 50

Note: Be brief. Attempt only Five Questions out of which Question No. 1 is compulsory. In addition to Question 1, answer any Four questions from the rest of the questions.

1. Write your Name & Roll Number clearly. What are fuels, and biofuels, also mention the 1st to 4th generation of biofuels. What are the social, economic and environmental impacts of bioenergy? **(1+9 Marks) (CO-1)**
2. What are algae and microalgae. How can you produce biodiesel from algal biomass. What are the challenges and Life Cycle Analysis, economics and environmental impacts of algal process. **(10 Marks) (CO-5)**
3. How can you produce bioethanol from lignocellulose. Mention the pre-treatment method of this. For a country like India, why are we concerned using food-based feedstocks for fuel/biofuel production. **(10 Marks) (CO-3)**
4. What is Torrefaction. Using municipal solid waste (MSW), how can you produce products like biogas, biodiesel, ethanol. **(10 Marks) (CO-4)**
5. How can you convert low rank coal (Lignite) or wooden biomass into bio-oil, bio-char, & syngas. Which is the best/preferred method in case of waste-tires as compared to any other sources of biomass. **(10 Marks) (CO-2)**
6. How do you see the transition from fossil to renewable biofuels from sustainability angle, and what are the future directions. How do you see the scenario for transportation biofuels by the year 2060. **(10 Marks) (CO-3 &4).**
7. What are advanced biofuels. What are the advantages, critical hurdles in the production of these advanced biofuels. How would you overcome these hurdles. **(10 Marks) (CO-5)**
8. What is Life Cycle Assessment (LCA), mention the LCA for waste to biodiesel. What are thoughts on the sustainability and future directions, fossil fuel to renewable biofuel. **(10 Marks) (CO-3 &4)**

GOOD LUCK

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Total no. of Pages: 04 *Roll no* .....

SECOND SEMESTER

B. Tech

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END TERM EXAMINATION *May 2024*

COURSE CODE: CE102

COURSE TITLE: STATISTICAL METHODS FOR ENGINEERS

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

Note: 1) Attempt all questions; the internal choice is indicated wherever applicable.
2) Marks are indicative of time distribution. The use of calculator is allowed.
3) Mobile/tablets/programming calculators are not permitted.
4) Assume suitable missing data, if any.

Q.1 Explain with examples & differentiate between,

(i) Discrete and Continuous distribution [CO2]
(ii) Type I and Type II errors [CO3]
(iii) Causation and Correlation [CO4]
(iv) Positive and Negative correlation [CO4]
(v) Null hypothesis and Alternative hypothesis [CO3]

[2*5=10]

Q.2(i) Consider a case where the daily flow rates of a river follow a normal distribution with a mean of 500 m^3/s and a standard deviation of 100 m^3/s. Calculate the probability for the following cases:

a) Daily flow rate in the river exceeds 700 m^3/s
b) Daily flow rate in the river is below 250 m^3/s
c) Daily flow rate in the river is in the range of 450 to 600 m^3/s

(ii) A compression test is performed on 20 concrete cubes, produced the following strength results (in N/mm^2):

26.7	25.8	24.0	22.1	22.2	23.2	22.5	21.2	22.5	22.4
22.8	22.7	22.0	22.6	22.9	24.5	26.4	25.9	24.4	21.7

Find a 95% and 99% confidence interval for the true average strength of the concrete.

[6+4] [CO2]

Q.3 Explain the concept of Mathematical expectation and its use. Using Mathematical expectation derives the expression for the mean and variance of a binomial distribution.

[5+5] [CO1]

33 Q.4 Continuous stream water quality monitoring is done at a point downstream of an industry area. The variables that are measured, among others, are the amount of Dissolved Oxygen (DO) and the Biochemical Oxygen Demand (BOD) in mg/L.

DO	5.4	6.0	6.2	6.5	7.0	7.5	6.9	7.1	8.7	8.0
BOD	4.4	4.0	3.8	3.9	3.6	3.1	3.4	3.3	2.7	2.9
DO	8.9	8.3	8.4	8.6	9.2					
BOD	2.3	2.6	2.8	2.5	2.1					

a) Construct a scatter plot between DO and BOD. [CO1]
b) From the scatter plot, can we conclude that the value of BOD can be estimated from DO? [CO1]
c) Find the equation of a straight line using least squares method [CO4]
d) Estimate the value of standard error [CO4]
e) Estimate the value of the root mean square error and mean absolute percentage error. [CO4]

[1+1+4+2+2] [CO4]

OR

Q.4 (i) For a given data set of 100 values having μ=100 and σ= 15. How can one test whether the data is normally distributed or not? Explain with suitable data/examples. [CO2]

(ii) Explain the method of least squares for regression analysis/ curve fitting. [CO4]

(iii) What is the significance of R^2 in regression analysis? [5+3+2] [CO4]

Q.5 (i) Describe the steps in the development of the AR model.

(ii) Explain the required conditions of AR Models for time series data. How is the order of the AR Model determined from ACF and PACF?

(iii) How to test that the white noise (E_t) has no significant information (signal).

[4+3+3] [CO5]

OR

Q.5 (i) In the following AR (2) model $X_t = \emptyset_1 X_{t-1} + \emptyset_2 X_{t-2} + E_t$, for the optimal value of $\emptyset_1$ and $\emptyset_2$, what are the characteristics of E_t for a (i) Good model, (ii) Below average model. For these two cases, what are the expected indicative values of autocorrelation at lag 1 (ρ_1).

(ii) An analyst presents the following AR (2) model $(1 + 0.7B + 0.2B^2)Y_t = a_t$, where Y_t is the data series, and a_t is white noise. The 95th to 99th data points in series with white noise are as below,

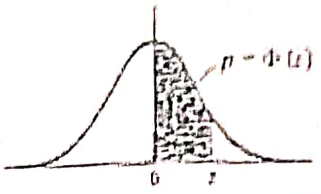
S. No	95	96	97	98	99	100	101
Y_t	103	105	104	102	104	?	?
a_t	+2	-2	+1	+3	-1		

Find the 100th & 101st values of the time series for the above model.

[5+5] [CO5]

Appendix

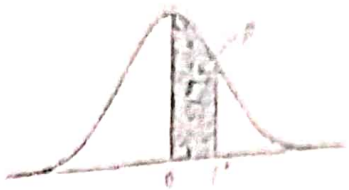
Table A-1 Standard normal distribution



The table entries are the probabilities p for which $P(0 \le Z \le z)$, where z ranges from 0.00 to 3.99.

z	0	1	2	3	4	5	6	7	8	9
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0764
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	.2258	.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	.2996	.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	.4162	.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	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.7	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.8	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000

Table A-2 The t distribution



The entry in row k (degrees of freedom) under column heading p (probability) is the value t^* for which $P(0 \le t \le t^*) = p$

k \ p	0.05	0.1	0.2	0.25	0.3	0.4	0.45	0.475	0.49	0.495
1	.158	.325	.727	1.000	1.376	3.08	6.31	12.71	31.82	63.66
2	.142	.289	.617	.816	1.061	1.89	2.92	4.30	6.96	9.92
3	.137	.277	.584	.765	.978	1.64	2.35	3.18	4.54	5.84
4	.134	.271	.569	.741	.941	1.53	2.13	2.78	3.75	4.60
5	.132	.267	.559	.727	.920	1.48	2.02	2.57	3.36	4.03
6	.131	.265	.553	.718	.906	1.44	1.94	2.45	3.14	3.71
7	.130	.263	.549	.711	.896	1.42	1.90	2.36	3.00	3.50
8	.130	.262	.546	.706	.889	1.40	1.86	2.31	2.90	3.36
9	.129	.261	.543	.703	.883	1.38	1.83	2.26	2.82	3.25
10	.129	.260	.542	.700	.879	1.37	1.81	2.23	2.76	3.17
11	.129	.260	.540	.697	.876	1.36	1.80	2.20	2.72	3.11
12	.128	.259	.539	.695	.873	1.36	1.78	2.18	2.68	3.06
13	.128	.259	.538	.694	.870	1.35	1.77	2.16	2.65	3.01
14	.128	.258	.537	.692	.868	1.34	1.76	2.14	2.62	2.98
15	.128	.258	.536	.691	.866	1.34	1.75	2.13	2.60	2.95
16	.128	.258	.535	.690	.865	1.34	1.75	2.12	2.58	2.92
17	.128	.257	.534	.689	.863	1.33	1.74	2.11	2.57	2.90
18	.127	.257	.534	.688	.862	1.33	1.73	2.10	2.55	2.88
19	.127	.257	.533	.688	.861	1.33	1.73	2.09	2.54	2.86
20	.127	.257	.533	.687	.860	1.32	1.72	2.09	2.53	2.84
21	.127	.257	.532	.686	.859	1.32	1.72	2.08	2.52	2.83
22	.127	.256	.532	.686	.858	1.32	1.72	2.07	2.51	2.82
23	.127	.256	.532	.685	.858	1.32	1.71	2.07	2.50	2.81
24	.127	.256	.531	.685	.857	1.32	1.71	2.06	2.49	2.80
25	.127	.256	.531	.684	.856	1.32	1.71	2.06	2.48	2.79
26	.127	.256	.531	.684	.856	1.32	1.71	2.06	2.48	2.78
27	.127	.256	.531	.684	.855	1.31	1.70	2.05	2.47	2.77
28	.127	.256	.530	.683	.855	1.31	1.70	2.05	2.47	2.76
29	.127	.256	.530	.683	.854	1.31	1.70	2.04	2.46	2.76
30	.127	.256	.530	.683	.854	1.31	1.70	2.04	2.46	2.75
40	.126	.255	.529	.681	.851	1.30	1.68	2.02	2.42	2.70
60	.126	.254	.527	.679	.848	1.30	1.67	2.00	2.39	2.66
120	.126	.254	.526	.677	.845	1.29	1.66	1.98	2.36	2.62
∞	.126	.253	.524	.674	.842	1.28	1.645	1.96	2.33	2.58

Source: R. A. Fisher and F. Yates, *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd., London (previously published by Oliver and Boyd, Edinburgh), and by permission of the authors and publishers.

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May -2024

II SEMESTER

B.Tech. END SEMESTER EXAMINATION

CE-104 Mechanics of Solids

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) Define ductility. How to measure ductility of material? [CO2]

(c) What do you mean by temperature stresses? Explain. [CO2]

(d) Explain the terms: Neutral axis, section modulus, and moment of resistance. [CO3]

(e) What is the difference between crushing and buckling failure of a column? [CO4]

Q.2 (a) Find the modulus of elasticity for a rod, which tapers uniformly from 30mm to 15mm in a length of 350mm. The rod is subjected to an axial load of 5.5 kN and extension of the rod is 0.025mm. [CO1] [2.5]

(b) For a material, Young's modulus is given as $1.2 \times 10^5 N/mm^2$ and Poission's ratio 1/4. Calculate the Bulk modulus. [CO1] [2.5]

(c) A steel wire of 8mm diameter is used to lift a weight of 1.5kN at its lowest end. The density of the wire material is $8000 kg/m^3$. Determine the elongation of the wire if the length of wire is 100m. E=205GPa. [CO1][3]

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Q.3 (a) Draw the S.F. and B.M. diagram for a cantilever of length L carrying a uniformly distributed load of w per m length over its entire length. [CO2] [3]

(b) A 10 m long simply supported beam carries two point loads of 10 kN and 6 kN at 2 m and 9 m respectively from the left end. It also has a uniformly distributed load of 4 kN/m run for the length between 4m and 7m from the left end. Draw shear force and Bending moment diagrams. [CO2] [5]

Q.4(a) What do you mean by 'simple bending 'or 'pure bending'? What are the assumptions made in the theory of simple bending? [CO3] [3]

(b)A cast iron beam section is of I section with a top flange 80mmx20mm thick, bottom flange 160mm x 40mm thick and the web 200mm deep and 20mm thick. The beam is freely supported on a span of 5m. if the tensile stress is not to exceed 20N/mm^2. Find the safe uniformly distributed load which the beam carry. Find also the maximum compressive stress. [CO3] [5]

Q.5(a) Show that for a rectangular section of the maximum shear stress is 1.5 times the average stress. [CO4][3]

(b) The cross section of a joist is a T Section 150mmx100mmx13mm 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 shear force of 80kN. [CO4][5]

Q. 6 (a) What is meant by equivalent length of columns? What are its values for different end conditions of columns? [CO5][3]

(b) A column of timber section 15cmx20cm is 6 metre long both ends being fixed. If the Young's modulus for timber=17.5 kN/mm^2, determine (i) Crippling load and (ii) Safe load for the column if factor of safety=3. [CO5][5]

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4th SEMESTER
END TERM EXAMINATION

Roll no.....
B.Tech. (Civil Engg.)
May 2024

CE202 Mechanics of Solids

Time: 3:00 Hours

Max. Marks: 40

Note:1. Attempt any five questions either from Part - A or from Part – B.
2. Marks of the questions are mentioned opposite to them.
3. Assume suitable missing data, if any.

Part - A

Q.1 Write down conditions of compatibility. [8] [CO1]

Q.2 The components of the strain tensor at a point in a body are given by ε_x = 0.005, ε_y = 0.004, ε_z = -0.002, γ_{xy} = 0.001, γ_{yz} = 0.0005 and γ_{zx} = 0.002. If the modulus of elasticity, E = 2 x 10^5 N/mm^2 and the Poisson's ratio is 0.25, determine the components of the stress tensor. [8] [CO2]

Q.3 Calculate the thickness of metal necessary for a thick cylindrical shell of internal diameter of 80 mm to withstand an internal pressure of 25 N/mm^2, if the maximum permissible tensile stress is 125 N/mm^2. [8] [CO3]

Q.4 A 400 mm deep and 150 mm wide I-section has 20 mm thick flanges and 13 mm thick web. Calculate the maximum intensity of shear stress, shear stress at the junction of flanges with web and sketch the distribution of shear stress across the section. The shear force at the section is 160 kN.

[8][CO4]

Q.5 Derive the expressions for stresses, when a curved beam is subjected to pure moments at its ends. [8] [CO5]

Q.6 A steel shaft of 5 cm diameter and 3 m long is rigidly fixed at its ends. A twisting moment of 2 kNm is applied at a distance of 1 m from left end. Calculate (a) the fixing couple at the ends, (b) the maximum shear stress,

(c) the angle of twist of the section, where the twisting moment has been applied. Take, $G = 0.82 \times 10^5$ N/mm^2. [8] [CO4]

Part – B

Q.1 Draw a neat sketch of stress-strain curve for Mild steel. Show various portions of it and discuss characteristics of it in various zones in detail. Compare its properties with high strength steels. [8] [CO1]

Q.2 A simply supported beam AB, of length 6 m is subjected to two pointed loads of 5 kN each applied in vertical direction. The loads are applied at a distance of 2 m from each support. Draw bending moment diagram for the beam. If the beam is subjected to a UDL of 4 kN/m length applied to whole span in place of the pointed loads mentioned above, what would be percentage increase or decrease in the value of maximum bending moment in the beam? [8] [CO2]

Q.3 A simply supported beam MN, of a length of 10 m is subjected to a UDL of 2 kN/m length applied on entire span. Draw shear force diagram for the beam. [8] [CO3]

Q.4 A cantilever AB of 5 m length is propped at right support B. An internal hinge is provided at a point C, at a distance of 4 m from left support A. A vertically downward pointed load of 10 kN is applied at the middle of portion AC. Draw free body diagrams of both portions AC and CB and that of the hinge. [8] [CO4]

Q.5 Derive expression for calculation of stresses for the pure bending of beams. Draw neat sketches and show various stresses. [8] [CO5]

Q.6 Discuss redundancy of structures in detail. Discuss in detail how structures are decided to be redundant. Give many examples of stable, unstable, determinate and redundant (or indeterminate) structures by giving neat sketches made with pencils. [8] [CO4]

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Roll no..... 140

4th SEMESTER

B.Tech.

END TERM EXAMINATION *May-2024*

COURSE CODE: CE 204 **COURSE TITLE: ENGINEERING SURVEY**

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

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

Q.1 Differentiate clearly between plane and geodetic surveying. [5] [CO1]

Q.2 Give, in a tabular form, the difference between prismatic compass and surveyor's compass. [5] [CO2]

Q.3 The length of a survey line was measured with a 20m chain and was found to be equal to 1200 metres. As a check, the length was again measured with a 25m chain and was found to be 1212m.On comparing the 20 m chain with the test gauge, it was found to be 1 decimetre too long. Find the actual length of the 25m chain used. [5] [CO3]

Q.4 Explain the triangulation and trilateration of surveying. [5] [CO1]

Q.5 A 30 m steel tape was standardised at a temperature of 20^0C and under a pull of 10 kg. The tape was used in catenary to fix a distance of 28m between two points at 40^0C and under a pull of 5kg. Given that the cross-sectional area of tap is 0.02 cm2, total weight 470g, Youngs modulus of steel is 2.1*106 kg/cm2. (a) Find the correct distance between the points and (b) Find the value of pull for which the measured distance would be equal to the correct distance. [5] [CO4]

Q.6 The following fore and back bearings were observed in traversing with a compass in place where local attraction was suspected. Find the corrected fore bearing & back bearing of lines using included angles.

Line	FB	BB
AB	$158^0 30'$	339^0
BC	62^0	242^0
CD	342^0	163^0
DE	281^0	$101^0 30'$
EA	$210^0 30'$	30^0

[5] [CO3]

Q.7 The following consecutive readings were taken with a dumpy level 0.894, 1.643, 2.896, 3.016, 0.954, 0.692, 0.582, 0.251, 1.532, 0.996, 2.35. The instrument was shifted after 4^{th} and 8^{th} readings. The first reading was taken on the staff held on the BM of RL 820.765m. Rule out a page of a level field book and enter the above staff readings. Calculate the RL of the points using Rise and Fall method and show the usual checks. [5] [CO4]

Q.8 Explain with sketches, the following methods of plane table survey.

a) Radiation b) Intersection c) Resection [5] [CO5]

Total no. of Pages:3

Roll no.....

4th Semester

B. Tech.

END TERM EXAMINATION

May-2024

CE206 : SOIL MECHANICS

Time: 3:00 Hours

Max. Marks: 40

Note: All questions are compulsory.
Attempt question as per their respective sequence.
Assume suitable missing data, if any.

Q1. Explain the following with suitable reasons and neat sketch. [16] (CO 1 to 5)

a) With the help of the three-phase diagram using the relation between bulk unit weight, specific gravity, degree of saturation, void ratio, and unit weight of water, compare the following,

Consider two soil samples, Sample A and Sample B, with the following properties:
Sample A:
Degree of saturation = 80%
Void ratio = 0.6
Unit weight of water = 9.81 kN/m³

Sample B:
Degree of saturation = 60%
Void ratio = 0.8
Unit weight of water = 9.81 kN/m³

Based on these properties, which sample would likely exhibit greater compressibility under load? Justify your answer.

b) Justify your answer for the difference between zero air void line and cent per cent saturation line in the compaction plot.

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c) How the time factor is evaluated for obtaining degree of consolidation of a saturated soil using consolidation theory?

d) A man running on the saturated bank of a river consisting of saturated clayey silt slides to slip. The strength parameters of the soil corresponding to failure (slide and slip) need to be analyzed either by conducting any of the tests namely, i) Consolidated drained, ii) Consolidated undrained, iii) Unconsolidated undrained triaxial shear test. Identify the test and justify your answer.

Q2. Solve for the following [6](CO 1 to 4)

a. A concentrated load of 5000 kN is applied at the ground surface. Determine the vertical stress at a point P which is 6m directly below the load. Also calculate the vertical stress at a point R which is at a depth 6m but at a horizontal distance of 5m from the axis of load.

b. In a laboratory consolidation test, the void ratio of the samples reduced from 0.85 to 0.71 as the pressure was increased from 100 to 200 kNm^{-2}. If the coefficient of permeability of the soil be $3.3x10^{-3}$ mm/s then determine (i) coefficient of volume change and (ii) coefficient of consolidation.

Q3. Write detailed note on the following [6] (CO3)

a) Explain with neat sketch, four consistency stages related to water content and volume change classification. Relate these four stages with plasticity index, shrinkage index, flow index, liquidity index, toughness index, and consistency index.

b) Derive mathematical co-relation for critical hydraulic gradient and how does critical hydraulic gradient influence the quick sand condition.

Q4. Solve the following [6] (CO4)

a) Draw mathematical relation and nature of following coefficients from their graphical representation

(i) Coefficient of volume compressibility

(ii) Coefficient of consolidation

(iii) Over consolidation ratio

b) Water content of the sample at the end of test was 31% and $G_s = 2.70$. Find out the void ratio at each applied stress, coefficient of compression and swelling.

Applied Stress (kN/m^2)	Sample thickness (mm)
0	19.9
50	19.5
100	19.17
200	18.89
400	18.58
800	18.38
0	18.89

Q5. Answer the following [6] (CO5)

a) What are the pore pressure parameters? How the strength parameters obtained in Consolidated drained, Consolidated undrained, and Unconsolidated undrained triaxial shear test are co-related using pore pressure parameters?

b) A sample of dry sand tested in triaxial and direct shear test, in the triaxial test sample fails when major and minor principal stresses are 960 kN/m^2 and 260 kN/m^2 respectively. What shear strength would be expected in direct shear test when normal stress is 230 kN/m^2.

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Roll No. .....

FOURTH SEMESTER

B. Tech. (Civil)

END SEMESTER EXAMINATION

May-2024

CE208 Hydraulics and Hydraulic Machines

Time: 3:00 Hours

Max. Marks : 40

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

1a) A 10 cm diameter jet of water strikes a curved vane with a velocity of 25 m/s. The inlet angle of the vane is zero and the outlet angle is 30°. Determine the resultant force on the vane (a) When the vane is stationary and (b) When the vane is moving in the direction of the jet at 10 m/s velocity. 4 Marks (CO 4)

1b) What is Priming of Centrifugal Pump? Explain the working of single-stage centrifugal pump with a neat sketch? 4 Marks (CO 5)

2a)A circular drainage pipe 0.80 m in diameter conveys a discharge at a depth of 0.30 m. If the pipe is laid on a slope of 1 in 900, estimate the discharge. Manning's n = 0.015. 4 Marks (CO 1)

2b)A rectangular channel has a width of 1.8 m and carries a discharge of 1.8 m^3 / s at a depth of 0.20 m. Calculate (a) the specific energy, (b) depth alternate to the existing depth and (c) Froude numbers at the alternate depths. 4 Marks (CO 2)

3a)A wide rectangular channel carries a flow of 2.76 m^3 / s per metre width, the depth of flow being 1.524 m. (a) Calculate the minimum rise in the floor at a section required to produce critical flow conditions. (b) What is the corresponding fall in the water level? 4 Marks (CO 2)

3b) In hydraulic jump occurring in a rectangular horizontal channel, the discharge per unit width is 2.5m^3 / s / m and the depth before the jump is 0.25 m. Estimate (i) the sequent depth and (ii) the energy loss 4 Marks (CO 3)

4a) An inward flow reaction turbine has inlet and outlet diameters of 1.2 m and 0.6 m respectively. The breadth at inlet is 0.25 m and at outlet it is 0.35 m. At a speed of rotation of 250 rpm, the relative velocity at entrance is 3.5 m/s and is radial. Calculate the (i) absolute velocity at entrance and its inclination to the tangent of the runner, (ii) discharge and (iii) the velocity of flow at the outlet. 4 Marks (CO 4)

4b) A Kaplan turbine develops 15000 kW power at a head of 30 m. The diameter of the boss is 0.35 times the diameter of the runner. Assuming a speed ratio of 2.0, a flow ratio of 0.65 and an overall efficiency of 90% calculate the (i) diameter of the runner, (ii) rotational speed. 4 Marks (CO 4)

5a) A conical draft tube of a reaction turbine has diameters of 1.5 m and 2.0 m at its ends. It is set 7.0 m above the tailrace level. When the discharge from the turbine is 12 m^3 / s calculate (i) pressure head at the entrance of the draft tube and (ii) efficiency of the draft tube. Assume loss of energy in the draft tube as 0.35 times the velocity head at the draft tube exit. 4 Marks (CO 4)

5b) A Pelton wheel is working under a head of 45 m and the discharge is 0.8 m^3/s.The mean bucket speed is 14 m/s. Find the overall efficiency and the power produced if the jet is deflected by the blades through an angle of 165". Assume the coefficient of velocity = 0.985 and mechanical efficiency = 0.95. 4 Marks (CO 4)

6a) A centrifugal pump has an impeller 0.5m outer diameter and when running at 600 rpm discharges 8000 litres/minute against a head of 8.5 m. The water enters the impeller without whirl and shock. The inner diameter is 0.25 m and the vanes are set back at the outlet at an angle of 45° to the periphery. The area of flow is constant from inlet to outlet of the impeller and is 0.06 m^2. Determine the (a) vane angle at the inlet (b) monomeric efficiency of the pump and (c) speed at which the pump commences to work. 4 Marks (CO 5)

6b) A single acting reciprocating pump has a 15 cm piston with a crank of radius 15 cm. The delivery pipe is 10 cm diameter. At a speed of 60 rpm, 310 litres/min of water is lifted to a total height of 15 m. Find the slip, coefficient of discharge and theoretical power in kW required to drive the pump. 4 Marks (CO 5)

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Roll no. 146

IV Semester
B.Tech (Environmental

End-Term Examination

May-2024

CE-252 Structural Analysis

Time: 3 hrs.

Max. Marks: 50

Assume any data, if missing, suitably

Q.1 (CO 1 to 5) (2 x 5 = 10 marks)

(a) Discuss Cup and Cone failure of a mild steel specimen subjected to uniaxial tension at room temperature

(b) What is the effect of pure shear on a brittle material?

(c) What is the Moment curvature relationship and its uses?

(d) Show that for a rubber-like material, the volume change is zero.

(e) What are the differences between Plane Stress and Plane Strain situation

Answer any FOUR of the following questions

Q.2. (CO1) (10 marks)

A mild steel bar of 2 m length and 50 mm^2 cross-section is subjected to a 2 kN load to determine normal (σ) and tangential/ shear (τ) stress distribution at the middle w.r.t θ.(from 0^0 to 90^0). Find the change in length, area of cross-section, and volume

Q3. (CO2) (10 marks)

Using the strain transformation equation determine the principal strain and maximum shearing strain from the following experimental data of a Delta Rosettee fixed on a mild steel specimen $\varepsilon_A = 200\mu$, $\varepsilon_B = 300\mu$ and $\varepsilon_C = 400\mu$ with the help of Mohr's circle of strain. If E = 200 kN/mm2 and $\nu = 0.3$ determine principal stresses.

Q4. (CO3) (10 marks)

An RCC simply supported beam of rectangular (cross-section 200 mm x 400 mm with 3, 25 mm dia reinforcement and effective depth = 350 mm) of 8 m span is subjected to a u.d.l load w kN/m throughout the span. Determine MOR using the transformed section method and the safe load-carrying capacity of the beam if the allowable stress in concrete and steel bending is 5 and 140 N/mm^2 respectively. What would be the reinforcements if total compression in concrete is equal to total tension in steel (balanced section)? Take modular ratio m = 18.

Q5. (CO4) (10 marks)

Draw the shear stress distribution of a T-section (200 x 20 mm flange and 300 x 20 mm web). If the allowable shear stress is 110 N/mm^2 determine the safe load carrying capacity of a cantilever beam of 4 m length subjected to a concentrated load at the free end.

Q6. (CO5) (10 marks)

Determine deflection at the free end of a non-prismatic cantilever beam of 4 m length subjected to a concentrated load at the free end. The beam has 2I up to 2 m from fixed support and I from the middle to the end of the cantilever where I = MOI of the beam.

Q7. (CO5) (10 marks)

Determine the central deflection of a simply supported beam of L m subjected to a concentrated load P kN at the middle of the beam. If MOI I is given how can you determine experimentally E? Take EI = Constant

Q8. (CO4,5) (10 marks)

Using the strain energy method determine the vertical & horizontal deflection of the free end of the fame loaded shown in Figure-1. Take EI = Constant D.

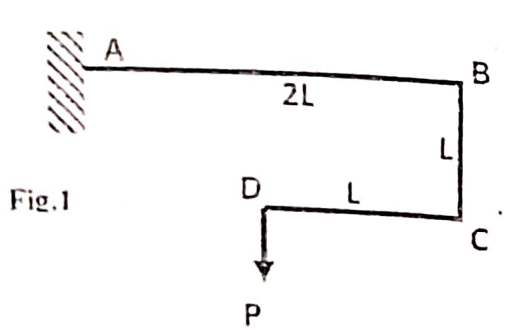


Fig.1

Total No. of pages 04 Roll No._____

VI SEMESTER B.Tech. [Civil Engg.]

END SEM EXAMINATION (MAY 2024)

CE302 INDETERMINATE STRUCTURAL ANALYSIS

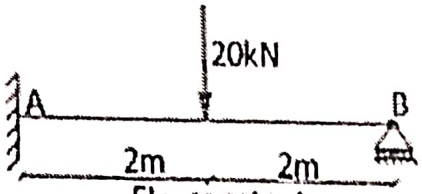
Time: **03 Hours** Max. Marks: **50**

Note: Answer questions as per instructions. Assume if data is missing.

Q1. Attempt any four parts from the following: [4 x 2½ = 10]

(a) Explain Müller Breslaü Principle. [CO 1]

(b) Analyze the propped cantilever beam shown in Q1(b) to draw BMD using strain energy method. [CO 1]



EI = constant

Figure Q1 (b)

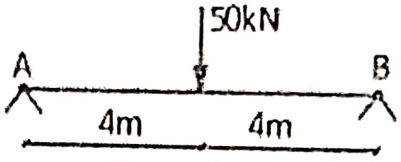
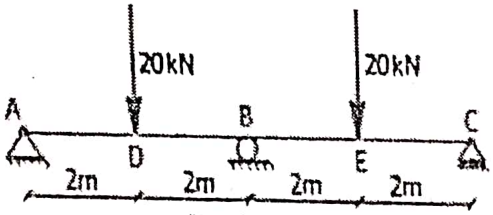


Figure Q1 (c)



EI = Constant

Figure Q1 (f)

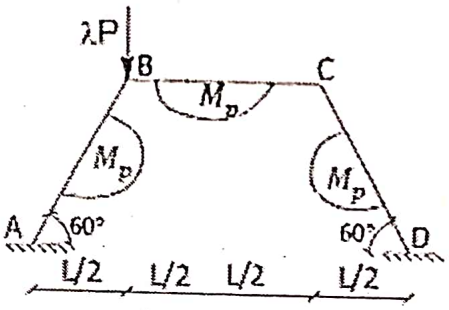


Figure Q1 (d)

(c) A 10-meter cable is stretched tightly between supports to have a span of 8 meters. A 50 kN point load is applied at the span's centre, as shown in figure Q1(c). Determine the tensions in the cable parts. [CO 4]

(d) Analyze the frame shown in figure Q1(d) using mechanism method and determine the collapse load factor λ_c. [CO 5]

(e) Determine the shape factor for a rectangular beam section of width 'b' and depth 'h'. [CO 5]

(f) Analyze the two span continuous beam as shown in figure Q1(f) using slope deflection method, taking advantage of symmetry. Draw BMD. [CO 2]

(g) Explain the theorem of least work. [CO 1]

Q2: Attempt any two parts: [2 x 05 = 10]

(a) Analyze the frame shown in figure Q2(a) with hinge at B using slope deflection method. Draw BMD. [CO 2]

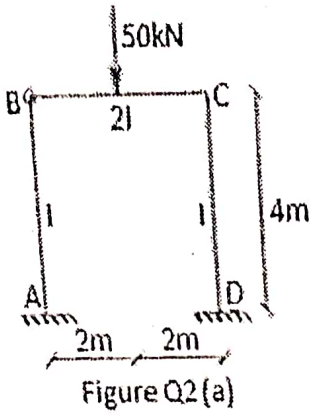


Figure Q2 (a)

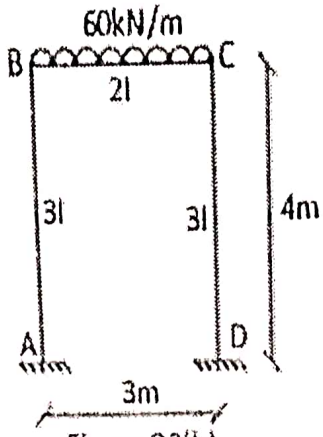


Figure Q2(b)

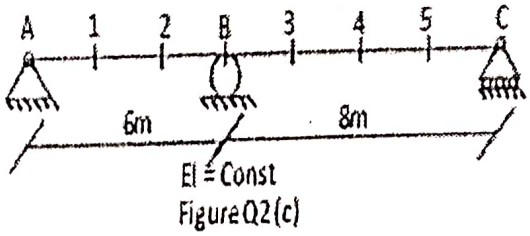


Figure Q2(c)

(b) Analyze the frame shown in figure Q2(b) using the moment distribution method. Draw BMD and SFD. [CO 2]

(c) Analyze the continuous beam shown in figure Q2(c) using the slope deflection method or stiffness method to draw influence line diagram for R_A^V based on Müller Breslaü principle. Obtain the influence coefficients at specified span points at 2m intervals. [CO 1,CO 2, CO 3]

Q3: Attempt any two parts: [2 x 05 = 10]

(a) Analyze the truss in figure Q3(a) using the Force/Flexibility method, considering member force BD as redundant. Determine the forces in all truss members. [CO 3]

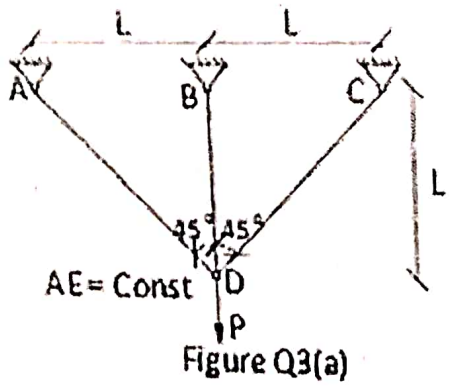


Figure Q3(a)

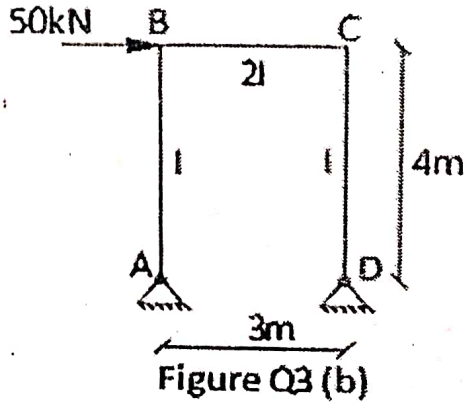
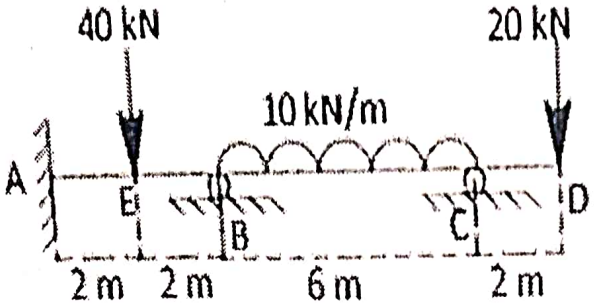


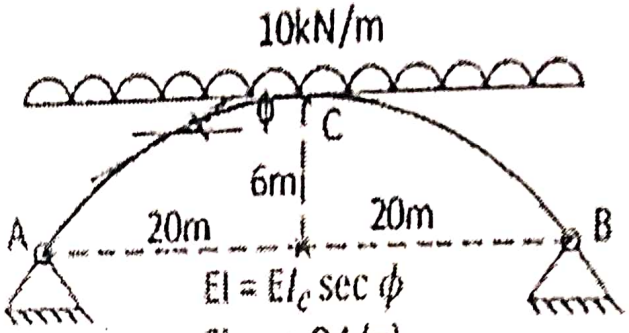
Figure Q3 (b)

(b) Analyze the frame shown in figure Q3(b) using stiffness method and draw BMD. [CO 3]

(c) Analyze the beam shown in figure Q3(c) using the moment distribution method. Support B sinks by 10 mm. Take EI = 20000 kNm^2 for all spans. [CO 2]



Support B sinks by 10 mm
EI = 20000 kNm^2 for all spans
Figure Q3(c)



$EI = EI_c \sec \phi$
Figure Q4 (a)

Q4: Attempt any two parts: [2 x 05 = 10]

(a) Analyze the two-hinged symmetric parabolic arch with a 40m span and 6m central rise under a 10 kN/m static UDL, as shown in figure Q4(a). Determine H and find the bending moment, normal thrust, and radial shear force 10m from the left support. Draw the BMD. [CO 4]

(b) For a symmetric parabolic suspension bridge cable with an 80m span and 8m dip stiffened by a two-hinged girder, with a total dead load (UDL) 15 kN/m, find the maximum cable tension when a 400 kN point load travels along the span. Also determine the maximum positive and negative bending moments on the girder. [CO 4]

(c) Draw ILD for H for the two hinged symmetric parabolic arch with span L and central rise of 'f'. Assume $EI = EI_c \sec \phi$, ϕ = slope of the tangent at a section. [CO 4]

Q5: Attempt as follows: [2 x 05 = 10]

(a) Explain the theorems of plastic collapse. [CO 5]

(b) Analyze the propped cantilever beam shown in figure Q5(b) using mechanism method and determine the collapse load factor. Apply statical check and draw the collapse BMD. [CO 5]

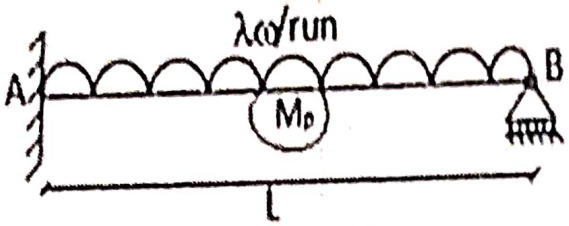


Figure Q5 (b)

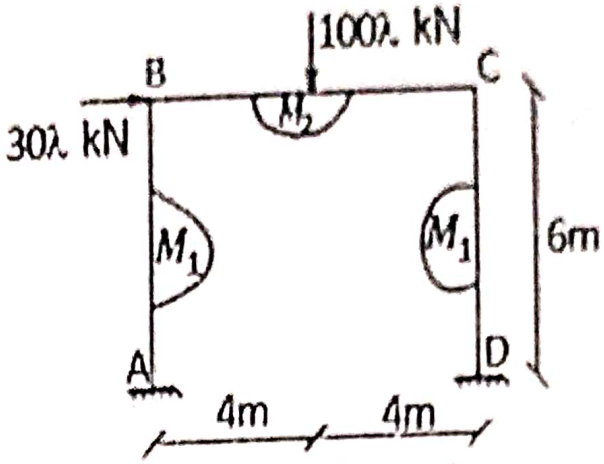


Figure Q5 OR option

OR

Q5: Attempt as follows: [1x 10 = 10]

Perform plastic analysis for the steel frame shown in figure Q5 considering various collapse mechanisms with a collapse load factor of 2. Plot the design plane M_2 vs M_1 (interaction diagram) to identify the safe region. Define the objective function to minimize the total weight of the frame based on a linear approximation between weight and plastic moment capacity for different steel sections. $w = 250 + 1.2\, M_P$ N/m length. Determine the coordinates of the design point from the design plane using the objective function. Select appropriate beam/column sections from the provided table and carry out the plastic design of the frame based on minimum weight design method, considering $\sigma_y = 250\, MPa$, and the $Shape\ factor = 1.15$. Recommend suitable sections for the beam and columns of the frame.

Section	Z_y in cm^3
ISLB 325 @ 431 N/m	607.2
ISLB 350 @ 495 N/m	751.9
ISLB 400 @ 569 N/m	965.3
ISLB 450 @ 653 N/m	1223.8
ISMB 350 @ 524 N/m	778.9
ISMB 400 @ 616 N/m	1022.9
ISMB 450 @ 724 N/m	1350.7

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B.Tech. SEMESTER VI

END TERM EXAMINATION *May-2024*

COURSE CODE: CE 304 COURSE TITLE: Geotechnical Engineering

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

Note: Attempt any Five questions. All questions carry equal marks. Use graph sheets wherever required. Assume suitable missing data, if any.

Q.1 A retaining wall 7 m high is inclined at a positive batter angle of 15° and the backfill surface is sloping up at an angle of 15° from the top of the wall. The properties of the cohesionless backfill are: $\varphi' = 35°$, $\gamma = 18$ kN/m^3, $\delta = 20°$. Determine the total active thrust by using Culmann's graphical construction. [8][CO2]

Q.2 A finite slope makes an angle of 45° with the horizontal, the slope is 11 m high. The slope has a slip surface of radius 17 m and passes through the toe. The soil properties of the slope are: $c = 36$ kN/m^2, $\varphi = 18°$, $\gamma = 19$ kN/m^3. The weight of the soil wedge formed by slip surface and the slope is 915 kN and it acts at a distance of 7.8 m from the toe. Determine the Factor of Safety of the slip surface by using friction circle method, locate the centre of the slip surface by using Fellinious method. [8][CO3]

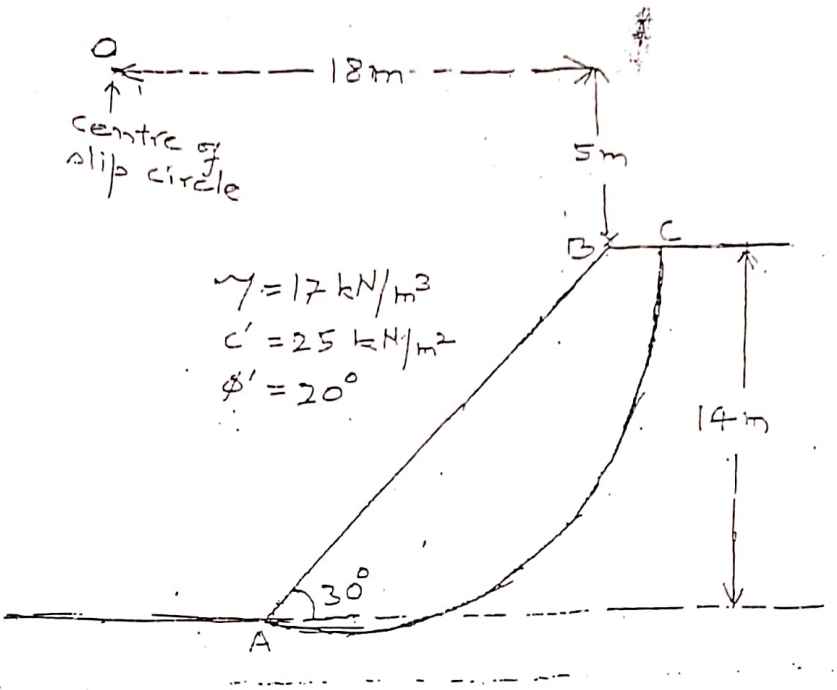
Q.3 What are the criteria for identification of expansive soils and what is the most important foundation problem associated with expansive soils. Draw detailed neat sketches of a single bulb and a two bulb under-reamed pile. [8][CO5]

Q.4 (a) Draw a detailed neat sketch of a well foundation. [3][CO5]

(b) What do you mean by machine foundation, how it is different from other building foundations. [2][CO5]

(c) Draw a neat sketch showing "negative skin friction" in a pile foundation. [3][CO4]

Q.5 A slope is shown in the Figure given below. Determine the factor of safety, against sliding for the trial slip surface AC. Use Method of Slices. [8][CO3]



Q.6 Calculate the ultimate bearing capacity, using the general bearing capacity equation, of a rectangular footing 2m×4m in plan, founded at a depth of 1.5m below the ground surface. The load on the footing acts at an angle of 15°. The properties of the soil are: $c' = 15\ kN/m^2$, $\varphi' = 25°$, $\gamma_{sat} = 18\ kN/m^3$. The natural water table is at a depth of 2m below the ground surface (apply water table correction also). The bearing capacity factors can be taken from table given below:

φ'	15°	20°	25°	30°
N_c	11.0	14.8	20.7	30.1
N_q	3.9	6.4	10.7	18.4
N_γ	1.2	2.9	6.8	16.7

[8][CO4]

Q.7 A 20m long concrete pile having a diameter of 400 mm is fully driven in sand. For the sand, given: $c'=0$, $\gamma=18\ kN/m^3$, and $\varphi'=35°$. Estimate (i) the ultimate point resistance (ii) ultimate frictional resistance, use $K = 1.3$, and $\delta' = 0.8\ \varphi'$. Further following data is also given:

φ'	25°	30°	35°	40°
N_q^*	26.0	56.7	143.0	346.0

[8][CO4]

152'

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B.TECH. (CIVIL) VI SEMESTER

END TERM EXAMINATION MAY-2024

CE306: TRANSPORTATION ENGINEERING

Duration: 3 Hours *Max. Marks: 40*

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

Q.1 Describe various factors that govern the highway alignment with the help of neat sketches. [CO1][5]

Q.2 Design the length of valley curve, if an ascending gradient 1 in 30 follows a descending gradient 1 in 25 at a section of National Highway having design speed of 80 km/h. Assume allowable rate of change of centrifugal acceleration C=0.6 m/sec^3. [CO4][5]

Q.3 Calculate length of transition curve for the following data:
Design Speed = 80 km/h
Radius of Horizontal Curve = 240 m
Pavement width at curve = 7.6 m
Super elevation = 0.07 [CO3][5]

Q.4 Describe function of a turn-out on a railway track. Draw a typical sketch of left hand turn-out showing all its important components. [CO2][5]

Q.5 Calculate the super elevation and permissible speed on branch line curve, which diverges from main line curve in opposite direction in the layout of broad gauge yard. Design data is as given below:
Radius of branch line curve =215 m
Radius of main line curve =344 m
Maximum speed on main line =45 km/h [CO4][5]

P.T.O.

Q.6 Discuss the factors that are considered for the selection of a site for an airport. [CO3][5]

Q.7 Describe the function of taxiway. For an airport operating supersonic aircrafts, determine the turning radius of taxiway with the following data:
Coefficient of friction between tyre and pavement=0.13
Tread of main landing gear =72 m.
Length of wheel base =30 m
Speed on curve = 70 km/h [CO4][5]

Q.8 What do you understand by breakwaters? Illustrate their salient features. [CO1][CO2][5]

Q.9 Classify harbour. Discuss the requirements of a good harbour. [CO1][CO2][5]

Q.10 What is the necessity of tunnelling? Suggest various methods of tunnelling in soft soil and hard rock. [CO2][5]

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SIXTH SEMESTER

B.Tech (REGULAR)

END TERM EXAMINATION

COURSE CODE- CE308 COURSE TITLE- DISASTER MANAGEMENT

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

Note : . Attempt all Questions.

Assume suitable missing data, if any.

Q.1 (a) Describe the Disaster Risk Reduction program in India in brief.
(b) Describe disaster management cycle with neat sketches.
[10][CO1]

Q.2 Write down the details of Preparatory stage, Activation Phase, Mobilisation Phase, Deactivation stage during execution of the Earthquake disaster response.
[10][CO2]

Q.3 (a)Explain policies and legislations for disaster management in india?
(b)What is disaster management Act 2005? Explain it.
[10][CO3]

Q.4 (a)What is recovery and role of local self-government in disaster management.
(b)Describe the salient features of NDMP? [10][CO5]

Q.5 Development can be a boon or a bane for disaster Risks. Elaborate. [10][CO4]

Total no. of Pages: 01

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VI SEMESTER

B. Tech.

END TERM EXAMINATION *May-2024*

COURSE CODE: CE 310 COURSE TITLE: Geotechnical Processes

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

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

Q.1 Describe with neat sketches the vibroflotation technique of ground improvement including the equipment, its working mechanism and the procedure; how the ground improvement can be verified. [5][CO3]

Q.2 What are the objectives of Ground Freezing? Explain the mechanism and procedures of Ground Freezing with neat sketches. [5][CO3]

Q.3 What is the objective of Dewatering? With the help of neat sketches, explain the methods of dewatering used for different depths. [5][CO2]

Q.4 What do you understand by stone columns? Describe the mechanism and procedure of installing stone columns for ground improvement. [5][CO3]

Q.5 Give neat sketches and explain various applications of geotextiles in ground modifications. [5][CO4]

Q.6 Describe with neat sketches the application of Dynamic Compaction for ground improvement with determination of various parameters. [5][CO3]

Q.7 What is soil cement? What are its applications? Which soils are difficult to stabilise with cement and how these soils can be made suitable for stabilisation with cement? [5][CO2]

Q.8 What are the characteristics of collapsible soils? What are the physical parameters for identification of collapsible soils? What is the general nature of expansive soils? [5][CO5]

Total No.of Pages: 01 Roll no. 156

Sixth Semester

B.Tech.

END TERM EXAMINATION May-2024

CE-314 TUNNEL, PORT AND HARBOUR

Time: 3 Hours Max. Marks: 40

Answer any three from group A and two from Group B.
All question carry equal marks
Assume suitable missing data, if any

[GROUP: A]

1. Write short notes:
   (a) Beach protection
   (b)Water current (c) Wave action on vertical walls (d) Wave action on piles. (e) Wave reflection and decay (f)Breaking of waves (g) Wave refraction (waves form and generation [8][CO:1]
2. Classify different types of breakwater. Under what condition a rubble mound breakwater is preferred? Briefly describe various methods of mound construction. [8][CO:1]
3. What are fixed signals and floating singles. Describes about them and their importance as navigational aids. [8][CO:2]
4. Explain the design principles of a dry dock. What are the principles of forces acting on a dry dock briefly describe the construction technique of dry dock. [8][CO:2]

[GROUP B]

5. Explain briefly how you would transfer the center line and grade of aproposed tunnel from ground surface to the interior of the tunnel with neat sketches. [8][CO:2]
6. What factors govern the quality of explosives to be used for blasting of rock for tunnelling and also explain what precautions should be taken while handling and storing explosive? [8][CO:2]
7. What are the objects of tunnel lining? What materials can be used for this purpose .Describe the advantages and disadvantages of cement concrete lining. [8][CO:2]

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End Term Exam May 2024 6th Semester B Tech.

CE-322 **Topics :** Traffic and Transportation Planning

Time: 3 Hrs Max Mark: 40

Note All Question are compulsory all question carry equal marks Assume Suitable Missing data if any.

Q- 1. What do you understand by collection of datas? discuss (CO1) 8 Marks

Q-2. Define the following terms? (CO2 8) Marks

i) Trip distribution models

ii) Trip attraction of work centers

Q-3. What is trip growth factor models?

Explain Merits and Demerits (CO3) 8 Marks

Q-4. Write short Notes on

i) Mode Split curves

ii) Pro babilistic Model (CO4) 8 Marks

Q-5. Enumerate the minimum path trees? Discuss Advantages and Disadvantages (CO5) 8 Marks

Total no. of Pages: 01 *Roll no.....158*

4th SEMESTER

B.Tech.

END TERM EXAMINATION *May-2024*

CE324 Infrastructure Resilience and Socio-Economic Dynamics

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

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

Q.1 a) What is Natural Disaster? What are the effects of natural disasters on people and infrastructure? [5][CO1]

b) What are the current and future impacts of infrastructure resilience on quality of life? Explain. [5][CO2]

Q.2 a) How do you measure optimal resilience and the effectiveness of risk reduction? [5][CO3]

b) Explain, "Infrastructure can be deciding factor in whether or not the situation becomes a disaster." [5][CO3]

Q.3 a) What is risk modeling? Why use of risk modeling is increasing? Discuss. [5][CO4]

b) Identify the types of hazards likely to affect humans and communities and describe steps to prepare for emergencies? [5][CO4]

Q.4 a) What is the impact of infrastructure on development? [5][CO5]

b) Evaluate the effectiveness of public-private partnerships in addressing infrastructure challenges and improving disaster response capabilities. [5][CO5]

Q.5 a) Explore the psychological and behavioural factors that shape individual responses to risk. [5][CO6]

b) Discuss the principle of Land use? [5][CO6]

Q.6 Write short note (any two): [5x2][CO2-CO6]

a) Risk
b) Hazard education
c) Individual response to risk
d) Effect of urban modernization on the environment

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VIII SEMESTER

B.Tech.

END TERM EXAMINATION ***May-2024***

CE 404 CONSTRUCTION TECHNOLOGY AND MANAGEMENT

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

Note: Attempt any 5 questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 a) Discuss the advantages of a lump sum contract over an item-rate contract.

b) Explain the Minimum Wages Act, 1948 for labour welfare. [CO1]

Q.2 a) What are the various types of cranes used in construction? Explain.

b) Explain the classification of construction equipment for pile driving and their applications. [CO3]

Q.3 a) Explain the significance of scheduling with the help of its advantages.

b) A project has the following time schedule. Draw the activity network and calculate the estimated time for each event. [CO2]

Activity	Times in weeks	Activity	Times in weeks
(1 – 2)	4	(5 – 7)	8
(1 – 3)	1	(6 – 8)	1
(2 – 4)	1	(7 – 8)	2
(3 – 4)	1	(8 – 9)	1
(3 – 5)	6	(8 – 10)	8
(4 – 9)	5	(9 – 10)	7
(5 – 6)	4		

Q.4 a) Compare the merits and demerits of using machines and manual labour in construction projects.

b) What is down time duration and in what ways can it be reduced? [CO

Q.5 a) Explain various types of depreciation costs for construction equipment.

b) Consider an excavator purchased for 3.1 million Rs. having a useful life of 5 yrs. Determine the depreciation and book value for each of the 5 years using the Straight Line method. Assume a salvage value of 860,000 Rs. [CO4]

Q.6 a) What are the safety measures for avoiding accidents in case of excavation and drilling ? Explain in detail.

b) Explain the necessity of quality control and assurance in construction management. [CO

Q.7 Write a short note on [CO

a) Scrapers
b) Excavator
c) Dredgers
d) Rammers

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VI/VIII SEMESTER

B.Tech (REGULAR)

END TERM EXAMINATION ***MAY 2024***

CE416:: GEO-ENVIRONMENTAL AND GEO-HAZARD ENGINEERING

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

Note : . Attempt all Questions.

Assume suitable missing data, if any.

Q.1 Elucidate the relationship between hazard and vulnerability. How does capacity determine vulnerability. [10][CO1]

Q.2 (a) Disasters are just an "act of God" but also determined by human activities. Comment?

(b) Discuss the importance of People in being first responders in disaster management? [10[CO2]

Q.3 Write a interlinkage between prevention and mitigation. How does risk determine their role in managing adverse effects? [10][CO3]

Q.4 Classify the disaster based on their source of origin. Discuss in details. [10][CO2]

Q.5 Vulnerability is a crucial aspect for defining the impact of disasters and its threat to people. How and in what ways can vulnerability to disasters be characterized? Explain various types of vulnerabilities with reference to disasters. [10][CO4]

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Q.5 Design two phase traffic signal by Webster's method for an intersection of two roads A and B. Turning traffic on both roads is found negligible. The design hour flows are 600 PCU per hour on road A and 450 PCU per hour on road B. The saturation flows are given as 1800 PCU per hour and 1500 PCU per hour on road A and B respectively. All red time for pedestrian crossing is given as 14 second. [CO4][8]

Q.6(a) Accident records for five consecutive years at an uncontrolled intersection show the following number of accidents:

Year	2014	2015	2016	2017	2018
Accidents	3	5	7	9	11

Using Poisson distribution, calculate the probability of occurrence of 6 accidents per year. [CO3][4]

(b) Explain applications of ITS in traffic control and regulation. [CO2][4]

Total no. of Pages: 2 Roll no.....

B.Tech

END TERM EXAMINATION ***May-2024***

COURSE CODE CE 424 **COURSE TITLE** HAZARD MONITORING, PREDICTION AND MITIGATION

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

Note : All Questions are compulsory.
Answer to the point and according to the max. marks assigned.
Assume suitable missing data, if any.

Q.1 Define the following terms:-

i. Creep [1][CO6]
ii. Subsidence [1][CO6]
iii. Pyroclastic activity [1][CO9]
iv. Solar storm [1][CO10]
v. Susceptibility [1][CO1]

Q.2 Explain the following:-

i. What is a Meteorological drought? [1][CO8]
ii. Why does Desertification Occurs? [1][CO8]
iii. Can Sea level Rise affect Indian coastal cities? [1][CO9]
iv. What Climatic/Terrain variables trigger Avalanches? [1][CO6]
v. What is Flash Flood? Can Delhi experience it? [1][CO5]

Q.3 Answer the following:-

i. Driving and resisting forces related to landslides. [1][CO6]
ii. Discuss the major processes involved in remote sensing for generating data over the earth's surface. [2][CO2]

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iii. What is Role of water & vegetation in Land sliding? [2][CO6]

Q.4 Briefly answer:-

i. What are the major GIS functions? [1][CO3]
ii. What is a Tsunami and why it originates? [2][CO7]
iii. What are the different effects of Volcanoes? [2][CO9]

Q.5 Explain:-

i. Describe Cyclone, their effects and how their warning or mitigation is done. [2.5][CO7]
ii. State Drought & Desertification mitigation measures. [2.5][CO8]

Q.6 Discuss:-

i. What are reasons for Tsunami? What are/is its structural controls? [2.5][CO7]
ii. Can pumping of fluids lead to subsidence? What can be other reasons for this Geohazard.? [2.5][CO6]

Q.7 Discuss Types of Landslides/Mass wasting. How is urbanisation affecting this hazard and how to prevent it? [5][CO6]

Q.8 Which lava type is most explosive and why. Discuss few points on early warning and monitoring/detection of Volcanism and Tsunami disasters. [5][CO9]

Total No. of Page – 3

Roll No. .....

Second Semester **B.Tech. (CSE)**

End Term Examination **May–2024**

CS102: DISCRETE STRUCTURES

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

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

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

A Test the validity of the following argument relating to the students of Department of Computer Science and Engineering (CSE) using Rules of Inference: - **[CO#1]**

(i) A student of the CSE will graduate this semester only if the student has passed the subject programming fundamentals.

(ii) If Raju does not study the subject programming fundamentals for 10 hours a week, then he will not pass in programming fundamentals.

(iii) If students study programming fundamentals for 10 hours a week, then they cannot play volleyball.

Therefore, it can be concluded that at least one student will not graduate this semester unless the student does not play volleyball.

B Convert the statement $(x \rightarrow (y \wedge w)) \wedge (z \rightarrow (y \wedge w))$ into PDNF forms **[CO#1]**

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

A Show that among any $n+1$ positive integers not exceeding $2n$ there must be an integer that divides one of the other integers. **[CO#2]**

B If the computational complexity of a divide and conquer algorithm is determined using recurrence relation $f(n) = 2f(\sqrt{n}) + 1,\ f(1) = 1$, where n is a perfect square, what is the big theta (Θ) estimate for the complexity of the algorithms? **[CO#2]**

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

A Let $A = \{a, b, c, d\}$ and R a relation on A defined as $R = \{(a,b), (b,a), (b,c), (c,d)\}$. Is R a transitive relation? If not, find the transitive closure of R. **[CO#3]**

B If $A = \{1,2,3,4,5,6\}$, $p_1 = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 1 & 2 & 6 & 5 \end{pmatrix}$; **[CO#3]**

$p_2 = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 3 & 1 & 5 & 4 & 6 \end{pmatrix}$; $p_3 = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 3 & 2 & 5 & 4 & 1 \end{pmatrix}$.

Find $(p_2 \circ p_1) \circ p_3$. Is the resulting permutation odd or even?

[5x2]

Q. No. 4 [CO#3]

A Let A = {a, b, c, d, e, f, g, h} and R be the relation defined by

$$M_R = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

(i) Show that (A, R) is a poset.

(ii) Does the poset (A, R) have a least element and a greatest element? If so, identify them.

(iii) Show that the poset (A, R) is complemented and list all pairs of complements.

(iv) Prove or disprove that (A, R) is a Boolean algebra.

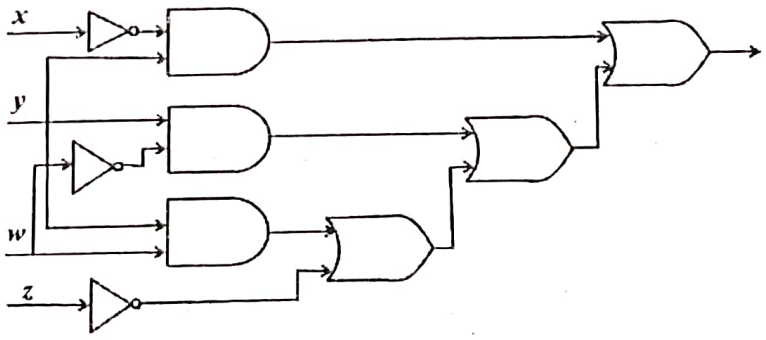
B Let $*$ be a binary operation on a set A, and suppose that $*$ satisfies the idempotent, Commutative and Associative Properties $\forall a, b, c \in A$. Define a relation $\leq$ on A by $a \leq b$ if and only if $a = a * b$. Show that $(A, \leq)$ is a poset, and for all a, b in A, $GLB(a, b) = a * b$. (*Note:* $GLB(a, b) = a \wedge b$) [CO#3]

[5x2]

Q. No. 5

A Compare isomorphism and homomorphism of semigroups. If Z is the set of integers, T the set of even numbers and × is the multiplication operator, prove or disprove that the semigroups $(Z, \times)$ and $(T, \times)$ are isomorphic. [CO#3]

B State the Boolean polynomial for the function, $f: B_4 \rightarrow B$ given by logic diagram show in the Figure. [CO#3]



Use the properties of Boolean algebra (or any graphical method) to refine the polynomial to use minimal number of variables and operators.

Draw logic diagram for the new Boolean polynomial.

Q. No. 6 [5x2]

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



B A college offers 8 elective subjects (with codes E01 to E08) for 2nd Semester students to choose from. The data of the number of students registered for both $Subject_i$ and $Subject_j$ is as tabulated below: - [CO#4]

	$Subject_i$	$Subject_j$	#
a)	E01	E04	9
b)	E04	E07	6
c)	E07	E02	8
d)	E02	E05	4

	$Subject_i$	$Subject_j$	#
e)	E05	E08	7
f)	E08	E03	8
g)	E03	E06	5
h)	E06	E01	11

A clash will occur in the timetable if the examination of two subjects, which are conducted during the same time-slot results in a student not being able to take the examination of one of the subjects for which the student is registered.

(i) Assuming that a student takes only one examination per day, in how many minimum numbers of days can the end-semester examination be conducted without any clash in the timetable for these elective subjects?

(ii) How many different *clash-free* time-tables can be generated for the conduct of End-Sem Examination for the elective subjects? (*Hint: Application of graph colouring*)

Q. No. 7 [5x2]

A Construct a labelled positional binary tree for the fully parenthesized algebraic expression $((a \div b) - c) \times (e + (f \div g))$. Assuming that visiting a vertex v prints the label of v, show the result of performing a post-order search on the constructed binary tree. [CO#4]

B The CEO of a newly formed entrepreneurship wished to send out a salesman to visit all major clients across 5 towns, $T = \{t_1, t_2, t_3, t_4, t_5\}$. The travel cost between these towns is given by the matrix C_T, where $c_{ij} = n$ if the cost of travel from town i to j is ₹$(n \times 1000)$. If the headquarters of this establishment is located at t_1, write a program to find the most economical round-strip for the salesman. What will be the minimum cost of the trip? [CO#5]

$$C_T = \begin{bmatrix} 0 & 7 & 50 & 1 & 1 \\ 7 & 0 & 3 & 50 & 8 \\ 50 & 3 & 0 & 6 & 2 \\ 1 & 50 & 6 & 0 & 7 \\ 1 & 8 & 2 & 7 & 0 \end{bmatrix}$$

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Total no. of Pages: 2

IInd SEMESTER B.Tech.

May-2024

END TERM EXAMINATION

CS104 Data Structures

Time: 03:00 Hours

Max. Marks: 40

Note : Attempt any 5 questions. All questions carry equal marks. Use C code/pseudo code to express the algorithms. Assume suitable missing data, if any.

Q.1 (a) Consider following array elements : 42, 23, 74, 11, 65, 58, 94, 36, 99, 87. What will be array contents if this array is converted to a MaxHeap? Also write algorithm to convert an array into MaxHeap.

(b) Write an efficient algorithm to merge two sorted link list into one sorted link list without using extra space for merging. (few temporary pointers can be used). What is the time complexity of you algorithm?

[4+4][CO2]

Q.2 (a) Write an algorithm to print range of numbers stored in a binary search tree. For every element x in BST, if $a \leq x \leq b$ then range is [a, b].

(b) Write an algorithm to check if two binary trees T1 and T2 are identical or not.

[4+4][CO3]

Q.3 Consider a B-tree of order 6. Perform the following operations on tree given in figure (a)

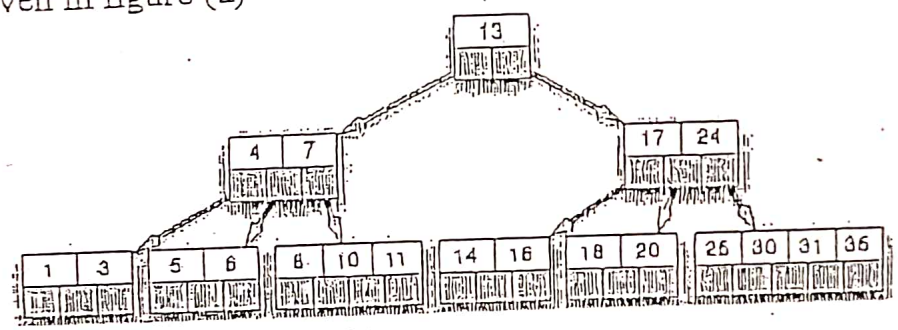


Figure (a)

(i) Insert 26 followed by 45 in B-tree of figure (a)
(ii) Delete 20 from B-tree given in figure (a)
(iii) Delete 3 from B-tree given in figure (a)

[2+2+4][CO4]

Q.4 (a) Insert the keys 79, 69, 98, 85, 27, 50 into the Hash Table of size 13. Resolve all collisions using Double Hashing where first hash-function is h1 (k) = k mod 13 and second hash function is h2(k) = 1 +(k mod 11). Collision at second hash can be resolved using linear probing. Draw the hash table after all numbers are inserted.

(b) Construct the AVL tree using following elements: 35, 15, 40, 7, 10, 100, 28, 82, 53, 25, 3. Show diagrammatically each step of construction of BST. [4+4][CO3, CO5]

Q.5 (a) Modify DFS algorithm to check if given undirected unweighted graph is a tree or not.

(b) Given an undirected unweighted graph G(V,E). Using BFS on this graph, write algorithm to print shortest path from vertex 1 to all other vertices in terms of number of edges. Write BFS algorithm also. You need to print the details in following format (example only).:

Vertex	length of shortest path	shortest path detail
2	2	1→4→2
3	3	1→4→5→3
...	...	...

[4+4][CO5]

Q.6. Implement a priority queue using an array as minHeap. Lowest key value is considered as highest priority. Write following methods/algorithms for this priority queue:

(a) capacity() : returns maximum size of queue.
(b) isEmpty()
(c) isFull()
(d) enqueue() : insert new element in queue.
(e) dequeue() : delete smallest element from queue.
(f) makeEmpty(): delete all elements of queue.
(g) minValue() : tells what is smallest value stored in queue.
(h) decreaseValue(i, delta): reduces value of i^{th} element by delta.

[1x8][CO1]

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

IV SEMESTER

B.Tech.

END TERM EXAMINATION **May-2024**

CS 262 Algorithm Design and Analysis

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

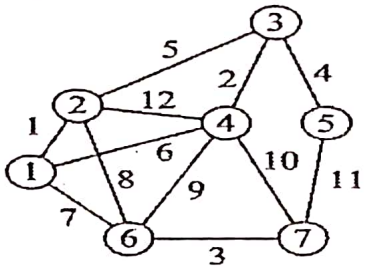
Note: Attempt any 5 questions. All questions carry equal marks. Assume suitable missing data, if any.

1) Solve the following recurrences

a) $T(n)=3T(n-1)$ for $n>1$, $T(1)=4$ (2) [CO2]

b) $T(n) = 16T(n/4) + n$. (3) [CO2]

c) Apply Prim's MST algorithm on following graph showing construction of MST at each step. Also specify how Prim's MST algorithm uses optimal substructure and greedy choice property. (5) [CO1, CO3]



2)

a) Derive the time and space complexity of Merge Sort? Assume that a merge sort algorithm in the worst case takes 30 seconds for an input of size 64. What would be the most closely approximates maximum input size of a problem that can be solved in 6 minutes? (5) [CO2, CO3]

b) Consider a scenario where you need to schedule tasks on a single machine to minimize the total completion time. Design an algorithm based on the greedy approach to solve this

scheduling problem (with a suitable example of your choice). Discuss about its correctness and time complexity.

(5) [CO1, CO3]

3)

a) What is LC branch and bound? Apply LC search on the following instance of 0/1 knapsack problem. (4) [CO3, CO5]

Item	Weight	Value
1	2	$12
2	1	$10
3	3	$20
4	2	$15

b) Given four matrices M1, M2, M3 and M4 with dimensions (12×25); (25×20); (20×5); (5×10) respectively, find the minimum scalar multiplication. (4) [CO3]

c) Explain the utility of backtracking approach compared to dynamic programming with a suitable example.

(2) [CO2, CO3]

4)

a) Explain the problem statement of Travelling Salesman Problem. Solve Travelling Salesman Problem using Dynamic Programming Algorithm step wise step in the following graph.

(5) [CO1, CO3]

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

Starting city = 1

b) Describe the problem of finding Longest Common Subsequence using recursive approach. Why Dynamic programming approach outperform to solve the problem? Find the LCS of <A,B,B,A,B,A,B,A> and <B,A,B,A,A,B,A,A,B> using dynamic programming along with algorithm and

runtime complexity for the same?

(5)[CO1,CO2,CO3]

5)

a) Find x using Chinese remainder theorem.

$x \equiv 4 (\mathrm{mod}\, 11)$

$x \equiv 5 (\mathrm{mod}\, 7)$

$x \equiv 6 (\mathrm{mod}\, 13)$

(3) [CO5]

b) Describe independent set problem? Prove that the independent set problem is NP-complete (Hint: Use an instance of 3-SAT problem to prove). (4) [CO4, CO5]

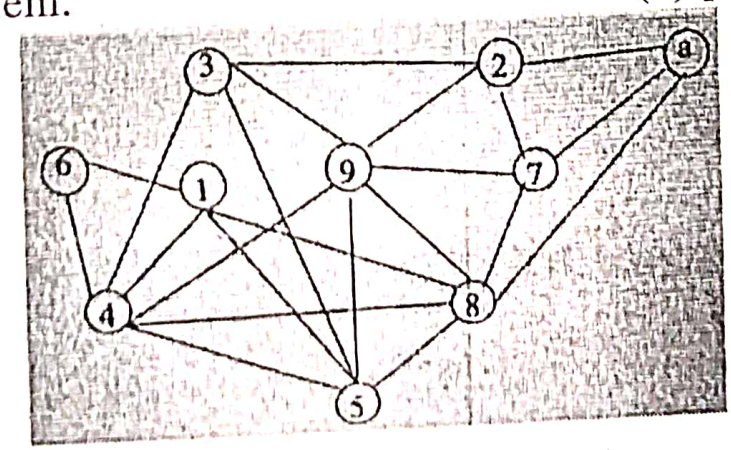
c) Discuss the key difference between Rabin Carp and Knuth Morris Pratt string matching along with their time complexity. (3) [CO5]

6)

a) Differentiate between Types of Complexity Classes P, NP, NP hard and NP complete in detail with suitable example. (3) [CO4]

b) State Cook's theorem and give your comment on it. (2) [CO4]

c) Show that vertex cover problem is reducible to set cover problem using the following graph as an instance to vertex cover problem. (5) [CO4, CO5]



**********All the Best**********

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

SECOND SEMESTER B.Tech

END TERM EXAMINATION *May-2024*

EN102 ENVIRONMENTAL AWARENESS

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

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

Q.1 (a) Analyze a case study of industrial pollution brought under the purview of the Water Act, 1974. Discuss the regulatory actions taken and their impact. [5][CO2]

(b) Enumerate the primary objectives of the Central Pollution Control Board (CPCB). Briefly explain its organizational structure. [5][CO1]

Q.2 (a) Outline the goals of the Basel Convention on controlling transboundary movements of hazardous wastes. Discuss the challenges and impacts of international hazardous waste trade. [5[CO1]

(b) Discuss the three pillars of sustainable development. How does sustainable development address the needs of present and future generations? [5][CO3]

Q.3 (a) Consider a rural Indian textile factory failing to meet the Factories Act 1948 requirements, post-1987 amendment, due to financial limits and low worker awareness. Discuss the challenges and suggest practical solutions for compliance. [5][CO2]

(b) Discuss the role of Convention on International Trade in Endangered Species (CITES) in regulating the trade of endangered species and preventing their exploitation. [5][CO4]

Q.4 (a) Examine the impact of the Polluter Pays Principle on industries known for high levels of pollution. Evaluate it's strengths and weaknesses as a policy tool for environmental management. [5][CO3]

(b) Discuss the main objectives of the Environment (Protection) Act of 1986. How does it aim to tackle environmental concerns in India?? [5][CO1]

Q.5 (a) Explain the objectives of the Montreal Protocol on Substances that Deplete the Ozone layer. Highlight it's key achievements and challenges in ozone layer protection. [5][CO1]

(b) Analyze the causes and effects of desertification on ecosystems and livelihoods, and assess the effectiveness of the UN Convention to Combat Desertification (UNCCD). [5][CO4]

Q.6 (a) Discuss the concept of Environmental Impact Assessment (EIA) and critically analyze its effectiveness in India. Highlight the strengths and weaknesses of the EIA process. [5][CO4]

(b) Examine the importance of Article 48A of the Indian Constitution in promoting environmental protection and conservation. How does this article demonstrate the constitutional dedication to preserving the environment, forests, and wildlife? [5][CO1]

Q.7 Write short notes on

(a) Animal welfare board of India [2.5][CO1]

(b) Precautionary principle [2.5][CO3]

(c) Ecology & Biodiversity [2.5][CO3]

(d) Key provisions of the Air Act, 1981 [2.5][CO1]

Total no. of Pages: 02

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SECOND SEMESTER
END-TERM EXAMINATION

B.Tech.(Env. Engg.)
MAY- 2024

EN- 104 BASIC ENVIRONMENTAL ENGINEERING

Duration: 3:00 Hrs.

Maximum Marks: 50

Note: Attempt *ANY FIVE* questions. Assume suitable missing data, if any.	Marks	CO
Q.1 (a) What is meant by the variations in the rate of water demand? What are the effects of these variations on the design of various units of a water supply scheme.	5	1
(b) What are the purposes of disinfection of water? Classify the various methods used for disinfection of water.	5	2
Q.2(a) Define Air Quality Index. Give the Indian Ambient Air Quality standards for SPM, SO_2, NO_X and CO	5	5
(b) Explain briefly about the method of sewage disposal. Which type of disposal method is generally found to be a better choice in hot climatic areas.	5	2
Q.3(a) Define noise. What is its unit of measurement? Also discuss various effects and control measures of noise pollution.	5	3
(b) What is "Eutrophication"? Briefly describe the process of eutrophication of lake. What remedial measures are taken for control of eutrophication of water bodies?	5	2
Q.4(a) "Ozone is a life saviour, if present in stratosphere; but is a pollutant, if present in troposphere". Justify the statement.	5	5
(b) What is the importance of waste water treatment? Briefly explain various units of treatment employed in waste water treatment plant and state their function.	5	2
Q.5 (a) Illustrate various sources and composition of solid waste in developing countries like India. Briefly discuss the various methods of solid waste management.	5	5
(b) What is meant by self-purification of rivers? Explain the various zones of pollution in river stream.	5	1

Q.6(a) What are stream standards? Give classification and zoning of water bodies as per CPCB. 5

(b) In detail with neat sketches about the trickling filters and state the various advantages and disadvantages of conventional trickling filters. 5

Q.7. Write Short note on:

(a) Sewage farming 2.5

(b) Stabilization ponds 2.5

(c) Secondary Pollutants 2.5

(d) Hazardous Waste 2.5

Total No. of Pages 3

Roll no……

Fourth Semester

B.Tech. (Environmental Engineering)

END TERM EXAMINATION

MAY-2024

EN 202: Geotechnical Engineering

Time: 3 Hours

Max. Marks: 40

Note: Answer any Five questions.
All questions carry equal marks.
Assume suitably missing data, if any.

Q.1 (a) Sketch the plasticity chart used for classifying fine grained soil according to IS classification system. What is its practical application? [3] [CO1]

(b) Determine the ratio of average coefficient of permeability in the horizontal to vertical direction for a deposit which consists of three layers $6\ m, 1.5\ m$ *and* $3\ m$ and having coefficient of permeability $2.5 \times 10^{-2}\ mm/s$, $3.5 \times 10^{-2}\ mm/s$ *and* $4.5 \times 10^{-2}\ mm/s$ respectively. Assume the layers to be isotropic. [5] [CO2]

OR

(b) What is the vertical stress in the soil mass at point A due to two loads P_1 and P_2 shown in the figure:1 below. Use Boussinesq analysis. [5] [CO2]

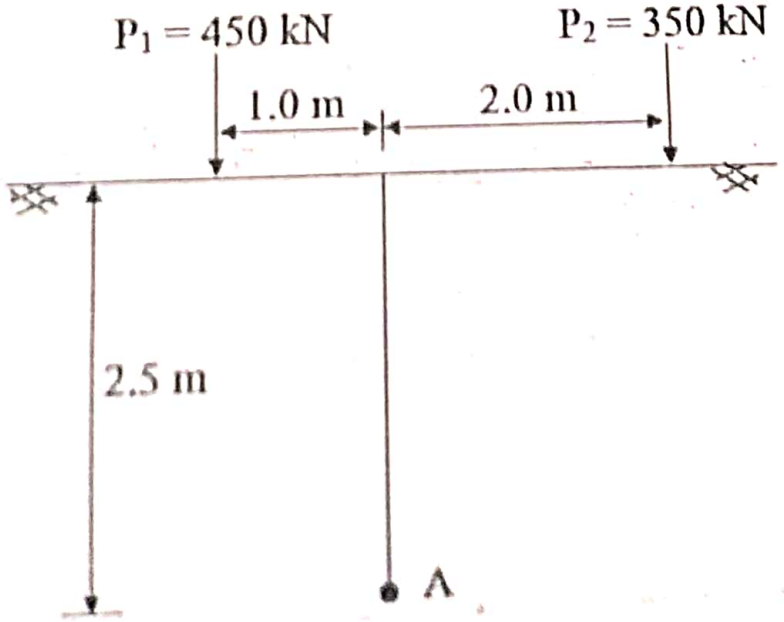


Figure:1

Q.2 (a) Differentiate between Compaction and Consolidation. What are the factors which affect compaction. [3] [CO3]

(b) A compaction test in the laboratory gave a maximum dry density of 1.85 gm/cc at a water content of 15 %. The specific gravity of soil is 2.70. Find the theoretical maximum dry density in gm/cc at zero air voids at the above OMC. Take density of water as 1 gm/cc. [5] [CO3]

Q.3 (a) Explain the various possible causes of failure of earth slopes. [3] [CO4]

(b) If a major and minor principal stresses through a mass of soil at the instant of failure are 60 N/cm^2 and 20 N/cm^2 respectively, calculate the values of normal and shear stresses on a plane making an angle of 30^0 with the direction of minor principal stress. [5] [CO4]

Q.4 (a) Explain active earth pressure, passive earth pressure and earth pressure at rest. [3] [CO4]

(b) Compute the intensities of active and passive earth pressure at depth of 8 m in a dry cohesionless sand with an angle of internal friction of 30^0 and unit weight of 18 kN/m^3. What will be the intensities of active and passive earth pressure if the water table rises to the ground level? Take saturated unit weight of soil as 22 kN/m^3 and $\gamma_w = 9.81\ kN/m^3$ [5] [CO4]

Q.5 (a) Differentiate between general shear failure and local shear failure with neat sketches. [3] [CO5]

(b) Find the ultimate bearing capacity of soil for a strip footing shown in the figure:2. [5] [CO5]

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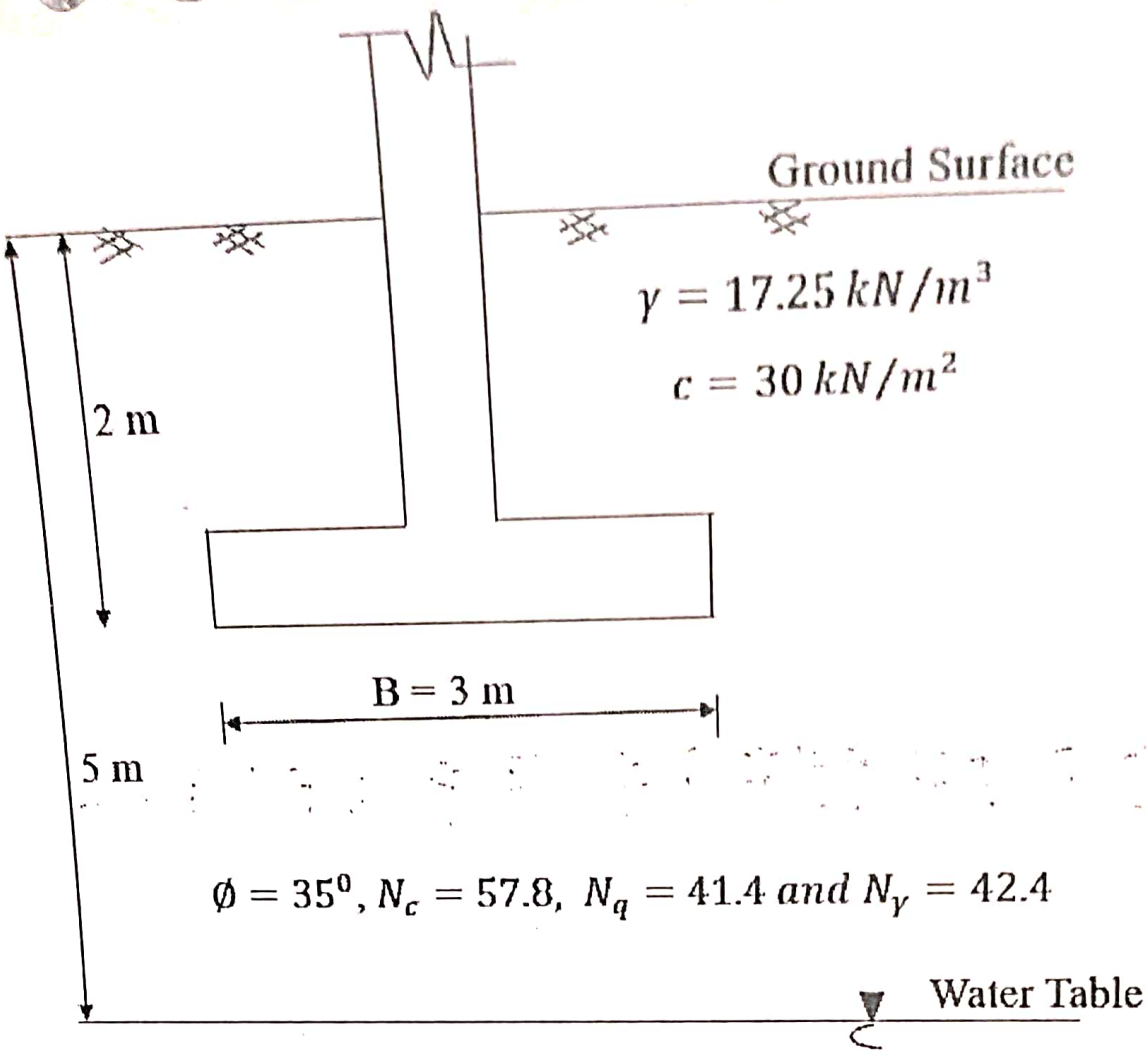


Figure:2

Q.6 Answer any four:

(a) Define uniformity coefficient and coefficient of curvature and its importance.

(b) Explain Darcy's law of permeability in soil.

(c) What do you understand by the term 'Isobar' and 'Pressure Bulb'. Explain with neat sketch.

(d) Differentiate between Indian Standard Light Compaction test and Indian Standard Heavy Compaction test.

(e) Discuss factors which contribute to shear strength of soils.

[4x2] [CO1, CO2, CO3, CO4]

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Total Number of pages 2

B.Tech.(Env. Engg.)

IV SEMESTER

MAY-2024

END-TERM EXAMINATION

EN204 Water Engineering: Design & Applications

Duration: 3:00 Hours

Maximum Marks: 40

Note: All questions are compulsory.

Assume suitable missing data, if any.

		Marks	CO
Q1(a)	A water supply scheme has to be designed for a city having a population of 2 lacs. Calculate the important kinds of drafts which may be required to be recorded capacities for an average consumption of 240lpcd. Assume suitable figures & data where needed.	4	CO2
(b)	Write short notes on the wastage of water in public water supplies. State various methods of detection and prevention of wastage.	4	CO1
Q2(a)	Explain the chemical quality parameters of drinking water.	4	CO3
(b)	Two million litres of water per day is passing through a sedimentation tank which is 6 m wide, 15 m long and having a water depth of 3 m. (a)Find the detention time for the tank. (b)What is the average flow velocity through the tank?	4	CO4
Q3(a)	10 mg of copperas is consumed with lime at a coagulation basin, per litre water. Determine the quantity of copperas and the quick lime required to treat 20 million litres of water.	5	CO4

OR

A coagulation – sedimentation plant clarifies 46 million of water every day. The quantity of filter alum required at the plant is 20 mg/l. If the raw water is having an alkalinity equivalent to 5 mg/l of

$CaCO_3$, determine the quantity of filter alum and the quick lime (containing 85% of CaO) required per year by the plant.

(b) Enumerate the chemicals which are used for coagulation. Discuss their comparative merits & Demerits. 3 CO3

Q4(a) Chlorine usage in the treatment of 30,000 cubic metre per day is 15 kg/day. The residual after 10 minutes contact is 0.20 mg/l. Calculate the dosage in milligrams per litre and chlorine demand of the water. 4 CO1

(b) Explain in detail the water softening process with lime and soda ash. 4 CO1 CO5

OR

What is meant by 'disinfection' in treating public water supply? What is its importance? What are the chemicals which are used as disinfectants?

Q5(a) What is the difference between domestic and Industrial water treatment? 4 CO1 CO5

(b) Discuss the O & M of water treatment plants. 4 CO5

Total No. of pages: 01 Roll No: 180

B.Tech. (Env.)
May / 2024

FOURTH SEMESTER
END-TERM EXAMINATION

EN206 ENGINEERING GEOLOGY, GIS AND REMOTE SENSING

Duration: 3 Hours Maximum Marks: 40

Note: All questions are compulsory and carry equal marks. Assume suitable missing data, if any.	Marks	CO#
Q. 1 Attempt the following		
a. Sketch the configuration of (i) synclinorium and (ii) normal fault. Label the components.	4	CO1
b. Explain hiatus with help of a sketch.	4	CO1
Q. 2 Attempt the following		
a. Apply optical properties to distinguish minerals.	4	CO2
b. Apply the concept of weathering, erosion and denudation of rocks to landscape alteration.	4	CO2
Q. 3 Attempt the following		
a. Compare folds, faults and joints.	4	CO3
b. Compare water-bearing strata with examples.	4	CO3
Q. 4 Attempt ANY TWO of the following		
a. Evaluate the role of image processing in GIS and remote sensing.	4	CO4
b. Evaluate the importance of any two igneous rock for engineering applications.	4	CO4
c. Evaluate GIS and Remote Sensing for land use land cover change.	4	CO4
Q.5 Attempt ANY TWO of the following		
a. Develop a methodology for remotely sensing water pollution.	4	CO5
b. Develop methods to utilize multi-spectral imaging.	4	CO5
c. Suggest ideal geological properties of strata for site selection for a dam.	4	CO5

Total No. of Pages 02 Roll no. 181

Fourth Semester B.Tech. (Environmental Engineering)

END TERM EXAMINATION MAY-2024

EN 208: Fluid Mechanics & Hydraulic Machines

Time: 3 Hours *Max. Marks: 40*

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

Q.1 (a) What are Centre of gravity and Centre of pressure of a vertically submerged surface? Explain. [3] [CO2]

(b) A rectangular gate which is 2 m wide and 1.5 m high is in a vertical plane. The water surface coincides with the top of the gate. Find the force exerted by the water on the gate. Find also the position of the centre of pressure. [5] [CO2]

OR

(b) An oil of Sp. Gr. 0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take $C_d = 0.98$ and Sp. Gr. of mercury as 13.6 [5] [CO2]

Q.2 (a) Describe major and minor losses taking place when a fluid flows through a pipe. [3] [CO5]

(b) Calculate the head loss due to friction using Darcy formula when water flows through a pipe of 100 mm in diameter and 50 m long with a velocity of 2 m/sec. Assume friction factor $f' = 0.005$ and $g = 9.81$ m/sec^2. [5] [CO5]

Q.3 (a) Give the dimensions of (i) Power (ii) Viscosity & (iii) Kinematic Viscosity. [3] [CO6]

(b) Find the expression for Power P, developed by a pump when P depends upon the head H, the discharge Q and specific weight w of the fluid. Use Rayleigh's method. [5] [CO6]

Q.4 (a) What do you understand by the term boundary layer. Define 'Bounda Layer Thickness'. On what factors Boundary Layer thickness depends?

[3] [CO7

(b) Find the ratio of displacement thickness to momentum thickness for th velocity distribution in the boundary layer given by

$$\frac{u}{U_\infty} = \frac{y}{\delta}$$

Where u = Velocity in boundary layer at a distance y
U_∞ = Free stream velocity
δ = Boundary Layer Thickness [5] [CO7]

Q.5 (a) Define the terms: Hydraulic machines, Turbines and Pumps. Explain th terms gross head, head loss and net head as they are applied to turbines.

[3] [CO8]

(b) Show that the force exerted by a jet of water on an inclined fixed plate in the direction of the jet is given by

$$F_x = \rho a V^2 \sin^2\theta$$

Where ρ = Density of water
a = Cross-sectional area of jet
V= Velocity of jet
θ = Inclination of the plate with the jet.

Q.6 Answer any four of the followings: [5][CO8]

(a) What is a pressure distribution diagram? What are the applications o such diagram?

(b) State and explain Principle of buoyancy and Principle of Floatation.

(c) Differentiate between (i) Steady and Unsteady flow and (ii) Uniform and Non-uniform flow.

(d) Explain Potential Energy, Kinetic Energy and Pressure energy in a flowing fluid.

(e) Explain with example the term 'Dimensionally Homogeneous Equation'.

[4 x 2] [CO2, CO3, CO4, CO6]

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Total no. of Pages:2 Roll no.....

4th Semester
B.Tech (Civil)

End Semester Examination May-2024
EN252 ENVIRONMENTAL ENGINEERING
Time 3 Hours Max Marks 40

Note : Attempt any five questions. Draw neat and labeled diagrams wherever needed. Assume suitable missing data.

Q.1(a) Discuss the factors affecting self purification of polluted streams. What measures can be adopted to control stream pollution. [5] [CO1, CO2]

Q.1(b) Calculate 1 day 37 °C BOD of sewage whose 5 day BOD at 20 °C is 100 mg/L [3, CO2]

Q.2(a) Explain the importance of (i)self cleansing velocity (ii) non-scouring velocity in the design of sewers. [3, CO1, CO2]

Q.2(a) A 300 mm diameter sewer is to flow at 0.3 depth on a grade ensuring a degree of self cleansing equivalent to that obtained at full depth at a velocity of 0.9 m/sec. Find (i) the required grade (ii) associated velocity (iii) rate of discharge at this depth. Given Manning's coefficient =0.013. For d/D=0.3, proportionate area (a/A =0.252), proportionate hydraulic mean depth (r/R) = 0.684, variations of n with velocity may be neglected. [5][CO3, CO4]

Q.3(a) Explain what is the purpose of providing a Grit Chamber in a sewage treatment plant, when a sedimentation tank in any case is already provided ahead of it? [2] [CO2]

Q.3(b) Design a parabolic (trapezoidal) grit chamber for a horizontal flow velocity of 25 cm/sec, and a flow which ranges from a minimum of 25000 cu.m./day to a maximum of 100000 cu.m./day. Average flow is 62500 cu.m./day. [6] [CO4]

Q.4(a) Design suitable dimensions of trickling filter units for treating 5 MLD of sewage per day. BOD of sewage is 150 mg/L. also design, suitable dimensions for its rotary distribution system, as well as the under drainage system. [5] [CO4]

Q.4(b) Discuss troubles which may be faced during operation of standard rate trickling filter and their remedies. [3] [CO2]

Q.5(a) Design a digestion tank for the primary sludge with the help of given data: average flow 20 MLD, TSS in raw sewage 300 ng/L, moisture content of digested sludge 85%. Assume any other suitable data. [4] [CO4]

Q.5(b) Raw wastewater is entering a treatment plant and contains 250 mg/L SS. If 55% of these solids are removed in sedimentation, find (i) the volume of raw sludge produced per million litres of wastewater. Assume sludge has moisture content of 96%, and specific gravity of solids is 1.2 (ii) unit weight of raw sludge (iii) if 45% of raw sludge is converted to liquid and gas in the digestion tank, find the volume of digested sludge per million litre of wastewater. Assume moisture content of digested sludge as 90%. [4] [CO3]

Q.6 Design a conventional activated sludge plant to treat domestic sewage with diffused air aeration system with following data

Population 25000, average sewage flow 180 lcpd, BOD of sewage 220 mg/L, BOD removed in primary sedimentation 30%, overall BOD reduction desired 85% [8] [CO4]

Q.7(a) Enumerate the different major air pollutants, their characteristics, sources, and health effects on human beings. [4] [CO1]

Q.7(b) Explain negative lapse rate and temperature inversion condition. How does temperature inversion conditions affect the pollution levels in the immediate environment ? [4] [CO2]

Q.8(a) Explain aerobic composting process for management of municipal solid wastes. Discuss design considerations for aerobic composting process. [4] [CO2]

Q.8(b) Discuss Pyrolysis process with regard to management of solid wastes along with its advantages and disadvantages. [4] [CO1, CO2]

END-SEM EXAMINATION

EN-302 SOLID WASTE MANAGEMENT

Time: 03 Hours *Max Marks: 40*

Note: Attempt any five questions; assume suitable missing data if any

1.a) Describe the typical characteristics of Indian solid waste. 4[1]

b) With the help of a neat sketch explain the functions of the different components of sanitary landfill and its operation. 4[3]

2.a) Estimate the landfill area required to handle five year's MSW for a town of 100000 people. The per capita waste generation is 0.65Kg/day; landfill density is 500Kg/m^3, with a three metre lift. Assume that 20% of the cell volume is soil used for cover. 4[4]

b) Briefly discuss the measures for reduction at source for solid waste management in India. 4[2]

3.a) A community of 20000 people generates MSW at a rate of 0.5 kg per person per day. The density of MSW in the collection truck is 500 kg/m^3. If the capacity of collection truck is 15m^3, how many truckloads of MSW, on average, will be unloaded at the landfill each year? 4[4]

b) Explain the challenges associated with waste management. 4[1]

4. Write short notes on

a) Mass burn facility 4[2]

b) RDF 4[2]

5. MSW 'as delivered' has 65.1% of paper, food waste, yard trimmings, wood, and other decomposable matter. The moisture content of this waste is 35%. The elemental analysis of decomposable has following mass percentages:

Element	C	H	O	N	Other	Total
Dry Mass (%)	45.2	6.0	43.7	0.43	4.67	100

Find the chemical formula for the C, H, O, N portion of decomposable. Also find out the percentage of methane generated, per kilogram of waste. 8[3]

6 a) Define a landfill liner What are the characteristics of a liner system? Explain its role in a landfill 4[4]

b) Briefly discuss the protocol for quantification and characterisation of municipal solid waste 4[2]

Total no. of Pages 03 Roll no.....

SIXTH SEMESTER

B. Tech.

END TERM EXAMINATION May 2024

ENE304 AIR POLLUTION AND CONTROL

Time: 3:00 Hours Max. Marks: 40

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

Q.1 Given the following temperature variation with altitude:

Elevation (m):	0	20	40	60	80	100	120
Temp. (°C):	20	18	16	18	20	18	16

What type of plume would you expect if the smoke stack was:

a) 20 m tall

b) 40 m tall

c) 60 m tall

d) 80 m tall

e) 100 m tall [1x5][CO4][CO1]

OR

a) What is acid rain? Explain the causes and impacts of acid rain.

NOTE: Include governing chemical equations.

b) What are the potential gases and their sources that contribute to the greenhouse gas effect? [2x2.5][CO1][CO4]

Q.2 Describe the working principle of an electrostatic precipitator (ESP) in controlling particulate matter emissions from industrial sources. Discuss the factors influencing the efficiency of ESPs and methods to enhance their performance. [5][CO4]

Q.3 Answer the following in one word or single sentence:

(i) In stack sampling, large sized particles are collected on filter paper under which conditions?

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(ii) From a stack, minimum ground level pollutant concentration is experienced under which atmospheric condition?

(iii) From a stack, under what atmospheric conditions do we expect to experience maximum ground level pollutant concentration?

(iv) What type of PM sampling do we conduct for legal compliance as per Indian National Ambient Air Quality Standards?

(v) If the fumigation plume occurs in case of elevated inversion conditions, what do you think would be the height of the stack? [1x5] [CO1][CO5]

Q. 4 Explain vehicular emission standards and their role in controlling air pollution from automobiles. Discuss the evolution of emission standards over time and the challenges associated with their implementation. [5][CO3]

Q. 5 (a) What is Dry Adiabatic Lapse Rate and show by derivation that Dry Adiabatic Lapse Rate is -1°C/100m. [2][CO1]

(b) Under what conditions the Gaussian dispersion equation for a continuous point source is valid? [3][CO2]

Q.6 A 1000 MW power plant burns 10,000 metric tonnes of 1.5% sulphurous coal per day. The flue gases are emitted into the atmosphere through a stack whose height is 200 m. The diameter of the stack at the plume exit is 5 m. The velocity and the temperature of the plume at the exit are 10 m/s and 120 deg. C respectively. What is the downwind SO2 concentration in the plume centerline on the ground at a distance of 5 km on a thin overcast night when the environmental lapse rate is equal to zero? Assume that the ambient air temperature is 15 deg. C and the wind speed at the stack altitude is 6 m/s. For values of σy and σz, the following table may be referred:

Class	A	x_1 (metres)	$x \le x_1$		x_2 (metres)	$x_1 \le x \le x_2$	
			B	p		B	p
A	0.40	250	0.125	1.03	500	0.00883	1.51
B	0.295	1000	0.119	0.986	10000	0.0579	1.09
C	0.20	1000	0.111	0.911	10000	0.111	0.911
D	0.13	1000	0.105	0.827	10000	0.392	0.636
E	0.098	1000	0.100	0.778	10000	0.373	0.587

Assume atmospheric pressure as 1013 mb.

[10][CO4]

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

(a) Causes and effects of "episodes" of notable air pollution disasters in the world.

(b) Symptoms of acute and chronic poisoning by Arsenic and Lead in ambient air on farm animals.

(c) Evaluate the effectiveness of air-fuel ratio control strategies in reducing emissions of criteria pollutants and greenhouse gases from automobiles.

(d) Working principle of Wet Scrubber for air pollution control

[2x2.5][CO1]

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Roll No. .....

Total Number of pages 3

B.Tech.(Env. Engg.)

VI SEMESTER

March-2024

END-TERM EXAMINATION

EN- 306 HYDROLOGY & GROUNDWATER ENGINEERING

Maximum Marks: 50

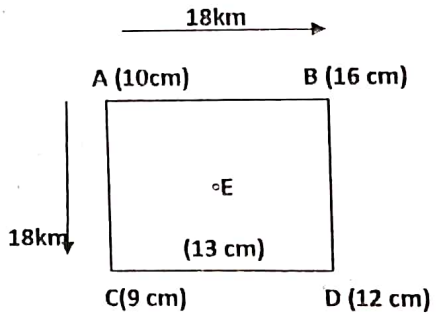
Duration: 3:00 Hours

Note: All questions are compulsory.

Assume suitable missing data, if any.

Use graph paper for plotting.

Q1(a) A catchment area is in the form of a square having 5 rain gauge stations (one in the centre & 4 at corners of the square) as shown below. The precipitation values are indicated in the figure. Determine the average precipitation in the catchment by Theissen's Polygon Method. [5][CO2]



(b) Explain the procedure for the calculation of optimum number of rain gauge stations for the catchment. Where the additional rain gauge stations are installed? [5][CO1]

Q2(a) Explain Synthetic unit hydrograph. [5][CO4]

OR

What is the difference between φ-index & W-index? [5][CO2]

(b) For an area in South India (latitude = 15° N), the mean monthly temperature are given as

Month	June	July	Aug	Sept	Oct
Temp.(°C)	30.5	29.2	30.5	29.2	28.7

Calculate the seasonal consumptive use of water for the rice crop in the season June 16 to October 15, by using Blaney-Criddle formula. The value of K is 1.1 and the value of coefficient p may be taken as 8.5, 8.89, 8.71, 8.25 & 8.35 respectively. [5][CO1]

Q3(a) The mean monthly rainfall & temperature of a catchment near Bangalore are given below. Develop the rainfall run-off correlation equation for this catchment & also find the correlation coefficient and the value of K. [5][CO3]

Year	1950	1951	1952	1953	1954	1955	1956	1957
Annual rainfall (cm)	100	99	38	130	145	50	140	100
Yield (cm)	30	50	16	62.1	33.1	40.1	65	7.5

(b) The discharge data for the river is given below. Draw & plot the flow duration curve for the river and determine the 70% dependable discharge. [5][CO3]

$Q(m^3/s)$	10	40	70	100	150	100	90	80
No. of occurrence	2	5	4	6	9	3	7	8

Q4(a) Explain the procedure to calculate the Unit Hydrograph from flood hydrograph. [5][CO4]

(b) Using 20 years data and Gumbel's method the flood magnitudes, for return periods of 100 and 50 years for a river are found to be 1200 and 1060 m3/s respectively. (i) Determine the mean and standard deviation of the data used and (ii)Estimate the magnitude of a flood with a return period of 500 years. [5][CO4]

OR

The ordinates of a 2-h unit hydrograph are given: -

Time (h)	0	2	4	6	8	10	12	14	16	18	20	22
2-h UH ordinate (m^3/s)	0	25	100	160	190	170	110	70	30	20	6	0

Determine & plot the ordinates of 6 – h unit hydrograph.

[5][CO4]

Q5(a) Explain the following terms
a. Aquitard
b. Aquiclude
c. Aquifuge
[3][CO5]

(b) Prove $Q = 2\pi T (S1 - S2) / \ln\frac{r2}{r1}$ for confined aquifer. [3][CO5]

A 30-cm well completely penetrates an unconfined aquifer of saturated depth 40 m. After a long period of pumping at a steady rate of 500 lpm, the drawdown in two observation wells 25 and 75 m from the pumping well were found to be 3.5 and 2.0 m respectively. Determine the transmissivity of the aquifer. What is the drawdown at the pumping well?

[4][CO5]

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Six Semester

B.Tech.

END-TERM EXAMINATION

MAY 2024

EN 316 Environmental Law and Policy

Time: 3:00 Hours *Maximum Marks: 50*

Note: Attempt any eight (8) questions.
Question no. 9 is compulsory.
Assume suitable missing data, if any

1. Damaging environment impacts economic development. Write your opinion with appropriate factors. **[CO1] (6)**
2. Discuss the relevance of PPP in the Indian context along with a landmark case study. **[CO2] (6)**
3. Make a case study of pollution concerning any of the known cases of highly polluted industries in India and discuss the action taken by the government to enforce compliance. **[CO3] (6)**

4. Describe the salient features of International agreements adopted during the Rio Conference. [CO1] (6)

5. Analyse the significance of sections 3 and 6 of the Forest Act. [CO2] (6)

6. Examine the international environmental law with the help of its eight principles. [CO3] (6)

7. Illustrate the organizational and functional structure of CPCB. [CO1] (6)

8. Discuss any two Indian social movements to save the Environment. [CO1] (6)

9. Write short notes on the following: [CO1] (8)

a) Ramsar Convention

b) Marpol Convention

c) CITES

d) The Just World

Total No. of Page 2 *Roll No. .....*

Eight Semester **B.Tech.**

END TERM EXAMINATION

MAY 2024

EN 412 Environment and Sustainable Development

Time: 3:00 Hours ***Maximum Marks:50***

Note: Attempt any six questions.

Question no. 8 is compulsory.

1. What led to the origin of the concept of sustainable development? Compare weak and strong sustainability? **[CO1] (8)**
2. Examine the various strategies and policy measures advocated to achieve sustainable development in Indian context. **[CO3] (8)**
3. Illustrate the necessary steps that can be taken by an individual to achieve the sustainable development. **[CO2] (8)**
4. In your opinion to what extent the Indian Government committed to sustainable development? Explain your stand through examples. **[CO5] (8)**

5. Describe the different principles of sustainable development along with priority activities of Agenda 21. **[CO2] (8)**

6. Analyse and discuss the seven principles for making sustainable development strategy. **[CO4] (8)**

7. According to Barbier (1989), outline the various impediments in achieving sustainability **[CO2] (8)**

8. **(a)** Mention the year against each activity that was focused towards the sustainability of the global environment: **[CO1] (5)**

   (i) A programme for Survival

   (ii) The United Nations World Charter for Nature

   (iii) The World Conservation Strategy

   (iv) Rio Conference

   (v) Stockholm Conference

   (b) Expand the followings terms: **(5)**

   (i) UNEP

   (ii) FAO

   (iii) IUCN

   (iv) OECD

   (v) WCS

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B.Tech.(Env. Engg.)

VIII SEMESTER

MAY-2024

END-TERM EXAMINATION

EN- 416 NON – CONVENTIONAL ENERGY SYSTEMS

Duration: 3:00 Hours

Maximum Marks: 50

Note: All questions are compulsory.

Assume suitable missing data, if any.

		Marks	CO
Q1(a)	Explain the techniques of collection of solar energy.	5	1
	OR		
	What are the reason for variation in solar radiation reaching the earth than received at the outside of the atmosphere ?		
(b)	What are the advantages of vertical axis machines over horizontal type? Describe a rotor for relative low velocity wind.	5	2
Q2(a)	Explain any one type of biogas plant.	3	2
	OR		
	Discuss the limitation of solar energy.		
(b)	Write a note on "Energy scenario in India".	3	1
(c)	Write the advantages & disadvantages of Geothermal energy.	4	3
Q3(a)	What is the basic principal of ocean thermal energy conversion (OTEC)?	4	4
(b)	What is the basic principal of Geothermal energy conversion? Describe the Main considerations in selection a site for Geothermal energy generators.	6	3
Q4(a)	Write the advantages & disadvantages of Hydro electric energy.	4	4
(b)	Explain the tidal energy potential in India.	3	4

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(c) What are the main applications of Geothermal energy?

Q5(a) What are the main four fusion reactions, which are considered for use in fusion reactors? Which one is most favorable reaction?

(b) What is the basic principal of Nuclear energy conversion? Describe the Main considerations in selection a site for Nuclear energy generators.

OR

Write a note on present status and future possibilities of Nuclear energy.

(c) Explain cold fusion.

2nd SEMESTER, B.Tech.

END TERM EXAMINATION *May-2024*

COURSE CODE: EC102 COURSE TITLE: Data Structures and Algorithms

Time: 3 Hours *Max. Marks: 40*

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

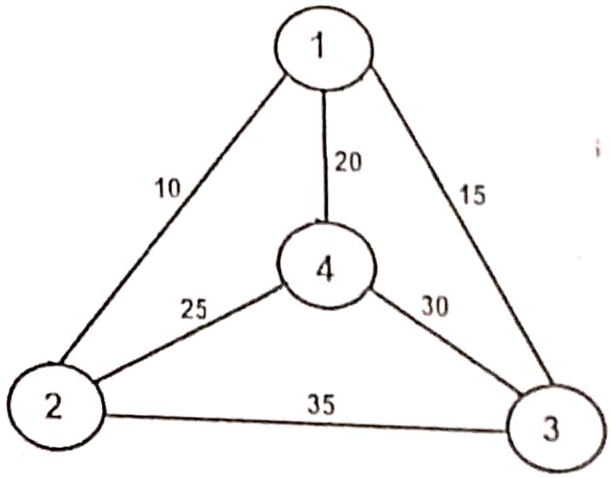
1. (a). Construct a BT from a pre-order and post-order traversal, given as below:

pre-order traversal: {A, B, D, C, E, G, F, H, I}

post-order traversal: {D, B, G, E, H, I, F, C, A}

[3] [CO5]

(b). Given a set of cities and the distance between every pair of cities, the problem is to find the shortest possible route that visits every city exactly once and returns to the starting point. Consider vertex 1 is a home city. Cost adjacency details are provided on edges. [4] [CO5]



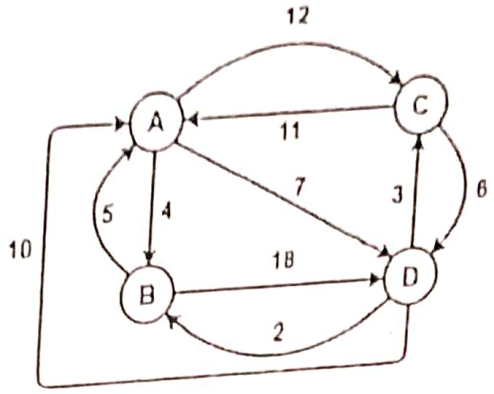
2. (a). What is the smallest value of n such that an algorithm whose running time is $100n^2$ runs faster than an algorithm whose running time is 2^n on the same machine? [3] [CO1]

(b) Form a recurrence relation of the following code and solve it using Master's Theorem.

A(n) [3] [CO2]

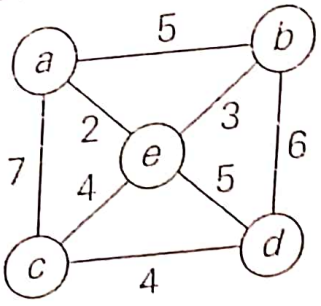
```
{
if (n<=1)
return 1;
else
return A(sqrt(n));
}
```

3. (a). Solve Travelling Salesman Problem in the following graph and show each and every steps [4] [CO5]

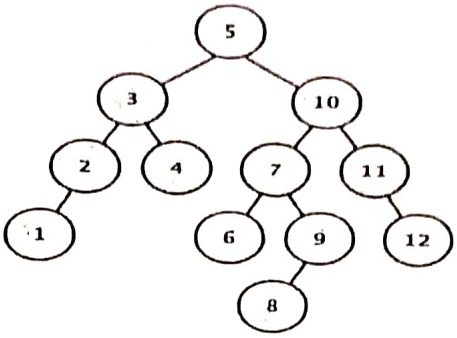


(b). Assume that a merge sort algorithm in the worst case takes 30 seconc for an input of size 64. Which of the following most closely approximate the maximum input size of a problem that can be solved in 6 minutes? [3 [CO4]

4. (a). Apply Prim's algorithm to the following graph. Include in the priority queue all the vertices not already in the tree. [3] [CO5]



(b). For a given AVL tree, delete a sequence of digits as 5, 10, 7 and draw resulting tree.



[3] [CO5]

5. (a). Can the master method be applied to the recurrence $T(n) = 4T(n/2) + n^2 lg(n)$? Why or why not? Give an asymptotic upper bound for this recurrence. [3] [CO3]

(b). Find the optimal solution to multiply four matrices A1, A2, A3, A4 such that the dimensions of each matrix are 5×5, 5×4, 4×8, 8×2 using generic formula. [4] [CO5]

6. (a). Given two linear linked lists L1, and L2. Write a pseudo code to merge two lists in sorted order. [3] [CO1]

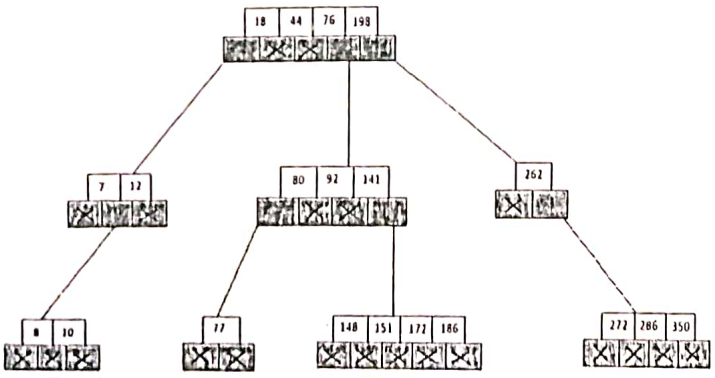
(b). Using the pseudo code for Fibonacci series generation, prove that Dynamic programming reduces the computation demand of the algorithm. [2] [CO5]

(c). Write a pseudo code for

i) Counting number of elements in the given m-way tree

ii) Searching number 151 in given m-way tree.

[2+2+1] [CO6]



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Roll No. .....

SECOND SEMESTER

B.TECH.(EC)

END SEMESTER EXAMINATION

MAY, 2024

EC104 Network Analysis & Synthesis

Time: 3Hours

Max. Marks: 50

Note: **Question number 1 is compulsory.** Answer **any five** questions from the rest. Any required data not explicitly given, may be suitably assumed. **Use the answer sheet space judiciously.** Symbols have their usual meanings.

1[a] For a two-port reciprocal network, the output open-circuit voltage divided by the input current is equal to [1][CO4]

(a) B (b) z_{12}

(c) y_{22} (d) h_{12}

1[b] Consider the following statements regarding the driving point admittance function [1][CO5]

$$Y(s)=\frac{s^2+6.5s+10}{s^2+4s+3}$$

1. It is an admittance of RL network.
2. The lowest critical frequency is a pole.
3. Poles and zeros alternate on the negative real axis of s-plane.

Which of these statements are correct

(a) 1 and 2 (b) 2 and 3

(c) 1 and 3 (d) 1, 2 and 3

1[c] Consider a second order network with both the poles as negative real and equal, then the unit step response of the network will be [1][CO1], [CO2], [CO 3]

(a) Critically damped (b) Overdamped

(c) underdamped (d) Undamped (Oscillatory)

1[d] Consider the following statements for a 2-port network [1][CO4]

(1) $z_{11}=z_{22}$ (2) $h_{12}=h_{21}$

(3) $y_{12}=-y_{21}$ (4) $BC-AD=-1$

The network is reciprocal if and only if

(a) 1 and 2 are correct (b) 2 and 3 are correct

(c) 3 and 4 are correct (d) 4 alone is correct

1[e] Poles and zeros of a driving point impedance function of a network are simple and interlace on the jω axis. The network consists of _____ elements. [1][CO5]

1[f] A network contains only independent current sources and resistors. If the values of all resistors are doubled, the values of the node voltages [1][CO1]

(a) will become half (b) will remain unchanged
(c) will become double (d) cannot comment on this

1[g] The transmission (ABCD) parameter matrices of two, 2-port networks are given by [1][CO4]

$$\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} \text{ and } \begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}$$

If these two network are connected in cascade, the transmission (ABCD) parameter matrix of the resulting network will be.

1[h] $P(s) = s^4 + s^3 + 2s^2 + 4s + 3,\ \ Q(s) = s^5 + 3s^3 + s$ [1][CO5]

Which one of the following statements is correct for above *P(s)* and *Q(s)* polynomials?

(a) Both *P(s)* and *Q(s)* are Hurwitz
(b) Both *P(s)* and *Q(s)* are not Hurwitz
(c) *P(s)* is Hurwitz but *Q(s)* is not
(d) *P(s)* is not Hurwitz but *Q(s)* is Hurwitz

1[i] Time constants of series RL and RC circuits for the following elements values are respectively: [1][CO2]

R=1Ω; L=2H; C=1F

(a) 0.5 sec and 1 sec (b) 1 sec and 2 sec
(c) 1 sec and 0.5 sec (d) 2 sec and 1 sec

1[j] Which responses are not available in the first order filter? [1][CO5]

2[a] For the circuit of Fig. 2(a). Find the value of i(t) and vc(t) for all value of t. [6][CO1], [CO2], [CO 3]

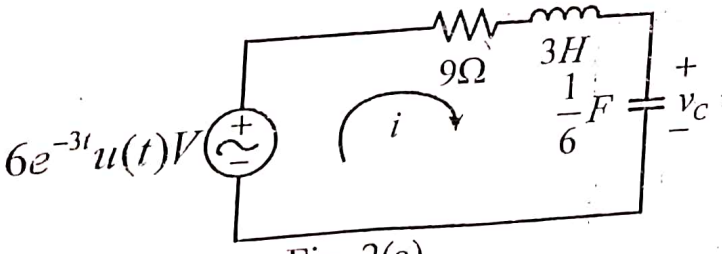


Fig. 2(a)

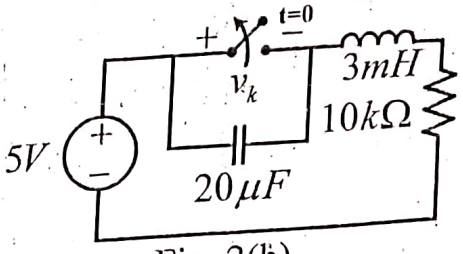


Fig. 2(b)

2[b] For the circuit shown in Fig. 2(b), switch has been closed for a long time and then it is opened at $t = 0$. Find $\frac{dv_k(0+)}{dt}$. [2][CO1], [CO2], [CO 3]

3[a] For the network shown in the Fig.3(a), find the transmission (ABCD) matrix $[t]$. **[2][CO4]**

3[b] Switch K has been open for a long time then it is closed at $t = 0$. Find the complete response $v(t)$ and $i(t)$ for $t > 0$ in the Fig.3(b) **[6][CO1] [CO2], [CO 3]**



Fig.3(a)

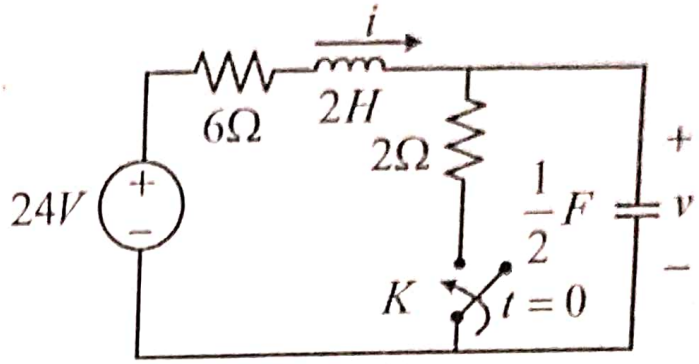


Fig.3(b)

4[a] Networks a and b are connected as shown in the Fig.4(a). Find the overall transmission matrix for the connected network. **[5][CO4]**

Where

$$[z_a] = \begin{bmatrix} 41 & 4 \\ 4 & 1 \end{bmatrix} and [z_b] = \begin{bmatrix} 18 & 2 \\ 2 & 2 \end{bmatrix}$$

4[b] Find z parameter for the Fig. 4(b). **[3][CO4]**

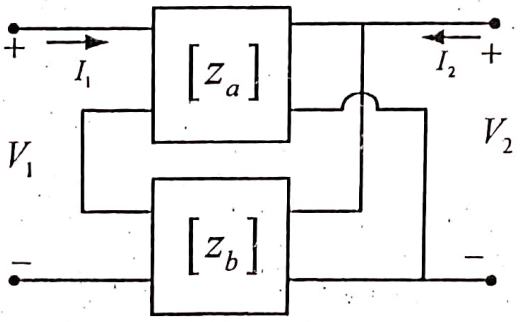


Fig.4(a)

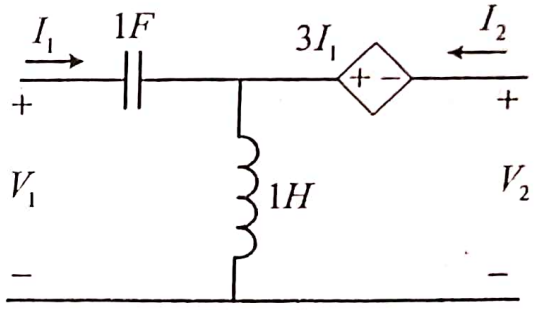


Fig.4(b)

5[a] Write the necessary and sufficient condition for a rational function F(s) to be positive real. **[2+4=6] [CO5]**

Whether given admittance function Y(s) is positive real

$$Y(s) = \frac{s^2 + \frac{2}{3}s + \frac{2}{3}}{s^2 + s + 3}$$

5[b] Test whether given polynomial is Hurwitz. [2][CO5]

$P(s) = s^4 + 2s^3 + 5s^2 + 6s + 4$

6 A plot in the Fig. 6 represents a driving point admittance Y(s). Synthesize this admittance in Foster's first form and Cauer's first form of realization. Note that the location of the pole $\sigma = -\sigma_1$ between $\sigma = -2$ and $\sigma = -6$ is not known, do not read it from the plot which is not purposely drawn to the scale. [8][CO5]

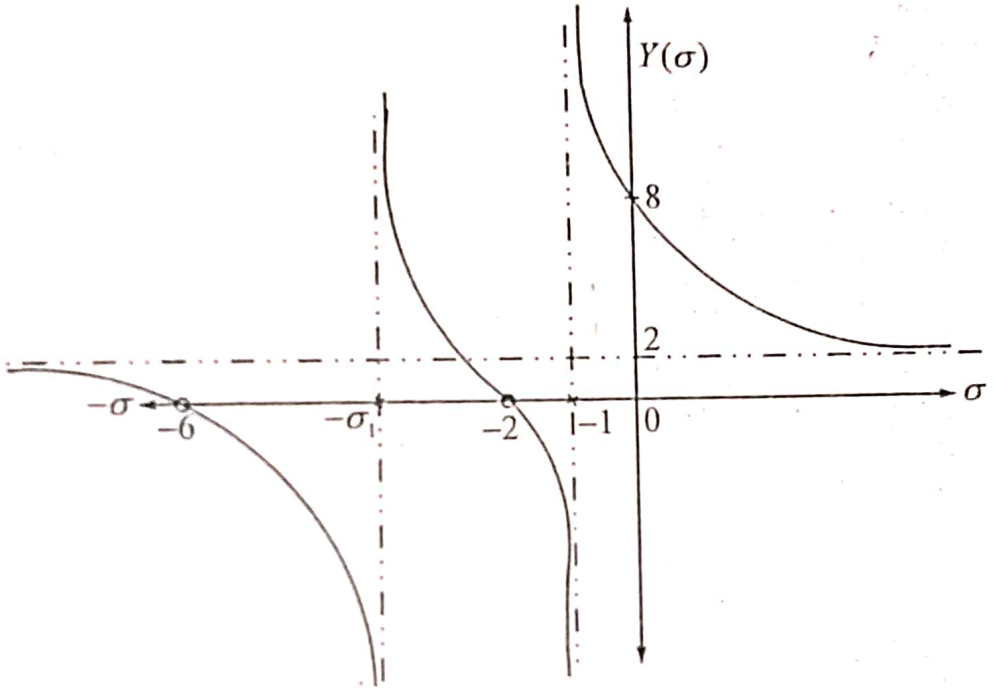


Fig. 6

7 Synthesize the LC driving point impedance [8][CO5]

$$Z(s) = \frac{2(s^6 + 11s^4 + 7s^2 + 1)}{s^5 + 8s^3 + 3s}$$

In the form shown in the Fig.7 (i.e. find the values of Capacitors and inductors)

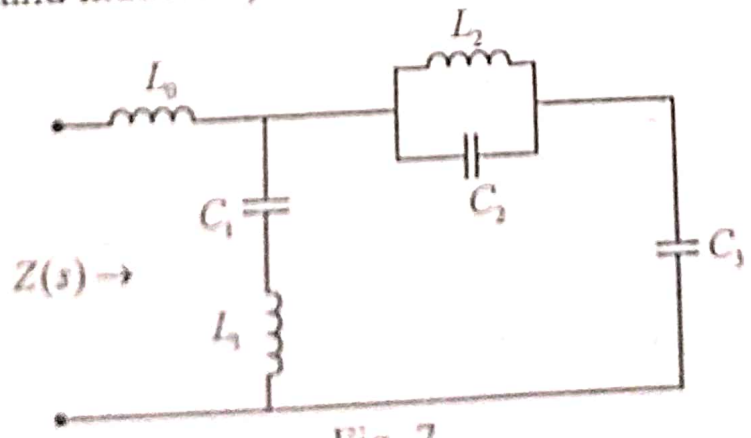


Fig. 7

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Roll no.....

IV SEMESTER

B.Tech.(ECE)

END SEMESTER EXAMINATION *May-2024*

EC-202 ANALOG ELECTRONICS-II

Time: 3 Hour *Max. Marks: 40*

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

1[a] How the gain and bandwidth is affected in multistage amplifier? What is the advantage of cascode amplifier? [2x5][CO1]

1[b] An amplifier with negative feedback gives an output of 12.5V with an input of 1.5V. When feedback is removed, it requires 0.25V input for the same output. Find value of voltage gain without feedback and value of β, if the input and output are in phase and β is real. [CO2]

1[c] Describe the basic criterion for sustained oscillations. [CO3]

1[d] Calculate the second harmonic distortion for an output waveform if $V_{CE,min}$=2.4V, V_{CEQ}=10V and $V_{CE,max}$=20V. [CO4]

1[e] Define buried layer. Why it is used? [CO5]

2[a] Draw the high frequency equivalent circuit of a cascode amplifier and determine f_H for the circuit. A cascode amplifier has R_{C1}= R_{C2}=1.5kΩ and R_S=300Ω.The transistors are identical and have r_π=2kΩ, g_m=0.05S, β_0=100, C_π=19.5pF, C_μ=0.5pF, and ω_T=2.5x10^9 rad/sec. Determine f_H for the circuit. [4][CO1]

OR

A common-source MOSFET amplifier has Rin=2MΩ, gm=4mA/V, ro=100kΩ, R_d=10KΩ, C_{gs}=2pF and C_{gd}=0.5pF. The amplifier is fed from a voltage source with internal resistance of 500kΩ and is connected to a [4][CO1]

10kΩ load. Find a) the overall midband gain, (b) the upper 3 dB frequency.

2[b] For the two stage cascaded amplifier shown in fig 1. Calculate the low 3dB frequency F_L with value of parameters $C_{gs1}= C_{gs2}=5pF$, $C_{gd1}= C_{gd2}=2pF$ and $g_{m1}= g_{m2}=10mA/V$, $C_1=1\mu F$ and $C_2=10\mu F$ [4][CO1]

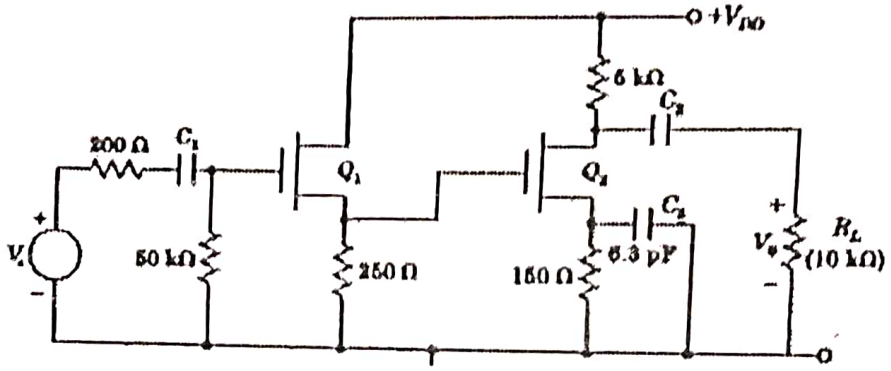


Fig.1

3[a] Derive the expression for R_{if}, R_{of} and gain with feedback for current shunt topology. [3][CO2]

3[b] Determine *T*, A_{OL} and A_f for the given circuit in fig 2.The MOSFETs have $g_m=1mA/V$, $r_d=20k\Omega$. [5][CO2]

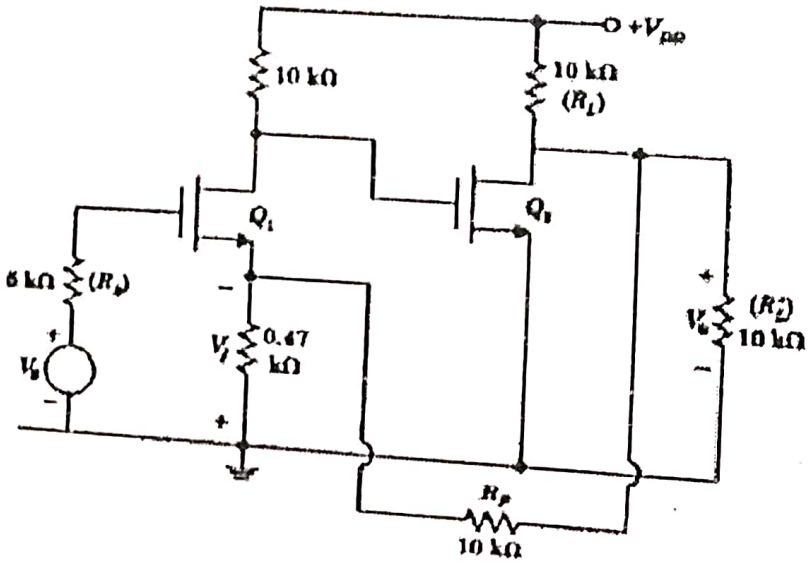


Fig2.

199

4[a] For an RC phase shift oscillator using the feedback network shown in fig. 3, find the frequency of oscillation and value of gain for sustain oscillation. Assuming the gain of amplifier is 'A' and capacitor to be ideal [4][CO3]

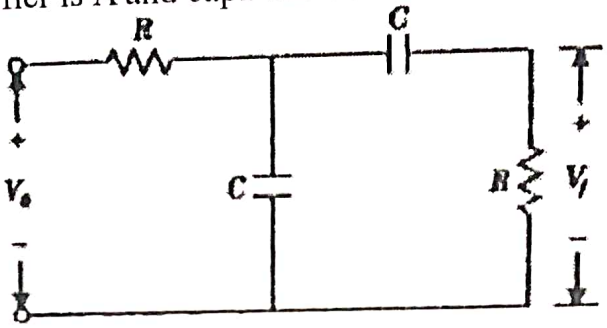


Fig.3

OR

We wish to design the amplifier shown in Fig. 4 for a 3 - dB bandwidth of 10 GHz. Assume I_C =1 mA, $r_0 = \infty$, R_S = 50Ω, C_π = 20 fF, C_μ = 5 fF. Determine the maximum allowable value of R_C. [4][CO6]

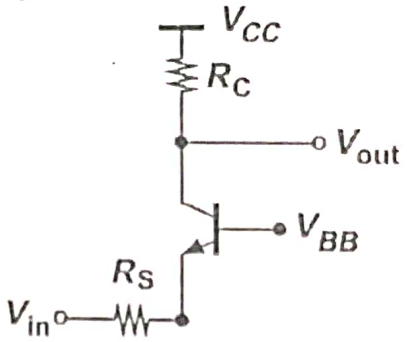


Fig4.

4[b] Design a class B output stage to deliver an average power of 20W to an 8Ω load. The power supply should be 5V greater than the peak output. Determine, the supply voltage required, the peak current drawn from each supply, the total supply power and the power conversion efficiency. [4][CO4]

5[a] A 2MHz crystal is specified to have L=0.52H, C_s=0.012pF,C_p=4pF and r=120 Ω.Find f_s, f_p and Q. [3][CO3]

5[b] Explain the steps involved in PNP transistor fabrication? [3][CO5]

Roll No. .....

Total No. of Pages:3

FOURTH SEMESTER

B.Tech. (ECE)

MAY-2024

END SEMESTER EXAMINATION

EC-204 DIGITAL DESIGN - II

Time: 3.00 Hours

Max. Marks: 40

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

Q. 1 (a) Implement the hazard free switching circuit for the following Boolean function.

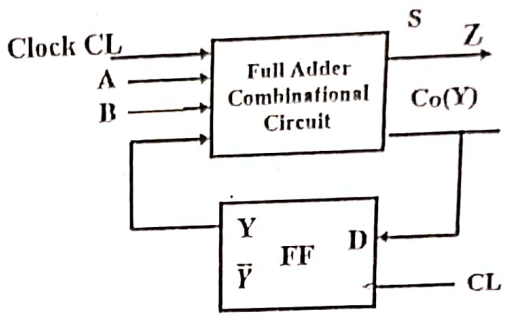
$f(x1 \ldots\ldots x4) = \sum m\,(0, 4, 11, 13, 15) + d\,(2, 3, 5, 10)$ **(4) [CO4]**

(b) Construct the corresponding reduced state table for the given **Table 1** using partitioning technique. **(4) [CO3]**

Table 1

	NS, z	
PS	x=0	x=1
A	A,0	B,0
B	D,0	C,1
C	F,0	E,0
D	D,0	F,0
E	B,0	G,0
F	G,0	C,1
G	A,0	F,0

Fig. 1



Q. 2. (a) Sketch the ASM chart (Mealy Machine) for serial adder shown in **Fig. 1** that adds two bits (A and B) with carry input (C_0) and produces Z output as sum. Obtain the expression for Z using ASM Chart. **(4) [CO5]**

(b) Interpret all test vectors that cannot be used to detect AND bridging fault between lines X and X' in **Fig. 2.** Also, justify your answer. **(4) [CO4]**

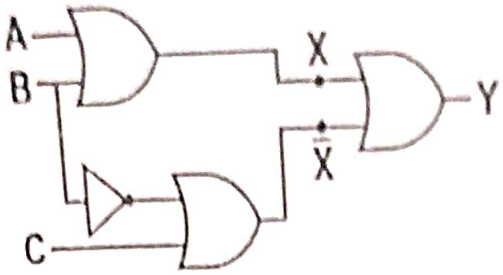


Fig. 2

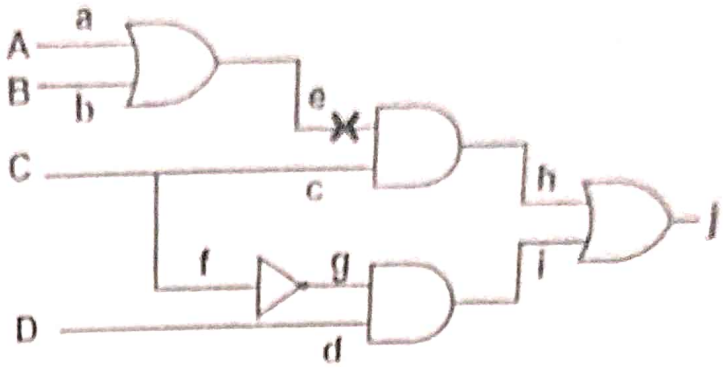


Fig. 3

(OR)

(b) Interpret all test vectors that can be used to detect stuck-at-0 fault at terminal **'e'** in **Fig. 3**. Also, justify your answer. **(4) [CO4]**

Q. 3 (a) Design an SIC fundamental-mode two-input asynchronous sequential circuit for which the output (Z) is to change from 0 to 1 only when the value of X_2 changes from 0 to 1, while $X_1 = 1$. The output value is to change from 1 to 0 only when the value of X_1 changes from 1 to 0 while $X_2 = 1$. **(4) [CO3]**

(b) Realize the circuits for expressions; X, Y and Z using ROM, PLA and PAL with minimum number of gates. **(4) [CO5]**

$X(A, B, C) = \sum (2, 3, 5, 7)$
$Y(A, B, C) = \sum (0, 1, 5)$
$Z(A, B, C) = \sum (0, 2, 3, 5)$

Q. 4 (a) Mention all critical and non-critical races in the state table (**Table 2**). Also Find a suitable race free secondary state assignment using as few states as possible. **(4) [CO4]**

Table 2

	Y_1Y_2, Z			
y_1y_2 \ x_1x_2 →	00	01	11	00
00	(00)	11	01	11
01	(01)	11	(01)	10
11	00	(11)	00	(11)
10	01	(10)	(10)	11

(b) Make the state diagram for a single-input and single-output Mealy-type FSM that produces an output of 1, if it detects either 110 or 101 input patterns. Overlapping sequences should be detected. Write the output for input sequence; 1100101101010110. (2) [CO2]

(c) Explain FPGA with suitable diagrams. (2) [CO1]

Q. 5. (a) Write the VHDL/Verilog code (along with library and entity) for 4-bit Binary to Gray code converter using any style for architecture. (4) [CO1]

(OR)

(a) Write the VHDL/Verilog code in structure style of architecture (along with library and entity) for the circuit shown in **Fig. 4**. (4) [CO1]

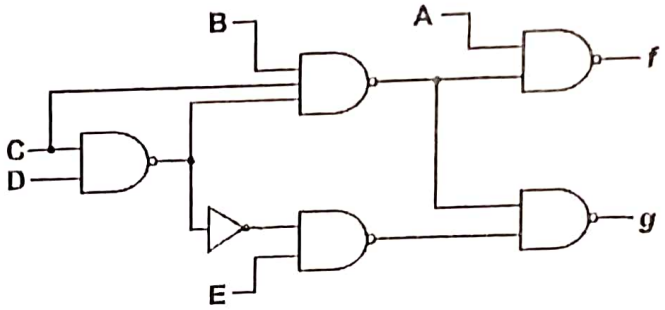


Fig. 4

(b) Derive the state table and state diagram for the circuit in the given **Fig. 5**. Identify the type of FSM (Mealy/Moore). Convert the obtained state table to other type of FSM (Moore/Mealy). (4) [CO2]

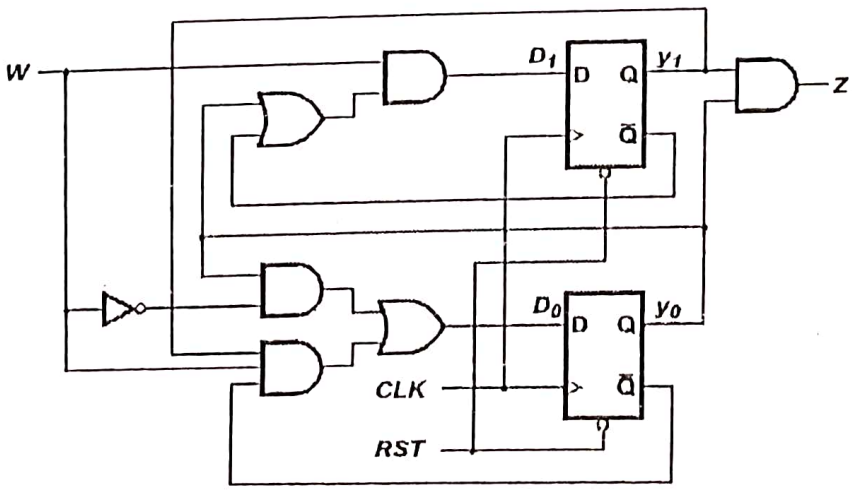


Fig. 5

Total No. of Pages: Two Roll No: 202

4TH SEMESTER

B.Tech.

END TERM EXAMINATION

May-2024

COURSE CODE: EC206

COURSE TITLE: COMMUNICATION SYSTEMS

Time: 3 Hours *Max. Marks: 40*

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

Q.1 Discuss the implementation of PLL as a FM demodulator, with the help of appropriate diagrams and equations. [4] [CO2]

Q.2 For an FM broadcasting system, if the maximum value of frequency deviation is fixed at 90 kHz. The modulating signal is a baseband signal with a bandwidth of 15 kHz. Compute the effective bandwidth for the FM signal and determine whether it is wideband FM or narrowband FM. Make a comparison between wideband FM or narrowband FM. [4] [CO2]

Q.3 Using phase discrimination method discuss the concept of SSB-SC generation. [4] [CO2]

Q.4 Draw the block diagram of an SSB transmitter using the filter system. Why must the filter have such sharp cutoff outside the passband? In a transmitter, must this cutoff be equally sharp on each side of the filter's passband? [4][CO2]

Q.5 Prove that the balanced modulator produces an output consisting of sidebands only, with the carrier removed. Other than in SSB generation, what applications can this circuit have? [4] [CO2]

Q.6 Explain the working of a superheterodyne AM receiver. Discuss the issue of image frequency in such receivers. Why is this receiver better than the TRF AM receiver? [4] [CO3]

Q.7 A superheterodyne FM receiver operates in the 88-108 MHz frequency range. The IF and local oscillator frequencies are chosen such that $f_{IF}<f_{LO}$. We require that the image frequency f_{im} fall outside of the 88-108 MHz region. Determine the minimum required f_{IF} and the range of variation in f_{LO}. The bandwidth of an FM channel/station in this scheme is 200 KHz. [4] [CO3]

Q.8 The first stage of a two-stage amplifier has a voltage gain of 10, a 600-Ω input resistor, a 1600- Ω. Equivalent noise resistance and a 27-k Ω output resistor. For the second stage, these values are 25, 81 k Ω, 10 k Ω and 1Megaohm (1 MΩ), respectively. Calculate the equivalent input-noise resistance of this two-stage amplifier. [4] [CO4]

Q.9 Assuming thermal noise, derive the relationship for the noise contribution from an amplifier with gain G and noise figure F, if the bandwidth over which noise is measured is assumed to be B. Consider a cascaded system of three such amplifiers, each with a gain of 10 dB and noise figure of 6 dB. Calculate the overall noise figure for such a system. [4] [CO4]

Q.10 An amplifier operating over the frequency range from 18 to 20 MHz has a 10-kilohm (10-k Ω) input resistor. What is thermal noise voltage at the input to this amplifier if the ambient temperature is 27°C? [4] [CO4]

Q.11 Differentiate between the de-emphasis and pre-emphasis used in FM communication systems and describe how they improve the noise performance of FM communication systems. [4] [CO5]

Q.12 Write short note on any TWO: - 2X2=4

A] Analog Vs Digital Communication. [2] [CO1]

B] Sampling Theorem. [2] [CO3]

C] Additive White Gaussian Noise. [2] [CO4]

Total no. of Pages: 03

Roll no.....

IV SEMESTER

B. Tech. (ECE)

END TERM EXAMINATION

May-2024

EC 208: COMPUTER ARCHITECTURE

Time: 03:00 Hours

Max. Marks: 40

Note: Assume suitable missing data, if any.

Q.1 A) Implement Booth's multiplication algorithm for the multiplication of two numbers +13 (multiplicand) and -9 (multiplier). Show the contents of registers A, Q and SC during the process of multiplication in tabular form. Assume 5-bit registers that hold the signed numbers.

(OR)

A) Implement the division algorithm for the division of two signed-magnitude numbers +17 (Divisor) and -448 (Dividend). Show the contents of registers E, A, Q and SC during the process of division in tabular form. Assume 5-bit registers that hold the signed numbers. Sign bits are stored in separate flip-flops.

[4][CO2]

B) Design a BCD adder that can add two BCD numbers incorporating the logic for the correction if the sum is not a valid BCD number.

[4][CO2]

Q.2 A) Propose a hardwired control unit (block diagram) consisting of IR, two decoders, a sequence counter, and logic gates. Also draw a timing diagram assuming that sequence counter is cleared to 0 at time T_3 if decoder signal D_2 is active.

D_2T_3: SC $\leftarrow$ 0

[4][CO4]

B) Answer the following questions:

i. Determine the number of clock cycles required to process 100 tasks in a five-segment pipeline.

ii. A non-pipeline system takes 50 ns to process a task. The same task can be processed in a six-segment pipeline with a clock cycle of 10 ns. Determine the speedup ratio of the pipeline for 100 tasks. What is the maximum speedup that can be achieved?

[2+2][CO1]

Q.3 A) Answer the following questions:

i. It is necessary to transfer 256 words from a magnetic disk to a memory section starting from address 1230. The transfer is by means of DMA. Give the step-by-step account of the actions taken during the input of the first two words.

ii. The three outputs xyz from the priority encoder are used to provide a vector address of the form 1xyz0101. Calculate the eight vector addresses starting from the one with highest priority.

[2+2][CO1]

B) Discuss the following methods used for the asynchronous data transfer with the help of a neat block diagram and the timing diagram.

i. Source initiated transfer using strobe

ii. Destination initiated transfer using handshaking

[2+2][CO1]

Q.4 A) The access time of a cache memory is 100 ns and that of main memory is 1000 ns. It is estimated that 80 percent of the memory requests are for read and the remaining 20 percent are for write. The hit ratio for read accesses only is 0.9.

i. What is the average access time of the system considering only memory read cycles?

ii. What is the average access time of the system for both read and write requests?

(OR)

A) A virtual memory system has an address space of 8K words, a memory space of 4K words, and page and block sizes of 1K words. The following page reference changes occur during a given time interval. (Only page changes are listed. If the same page is referenced again, it is not listed twice.)

4 2 0 1 2 6 1 4 0 1 0 2 3 5 7

Determine the four pages that are resident in main memory after each page reference change if the replacement algorithm used is FIFO.

[4][CO3]

B) An 8-bit computer has a register R. Determine the values of status bits C, S, Z and V after each of the following instructions. The initial value of register R in each case is hexadecimal 72. The numbers below are also in hexadecimal.

i. Add immediate operand C6 to R.
ii. Subtract immediate operand 9A from R.
iii. AND immediate operand 8D to R.
iv. Exclusive-OR R with R.

[4][CO1]

Q.5 A) Write the symbolic microprogram for each routine given in the following table:

S. No.	Symbol	Opcode	Symbolic Function	Description
1	AND	0100	AC ← AC ∧ M[EA]	AND
2	BZ	1000	If(AC=0) then (PC ← EA)	Branch if AC zero

[4][CO1]

B) The following register transfers are to be executed using the hardwired control unit. For each transfer, specify: (1) the register whose load control input (LD) must be active (if any); (2) a memory read or write operation (if needed); and (3) the operation in the adder and logic circuit (if any).

i. AR ← PC
ii. IR ← M[AR]
iii. M[AR] ← TR
iv. AC ← DR, DR ← AC (done simultaneously)

[4][CO4]

*** END ***

Total No. of Pages: 02 Roll No.....

FOURTH-SEMESTER

B.Tech. [EP]

END-SEMESTER EXAMINATION May 2024

EC272: COMMUNICATION SYSTEM

Time: 3 Hours Max. Marks: 40

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

1. (a) What is modulation? Make a block diagram and explain the importance and necessity of modulation in the communication system. [4] [CO1]

(b) Explain the concept of bandwidth in AM signals and sketch the diagram with proper justification in the transmission of signals. [4] [CO1]

2. (a) State the difference between AM, FM, and PM with illustrations. Define the modulation index in the context of AM and explain its significance related to the modulation process in the digital world. [4] [CO3]

(b) Draw the electromagnetic spectrum in terms of increasing wavelength. What are the main factors responsible for the possible errors in the communication system? State them with a crisp definition of noise and its types. Where it is most likely to affect the signal? [4] [CO4]

3. (a) Explain the sampling theorem in detail with a diagram. Define signal-to-noise ratio (S/N), noise factor, and noise figure. [4][CO3]

(b) A message signal m(t) is given as $m(t) = A_m \sin(2\pi f_m t)$, where A_m is the amplitude of the message signal and f_m is its frequency. The carrier signal c(t) is given by $c(t) = A_c \sin(2\pi f_c t)$, where A_c is the amplitude of the carrier signal and f_c is its frequency. If the modulation index β is 1.5, and the frequency deviation Δf is 10 kHz, calculate the frequency-modulated signal s(t). [4] [CO5]

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Q.3 a) What set of information is transferred by CPU to data bus to initialise DMA. How DMA transfer is executed in a computer system (with suitable diagram)? [1+3] [CO-5]

b) Discuss the sequence of operations performed to establish CPU-IOP communication, with suitable diagram. [2] [CO-5]

c) Draw the diagram to show the RAM and ROM memory chips connection to CPU. [2] [CO-4]

d) How an associative memory of m words, n cells performs match logic to find the data, with suitable diagram. [2] [CO-4]

Q.4 a) Design a bus system for four registers. Write the mnemonic for register transfer via bus. [2+1][CO-1]

b) Design a 4-bit arithmetic circuit to perform all 8 arithmetic operations. Write a function table for all arithmetic operations. [3+1][CO-2]

c) Give one example of register reference instruction and explain its operation with essential control signal. [1+2] [CO-3]

Q.5 a) Design adder and logic circuit of Accumulator Logic in a basic computer system. [3] [CO-2]

b) Draw the timing diagram for given instruction C_7T_3: $SC \rightarrow 0$. Assuming C_7 is activated with positive clock transition of T_1. [1] [CO-3]

c) For a fetch routine write the set of microinstructions and their binary values received in 20-bit microinstruction code format as binary code. [3] [CO-3]

d) Discuss the operation of microprogram sequencer, with suitable diagram, used to design control memory. [3] [CO-4]

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Roll No._____

No. of pages 04

B.Tech

6th SEMESTER

May-2024

END TERM EXAMINATION

COURSE CODE EC302 **COURSE TITLE VLSI Design**

Max. Marks: 40

Time: 3:00 Hours

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) In a 2 input NAND gate using domino logic, which input combination may lead to charge sharing. Suggest changes in the circuit to avoid charge sharing. **[2][CO4]**

(b) Given that the effective capacitance of a MOS capacitor is found to be 40 fF while depletion capacitance (C_{dep}) is given as 50 fF. Compute oxide capacitance. **[2][CO1]**

(c) How would you size NMOS and PMOS transistor in symmetric static CMOS inverter? **[2][CO2]**

(d) A sequential circuit uses a combinational circuit and a register in feedback loop. If $t_{comb.} = 8$ ns, $t_{setup} = 2$ns and $t_{hold} = 2$ns, the circuit can operate correctly at ---- Hz frequency. **[2][CO5]**

Q.2(a) A PMOS transistor is fabricated with the following specifications: $V_{TO,p} = -0.5V$, $\gamma = -0.25\ V^{0.5}$, $\lambda = -0.05\ V^{-1}$, $\varphi_{Fp} = 0.2$ V, $k' = 20\ \mu A/V^2$. (i) Given I_D=8.48 μA, V_S=1.2V, V_B=1.8V, V_G=0.2V, V_D=0V. What is the transistor region of operation? Calculate W/L. (ii) Given V_S=1.2V, V_B=1.8V, V_G=0V, V_D=1V. What is the transistor region in this case? Calculate I_D. **[4][CO1]**

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(b) Design a depletion load inverter with the following specifications: $V_{OL} = 0.1V_{DD}$ and $P_{DC} = 1mW$. What is the resulting ratio of $(W/L)_{driver}$ and $(W/L)_{load}$? (Assume $\gamma = 0$, $\lambda = 0$, $V_{T0,load} = -0.6\ V_{DD}$, $V_{T,driver} = 0.2\ V_{DD}$, $k' = 20\ \mu A/V^2$, $V_{DD} = 5\ V$) [4][CO2]

Q.3(a) Design a combinational circuit for $F = S_1S_0I_3 + S_1S_0'I_2 + S_1'S_0I_1 + S_1'S_0'I_0$ using (i) static CMOS and (ii) transmission gates. Assess the efficiency in terms of transistors used in the realizations. [4][CO3]

(b) Find out the logic function implemented by the circuit of Fig. 1. Indicate the purpose of PMOS transistor. Comment on sizing of NMOS and PMOS transistors used in the circuit. [4][CO3]

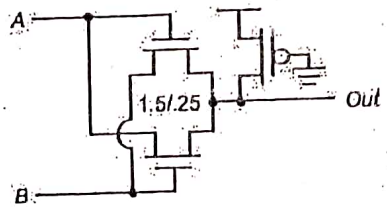


Fig. 1

Q.4 (a) Design static CMOS based clocked SR latch. Comment on its forbidden state. [4][CO4]

(b) Consider the circuit of Fig. 2. Give the logic function of OUT in terms of A, B, C, E and F. Sketch the waveforms at OUT if the values at both A and B are at logic '1' in pre-charge phase and remain unchanged during evaluation. The input C and F are kept constant at logic '1' while E is maintained at logic '0'. Sketch the waveforms at outputs at stage 1, stage 2 and OUT. Comment on maximum clock frequency if delay of stage 1, stage 2 and stage 3 are 5ps each. [4][CO4]

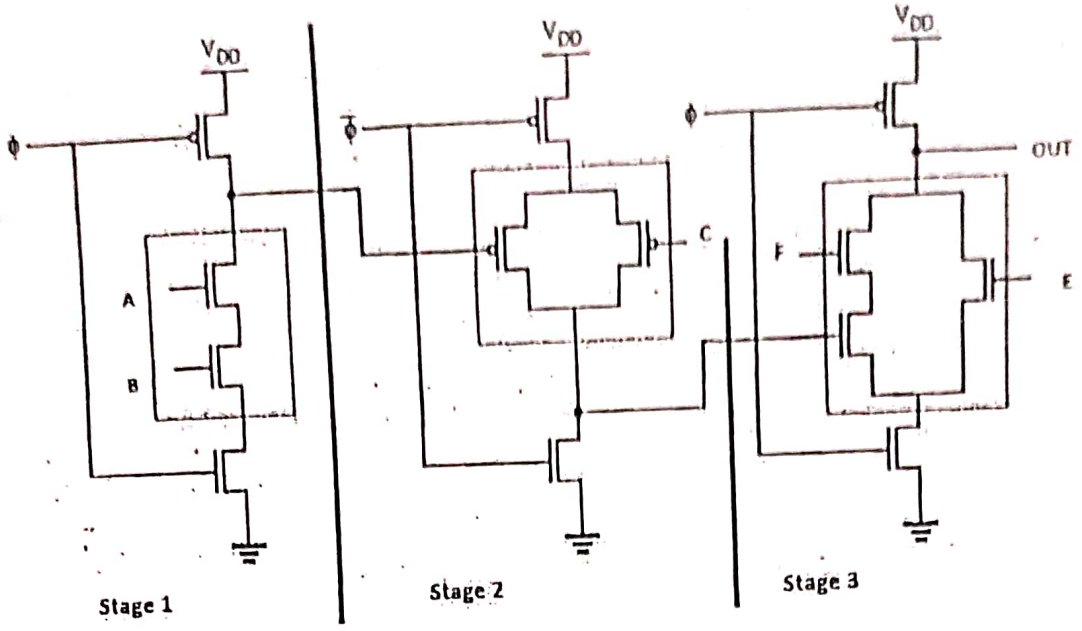


Fig. 2

Q. 5 (a) Analyse the circuit shown in Fig. 3. Answer the following [4][CO5]

(i) Is this a static or dynamic register?

(ii) Is this positive edge triggered or negative edge triggered?

(iii) Calculate t_{setup}, t_{CtoQ} and t_{hold} for this register in terms of the transmission gate and inverter delays.

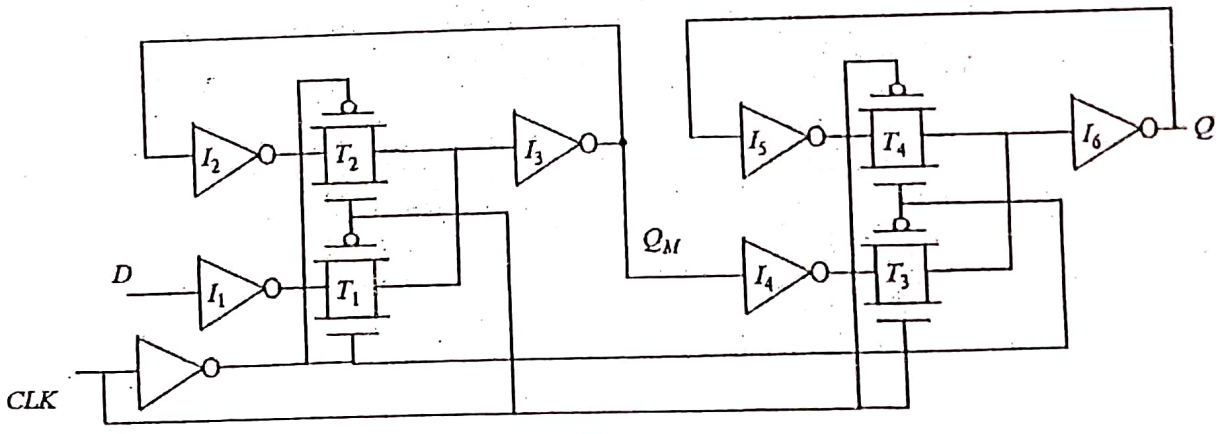


Fig. 3

(b) How would you implement a three-stage pipeline structure for computing log (|A+B|)? What would be the minimum time period of the clock for correct operation of the pipelined structure.

[4][CO5]

Q. 6 (a) Describe read and write operation of 1T and 3T dynamic RAM cell. Which out of these two has non-destructive read and why? **[4][CO6]**

(b) Explain the use of regularity, modularity and locality in VLSI design. Give suitable example of each. **[4][CO6]**

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Total No. of Pages 2

Roll No. .....

SIXTH SEMESTER

B.TECH. (ECE)

END TERM EXAMINATION

May. 2024

EC-304 DIGITAL SIGNAL PROCESSING

Time: 3 Hours

Max. Marks :40

Note: All questions are compulsory and are of equal marks.

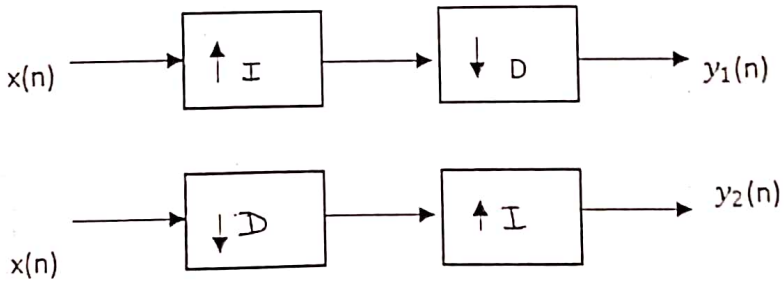
Q.No.1. (a). Can chirp-Z transform be used for computing DFT (Magnitude only). If yes then write method.

(b). Write about the algorithm to compute the DFT faster. Also compute complexity of FFT.

Q.No.2. (a). Determine the zeros for FIR lattice filter with parameters K_1=1/2,K_2= -1/3,K_3=1.Draw figure to show location of zeros.

(b). Define and express sensitivity parameter related to quantization of filter Co-efficients. Prove mathematically the proposed location of poles to keep perturbation error low .

Q.No.3(a). Consider the two different ways of cascading a decimator with an interpolator as shown: -



If D = I, show that outputs of the two configurations are different and are not identical.

(b). The analysis filter $H_0(z)$ in a two-channel QMF has the transfer function

$$H_0(z)= 1 + z^{-1}$$

Determine the polyphase filter $P_0(z^2)$ and $P_1(z^2)$. Also determine analysis filter $H_1(z)$.

Q.No.4. (a). Write about Bilinear Transformation and mathematically how it can be used to design IIR filter.

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(b). Prove that sampling rate conversion process is a discrete-time linear and time varying system.

Q.No.5. Write note on following

(a). TMS320C54x Processor Architecture.

(b). Dominant Addressing Mode/Modes of TMS320C54x.

(c). Adaptive Filters and applications.

Total No. of pages:2

Roll No.....

VI TH SEMESTER

B.Tech (ECE)

End Semester Examination

May 2024

EC-306 Embedded Systems

Time : 3 Hrs **Maximum Marks: 40**

Note: Question No 1 is compulsory. Answer any 7 questions from remaining. Assume missing data if any.

1	a	MOVWF TEMP1 ; MOVWF TEMP2 ; BCF STATUS,C ; RLF TEMP2,F ; RLF TEMP2,W ; ADDWF TEMP1,F ; BCF STATUS,C ; RLF TEMP1,W ; If content of W is 00000010 before executing the code, what will be the content of W after execution of this code	1	CO2
	b	Content of OPTION Register is 0xC30 What do you infer from this	1	CO3
	c	What is the significance of Q Flag in ARM processor	1	CO1
	d	Block Repeat Registers are a part of DSP architecture. Why?	1	CO4
	e	Explain the function of write buffer in Cache Memory	1	CO5

2	a	What are the salient features of Timer1 of medium range PIC Micro-controller	3	CO3
	b	Write the control word for configuring Timer 1 for the following features i. External Clock Pulse ii. Presaclar 8	2	
3		Write an assembly language program for finding the number of even numbers from a sequence of '10', 32 bit numbers using ARM Micro-controller	5	CO2
4		Write an assembly language program for finding the largest number in a series of "10" 32 bit numbers using ARM microcontroller	5	CO2
5		Write the functions of following instructions		
	a	i. MRS R1,CPSR ii. USAD8 Rd,Rm,Rs iii. UMULL R0,R1,R2,R3	3	CO1
	b	Does ARM Micro-Controller supports Multiple Data Transfer? If so explain with example	2	CO1
6	a	Explain the main features of ARM7TDMI with the help of block diagram	3	CO4
	b	Explain significance of THUMB mode in ARM controller and its limitations	2	
7		State and explain all exceptions of ARM Micro-controller	5	CO2
8	a	Compare the advantages and disadvantages of SRAM and DRAM	2	
	b	What are the different methods for enhancing the speed of DRAM	3	CO5

9	a	What is the significance of MMU in ARM micro-Controller	3	CO5
	b	How does a processor protect individual process while handling multiple processes	2	

Roll no.....

Total no. of Pages:3

B.Tech

6th SEMESTER

May-2024

END TERM EXAMINATION

EC310 Testing and Diagnosis of Digital System Design

Time: 03:00 Hours

Max. Marks: 50

Note : All questions carry equal marks.
Assume suitable missing data, if any.
Attempt any 5 questions.

Q.1 **(a)** Design the BILBO architecture and explain its four modes of operations. **[5][CO#4]**

(b) Define normal states, protected states and redundant states in a fault tolerant Finite State Machine. If an FSM has 3 protected states and no normal states, derive the total number of bits required for fault tolerant encoding of this FSM. **[5][CO#5]**

Q.2 **(a)** Design a self- checking circuit for half subtractor. Explain its functioning. **[5][CO#5]**

(b) Consider a PLA on which the following functions are implemented:

$X(a,b,c) = \sum(0,1,3,5)$

$Y(a,b,c) = \sum(4,5,6,7)$

Determine the expressions of check bits and design self-checking PLA using modified Berger codes? **[5][CO#5]**

Q.3 **(a)** Draw the internal architecture of a boundary scan cell. Explain its four modes of operation. **[5][CO#4]**

(b) Consider the following March algorithm: **[5][CO#2]**

{⇑(W0);⇑(R0, W1, R1);⇓(R1, W0, R0)}

This algorithm is used to test a large memory consisting of a total of n cells. You can assume that the initialization step correctly sets each memory cell to 0.

9/6

(i) How many march elements this algorithm has and what is the length of the above test. Also label the march elements as M0, M1, ...

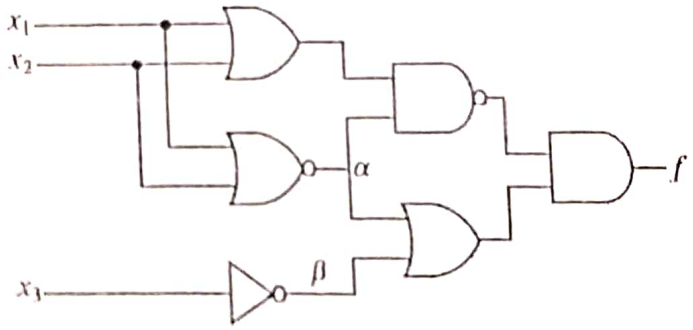
(ii) Consider a memory fault in which whenever the content of cell 250 is changed, the cell 200 will also change state (inversion coupling fault). Will this fault be excited and in which march element? Will this fault be detected and in which march element?

(iii) Write the pseudo code for this march test.

Q.4 For the circuit shown in Fig.1, find the syndrome for fault free circuit, and in presence of fault β sa0. Also, design a complete BIST architecture and determine the golden signature as per the following specifications:

(i) Use modular LFSR with characteristic polynomial $\Phi(x) = x^3 + x^2 + 1$ and seed 100 as test pattern generator.

(ii) Use cellular automata with all 3- cells following Rule 90 as Output Response Analyzer.



[10][CO#4]

Figure 1

Q.5 (a) Define machine identification. Design a four-state (A,B,C,D) mealy FSM using the input (X)/ output (Z) sequence shown below: **(5)[CO#3]**

X	A_0^0	B_0^0	C_1^0	D_1^0	0	0	C_1^0	1	1	0	1	0	0	0	0	0	1	1	0	1	0
Z																					

(b) Determine the test vectors to detect β sa0 fault in Figure 1 using D- Algorithm.

[5][CO#1]

Q.6 **(a)** Define inversion, idempotent and k-cell coupling. **[5][CO#2]**

Consider the following RAM test algorithm:

{⇑(W0)⇑(R0, W1, R1)⇑(R1, W0, R0)}. You can assume that the initialization step correctly sets each memory cell to 0. Consider a three coupling fault in which cell content of a cell i changes when cell j is changed and cell k is 1. For i= 500, j= 3000, and k= 5500, in which element and operation will this fault be excited and when will it be detected?

(b) Consider a characteristic polynomial $x^5 + x + 1$. **(5)[CO#4]**

Now answer the following and you must show your work for full credit.

(i) Is this polynomial primitive?
(ii) Give an internal exclusive-OR realization of this polynomial.
(iii) Give an external exclusive-OR realization of this polynomial.
(iv) What is the period of modular LFSR with polynomial x^4+x^2+1 if the seed is 1001?
(v) For the characteristic polynomial of Type-1 LFSR shown below:
$f(x)=x^8 + x^2 + x^7+1$,the output of which of the flip flops will take part in feedback connections?

********** END**********

Total No. of Pages 02

Roll No. .....

SEMESTER- VI

B.Tech. (ECE)

End Term Examination (May. 2024)

EC320-Soft Computing

Max. Marks: 50

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

1. a) Consider the search problem as shown in Fig. 1. with start state 'S' and goal state 'E'. The transaction costs are shown in figure. What is the final cost using A* algorithm to reach from the start to goal state? (Heuristic values are $h(S) = 10$, $h(A) = 5$, $h(B) = 6$, $h(Y) = 8$, $h(Z) = 5$, $h(C) = 4$, $h(D) = 15$, $h(E) = 0$. [6M] [CO2]

b) Define soft computing, hard computing and hybrid computing with some suitable examples. [4M] [CO1]

2. a) Using back-propagation network, find the new weights for the net shown in Fig. 2. It is presented with the input pattern [0,1] and the target ouput is 1. Use a learning rate $\alpha = 0.25$ and binary sigmoidal activation function.

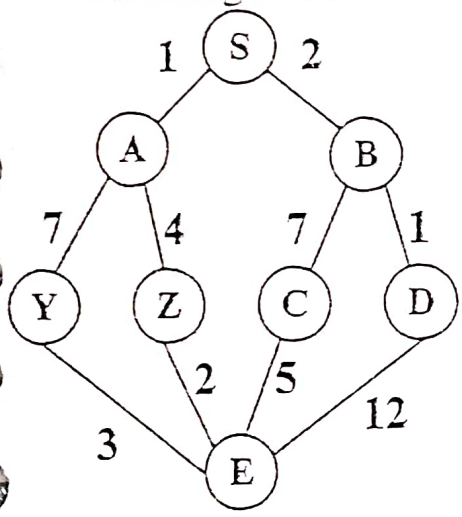


Fig. 1.

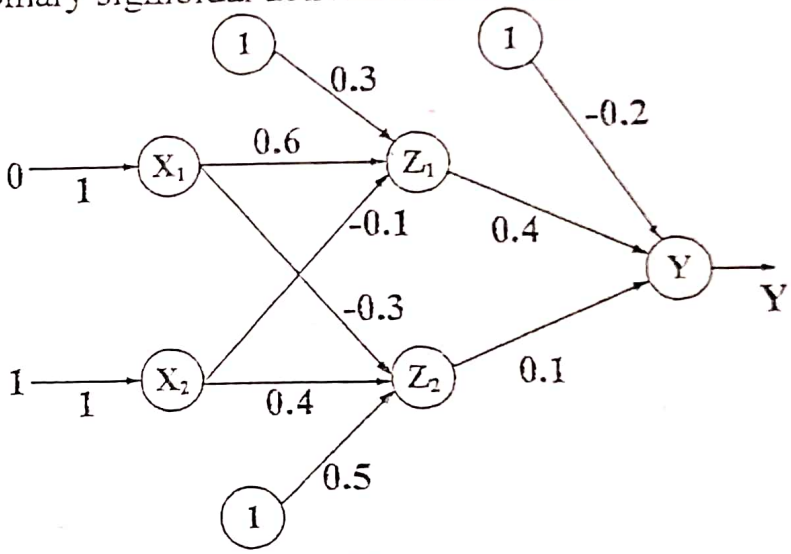


Fig. 2.

[6M] [CO3]

b) What are the different types of learning rules in neural network?. [4M] [CO3]

3. a) For the given membership functions as shown in the Fig. 3 below, determine the defuzzified output value for $C = C_1 \cup C_2$ by the following methods:
(i) Center of gravity method (CoG),
(ii) Center of sums method (CoS), and
(iii) Mean of maxima method (MoM)

[6M] [CO4]

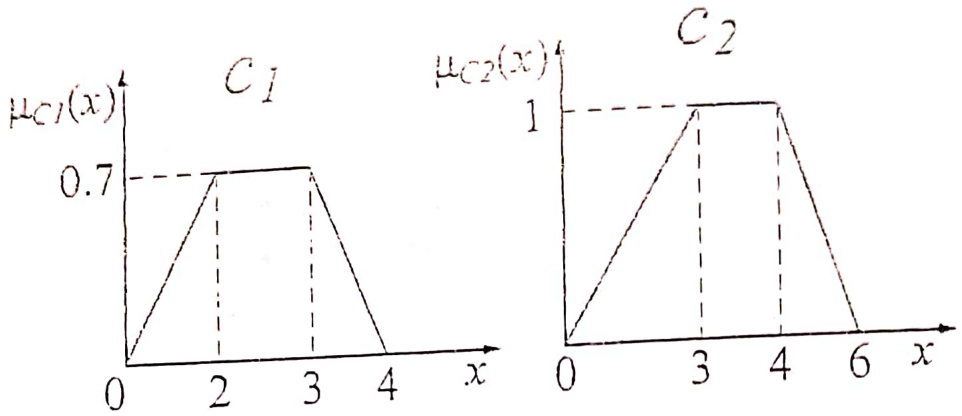


Fig. 3.

b) Given X = {a, b, c, d} and Y = {1, 2, 3, 4} are the universe of discourse, A = {(a, 0.0), (b, 0.8), (c, 0.6), (d, 1.0)} and B = {(1, 0.2), (2, 1.0), (3, 0.8), (4, 0.0)} are the Fuzzy sets then, determine the implication relation: **If x is A then y is B** using Zadeh's max-min rule.

[4M] [CO4]

4. a) Suppose, $R(x, y)$ and $S(x, y)$ are the two relations define over two crisp sets $x \in A$ and $y \in B$.

$$R = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \text{ and } S = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Find the following:

(i) R ∪ S, (ii) R ∩ S, (iii) R', (iv) (R∪ S)'

[4M] [CO4]

b) Two fuzzy relations are given by

$$R(x, y) = \begin{bmatrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix} \text{ and } S(y, z) = \begin{bmatrix} 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{bmatrix}$$

Obtain fuzzy relation T as a composition between the fuzzy relations R and S using Max-min composition and Max-product composition

[6M][CO4]

5. a) Maximize the objective function $f(x,y) = x/y$, where x can take any value from {0, 1, …, 127} and y can take any value from {1, 2, …, 31} using genetic algorithm approach. To start with, select the initial population of size 4 as given x = {1, 10, 20, 31}and y = {5, 10, 15, 20}. Show all the process of crossover, mutation and selection. Find the value of objective function and the new generation (x, y) after one iteration.

[8M] [CO5]

b) Explain the process of selection using Roulette-Wheel method related to genetic algorithm.

[2M][CO5]

**********END**********

Total no. of Pages: 03

Roll no.....

VI/VIII SEMESTER

B.Tech. (Elective)

END TERM EXAMINATION *May 2024*

EC-332: 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) 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]

(b) Calculate the capacity of an AWGN channel with a bandwidth of 1 MHZand an SNR of 40 dB.

[2][CO2]

(c) Determine the minimum distance of a linear code that can correct up to three errors.

[2][CO3]

(d) Determine whether the code C = {000, 100, 010, 111} is linear cyclic code or not.

[2][CO4]

(e) The impulse response of a convolutional encoder is 1011. Determine the generator matrix G and the output codeword for the input data d = (1 1 0).

[2][CO5]

Q.2 (a) A discrete source transmits messages x_1, x_2 and x_3 with probabilities 0.3, 0.4 and 0.3. The source is connected to the channel as given in the Figure 1. Find the conditional probability matrix P(Y/X), joint probability matrix P(X, Y) and marginal entropy H(X).

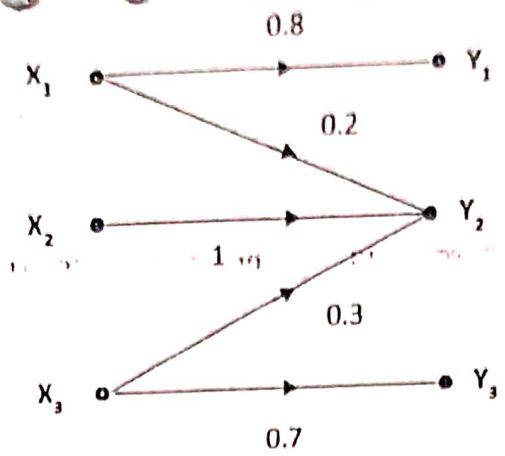


Figure 1

[5][CO1]

(b) A Discrete Memoryless Source (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. Construct a Shannon-Fano code for X and calculate the code efficiency.

[5][CO2]

Q.3 (a) Consider a single-error-correcting code for 11 data bits. Determine the number of check bits required.

[2][CO3]

(b) The generator matrix of a (6, 3) systematic linear block code is:

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

i. Determine the codeword for the data words [1 1 0] and [011].

ii. Suppose that the received word is 010011. Decode this received word by finding the location of the error and the transmitted data bits.

[4+4][CO3]

Q.4 (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.5 Consider the convolutional encoder shown in the Figure 2:

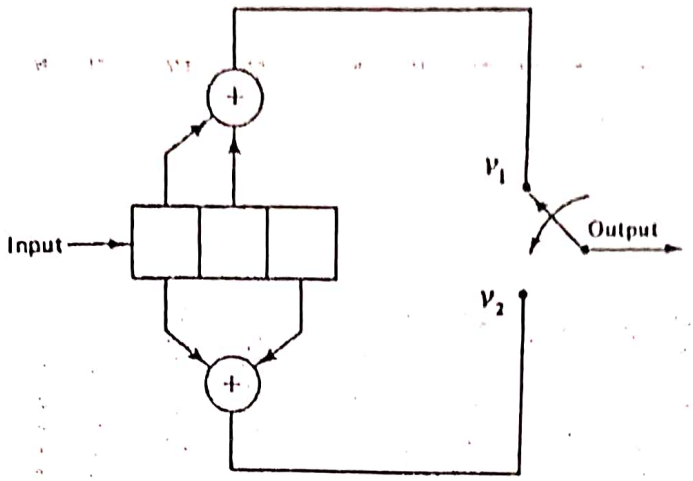


Figure 2

(a) Find the Impulse response of the encoder.

(b) Derive the state table and draw the state diagram for the given convolutional encoder.

(c) Sketch the Trellis diagram for the given convolutional encoder and determine the free distance.

[2+4+4][CO5]

Q.6 (a) A Discrete Memoryless Source (DMS) X has four symbols x1, x2, x3, x4 with probabilities P(x1) = 0.4, P(x2) = 0.3, P(x3) = 0.2 and P(x4) = 0.1. Determine the source entropy H(X), data rate (r) and the rate of information (R).

[5][CO1]

(b) Consider a binary memoryless source X with two symbols x1 and x2. Show that entropy H(X) is maximum when both x1 and x2 are equiprobable. Also, draw the graph depicting the variation in the entropy with the increase in probability.

[5][CO2]

*** **END** ***

Total no. of Pages:2 Roll no..... 222

VIII SEMESTER B.Tech[ECE]

END TERM EXAMINATION May-2024

COURSE CODE EC 404 COURSE TITLE Wireless Communication

Time: 03:00 Hours Max. Marks: 50

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

Q.1 (a) Compare and contrast the 2G, 3G, 4G and 5G technologies of wireless communication. Support your analysis with appropriate technical data parameters and diagrams (if any). [5][CO1]

(b) With suitable block diagrams, elaborate the process of downlink modulation in IS-95 (CDMA). What is the near-far effect in CDMA and how is it mitigated? [5][CO3]

OR

(b) Describe the roles of the different control channels in GSM, and show how they help in setting up a PSTN generated incoming call to a mobile network. [5][CO3]

Q.2 (a) Compare and contrast ALOHA and Slotted ALOHA protocols for multiple access. Calculate the throughput for both protocols making suitable assumptions, if any. [5][CO4]

(b) Differentiate between FDMA, TDMA and CDMA. Highlight the advantages and disadvantages of each scheme, and mention wireless technology standards based on each of these. [5][CO4]

Q.3 (a) Consider a cellular system, with N = 7, with a total of 660 channels, out of which 30 are designated as control channels. If the radius of one cell is 1.385 km, and the area of the city is 3500 km^2, what is the total system capacity over the city? If the cells are split into smaller cells, each with half the radius of the original cells, what is the new system capacity? Calculate, also, the new transmitted power at each base station relative to the original power before splitting. Assume n = 4. [5][CO2]

(b) Calculate the S/I ratio (in dB), considering co-channel interference, for a semi-urban situation where a cluster size of N= 7 is employed including the first tier of interferers when (a) Omni-directional antennas are employed and (b) 120° sectored cells are employed. Give appropriate diagrams for the sectored case to support your reasoning/calculations. [5][CO1]

Q.4 (a) What is Orthogonal Frequency Division Multiplexing and why is it widely employed as the modulation scheme in 4G? Prove mathematically the concept of orthogonality in OFDM, with suitable time and frequency domain representations. [5][CO3]

(b) What are MIMO antennas? With the help of appropriate matrix representations, describe how can these be employed for spatial multiplexing? [5][CO5]

Q.5 (a) Consider the following handoff situation. A user is travelling away from a base station with a speed of 25 km/hr. Assume that the power fall-off trend as a function of distance is modelled as:

$$P = \left(\frac{d_0}{d}\right)^n P_0$$

where n is the path loss exponent (assume n = 4), P_0 is the reference power (assume P_0= 0 dbm) measured at a distance d_0 (assume d_0= 1 m). The minimum power below which the call is dropped (Pr_min) is -120 dBm and the handoff threshold (Pr_handoff) is -115 dBm. How much time does the network have to perform a successful handoff so that the call is not dropped? [5][CO2]

(b) Write short notes on the following:

i. DECT

ii. Bluetooth [5][CO5]

Total No. of Pages 02 Roll No. 224

II SEMESTER **B. Tech. [EE]**

END-SEM EXAMINATION *MAY-2024*

EE102 DATA STRUCTURES AND ALGORITHMS

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

Note: Question no. 1 is compulsory for all.
Attempt any four questions out of the rest.
Assume suitable missing data, if any.

Q.1 Answer the following questions. [8 x 1 = 8]

(a) Which of the following is a dynamic data structure? [CO1]

i. Array ii. Linked List
iii. Int iv. None of these

(b) Find x(18) – x(10), given the definition of x below:

```
def x(n):
    sum = 0
    for i in range (2, n) :
        if n%i == 0:
            sum = sum + i
    return (sum)
```

[CO2]

(c) The Big-O notation for $f(n) = (n\log n + n^2)(n^3 + 2)$ is [CO2]

i.	$O(n^4)$	ii.	$O(n^3)$
iii.	$O(n^5)$	iv.	$O(3^n)$

(d) Elements of an array are accessed _____ [CO1]

(e) /*4 + 5 3 2 7 is an example of _____ expression. [CO1]

(f) _____ is a linear data structure where elements can be added or removed at either end but not in the middle. [CO4]

(g) In recursion, the condition for which the function will stop calling itself is called ..... [CO5]

(h) The depth of a complete binary tree with n nodes is [CO6]

i.	log (n+1) – 1	ii.	log (n)
iii.	log(n-1) + 1	iv.	log (n) + 1

Q.2 (a) Compare function, module, package, and library in Python. [4] [CO2]
(b) What do you understand by best, worst and average case analysis of an algorithm? Explain with examples. [4] [CO2]

Q.3 (a) Describe in detail the different classification of data structures. [5] [CO1]

(b) Describe the three major ways of organizing a file with example. [3] [CO8]

Q. 4 (a) Evaluate the given postfix equation: 4, 6, 8, *, +, 26, % and find its output. [3] [CO3]
(b) Write a technique for deleting a node in the deque at the left end. [5] [CO4]

Q.5 (a) Calculate f(9) for the recursive sequence f(a) = 2*f(a-2) + 3 which has a base value f(3) = 11. [3] [CO5]
(b) Write an algorithm to find the LCM of two numbers using recursion. [5] [CO5]

Q.6 (a) Define Binary tree. List various types of binary trees alongwith their description and examples. [5] [CO6]
(b) Create a binary search tree from the following given sequence of elements: 35, 42, 36, 30, 40, 50, 15, 18,9, 42.
Explain with proper justification. [3] [CO7]

Q.7 (a) Explain various applications of Graph [4] [CO7]
(b) Enlist the three most common ways of representing a graph in computer memory. Also enlist the two methods of graph traversal. Explain the term minimum spanning tree with example. [4] [CO7]

Q.8 Write short notes on **any two** [4 x 2 = 8] [CO3, CO8]

i. Circular doubly linked list
ii. Classification of sorting techniques
iii. Open hashing, its advantages, and disadvantages

----END----

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Total no. of Pages: 2 Roll no.....

II SEMESTER B.Tech

END TERM EXAMINATION May-2024

EE104 CIRCUIT AND FIELD THEORY

Time: 03:00 Hours Max. Marks: 40

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

Q.1 (a) State the maximum power transfer theorem and derive the expression for maximum power transfer to the load.
(b) Find v_{ab} and i_o for the circuit shown in Fig. 1. [4+4] [CO1]

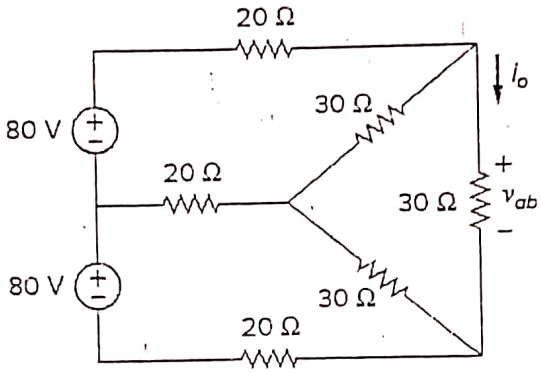


Fig. 1. Circuit for Q. 1(b)

Q.2 (a) Draw and explain the following curves for a series RLC Circuit:
i. inductive reactance vs. frequency
ii. capacitive reactance vs. frequency
iii. impedance vs. frequency
iv. current vs. frequency

(b) In the circuit shown in Fig. 2., the 60Ω resistor absorbs an average power of 240W. Find the source voltage, **V**, and Complex power in the RC branch. (Assume the current through the 60Ω resistor has no phase shift.) [4+4] [CO2]

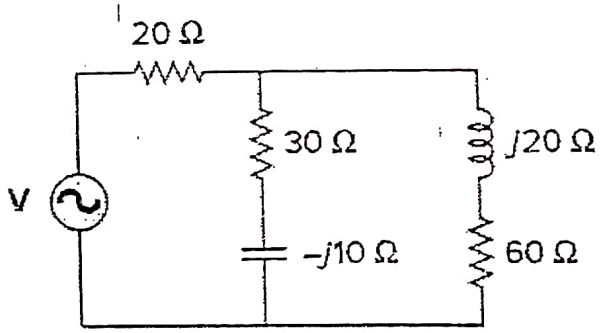


Fig. 2. Circuit for Q. 2(b)

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Q.3 (a) Obtain the expression of the power factor of the three-phase balanced load using the two-wattmeter method.

(b) A Y-connected balanced three-phase generator with an impedance of $0.4 + j0.3\ \Omega$ per phase is connected to a Y-connected balanced load with an impedance of $24 + j19\ \Omega$ per phase. The line joining the generator and the load has an impedance of $0.6 + j0.7\ \Omega$ per phase. Assuming source voltages $V_{an} = 120\angle 30^\circ$ V, find all the three (a) line voltages and (b) line currents. [4+4] [CO3]

Q.4 (a) Mention at least four analogies between electrical and magnetic domains.

(b) A cobalt ring (μ_r=600) has a mean radius of 30cm. If a coil wound on the ring carries 12A, Calculate the number of turns required to establish an average magnetic flux density of 1.5Wb/m^2 in the ring. [4+4] [CO4]

Q.5 (a) State Gauss Law. Obtain the expression of the electric field of a line charge using Gauss Law.

(b) Two-point charges -4 μC and 5 μC are located at $(2,-1,3)$ and $(0,4,-2)$, respectively. Find the potential at (1,0,1) assuming zero potential at infinity. [4+4] [CO5]

Q.6. (a)Write Maxwell's equations for time-varying fields in point and integral form with their significance.

(b) The electric field intensity in a material with ε_r of 2 filling the space between the plates of a parallel plate capacitor is 8kV/m. The distance between the plates is 2mm. Calculate the following:

i. Electric flux density, D
ii. Polarization, P
iii. Surface density of Polarization Charge
iv. Potential difference between the plates.

[4+4] [CO5]

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

(a) Biot-Savart Law and Ampere Circuital Law
(b) B-H Curve and its application
(c) Conversion of Star to Delta connection

[4+4][CO1, CO4, CO5]

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

FOURTH SEMESTER **B.Tech(EE)**

END TERM EXAMINATION **MAY-2024**

EE-202 LINEAR INTEGRATED CIRCUIT

Time:3 Hours *Max. Marks : 40*

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

1 Define the input offset voltage, input bias current, CMRR and slew rate of an OP-AMP **4 [CO1]**

2 Draw the circuit of basic integrator. What are the problems associated with this circuit? How these problems can be solved? Justify your answer with transfer function and frequency response? **4 [CO2]**

3 For the circuit shown in Fig. 1, derive an exact expression for closed loop gain and input resistance . Assume a non-ideal OP-AMP. **4 [CO5]**

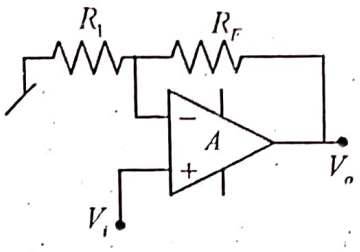


Fig- 1

4 The circuit shown in Fig.2 operate from a 10-V supply with current Io = 10 μA. Determine the values of the required resistors, assuming that V_{BE} is 0.7 V at a current of 1 mA and neglecting the effect of finite β. **4 [CO2]**

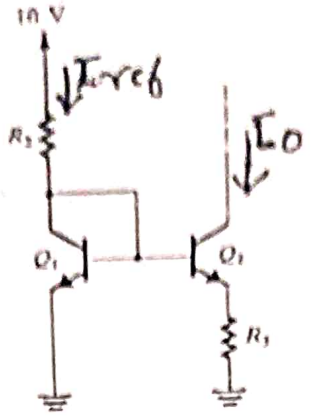


Fig-2

5 What is an instrumentation amplifier? What are its important features? For the instrumentation amplifier shown in Fig.3 Prove that $V_o = \frac{R_2 R_G}{R_1 R_3}(V_2 - V_1)$ 4 [CO3]

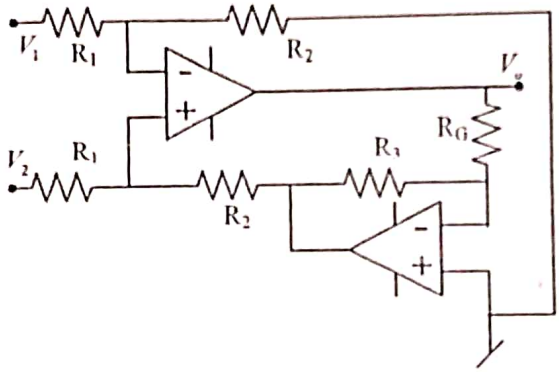


Fig-3

6 State Barkhausen criterion for sinusoidal oscillator. Find the condition of oscillation and frequency of oscillation for the circuit of Fig.4 4 [CO3]

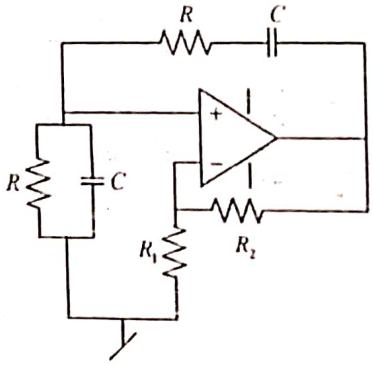


Fig-4

2201

7 Write standard transfer functions of second order Filter. Find the transfer functions $\frac{V_{o1}}{V_i}$, $\frac{V_{o2}}{V_i}$ *and* $\frac{V_{o3}}{V_i}$ of the given circuit shown in Fig.5. Identify the filter outputs and find their performance parameters. 4 [CO3]

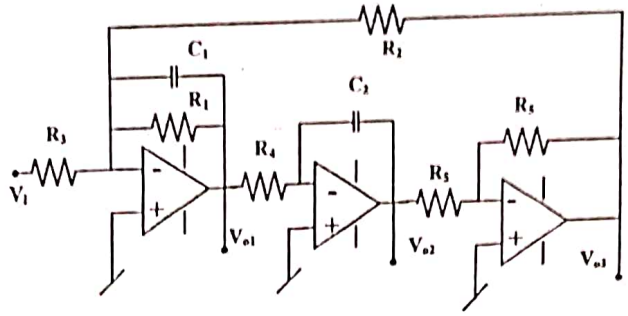


Fig-5

8 Draw the circuit diagram of astable multivibrator using 555timer IC and explain its operation with suitable waveforms. Also derive its equation for calculation of time period. 4 [CO4]

9 Draw internal circuit diagram of an operational transconductance amplifier(OTA) 3080 and derive the expression for output current I_o. 4 [CO4]

10 Design an op-amp circuit to provide an output $V_o = -[2V_1 + (V_2/2)]$. Choose relatively low values of resistors but ones for which the input current (from each input signal source) does not exceed 50 μA for 1-V input signals. 4 [CO3]

11 Consider a bistable circuit of non inverting transfer characteristic with biasing voltage equal to ± 10 V and $V_{TH} = 5V$ and $V_{TL} = -5$ V. If V_{in} is a triangular wave with a 0V average, a 10V peak amplitude, and a 1ms period, sketch the waveform of output V_o. Find the time interval between the zero crossings of V_{in} and V_o. 4 [CO3]

12 With neat circuit diagram explain the working of an antilog amplifier using two op-amps and derive its output equation. 4 [CO3]

13 For the OTA based circuit shown in Fig. 6, find the derivation for 4 [CO4]

output voltage and hence identify the type of filters can be realized.

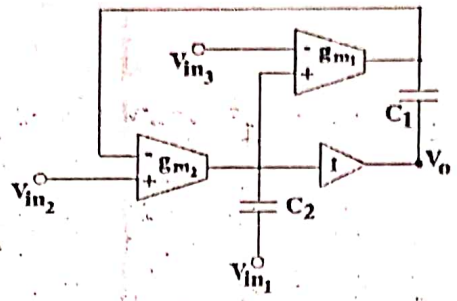


Fig-6

14 An input $V_i = V_m sin\omega t$ is applied to the circuit shown in Fig.7. Draw and explain the output waveform. 4 [CO3]

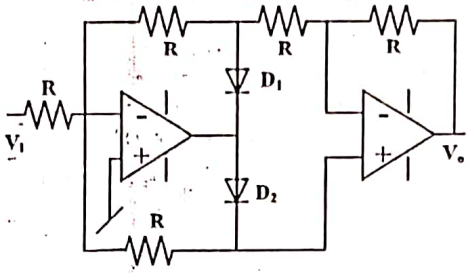


Fig-7

15 With neat block diagram explain the working of Phase Lock Loop. 4 [CO4]

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Roll No .....

Total No. of Pages 02

B.Tech. (EE)

FOURTH SEMESTER

END SEMESTER EXAMINATION May- 2024

EE-204 DIGITAL CIRCUITS AND SYTEMS

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

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

1. [a]Express the following functions in a sum of minterms and a product of maxterms.

   $F(A, B, C, D)=D(\bar{A}+B)+\bar{B}D$ [CO1]

   [b] Obtain the simplified expressions in sum of products for the following Boolean functions: Use karnaugh map method. [CO1]

   (i) $F(A,B,C,D)=\sum(7,13,14,15)$

   (ii) $F(x,y,z)=\bar{x}yz+x\bar{y}\bar{z}+xyz+xy\bar{z}$

2. [a] Implement the following Boolean function with two and three level NAND Gates. [CO2]

   $F(x, y,z)=\sum(0,6)$

   [b] Implement the Boolean function $F(x, y,z)=\sum(0,6)$ with following gates.

   (i) NOR-OR

   (ii) NAND-AND [CO1]

3. [a] Implement the following functions using the don't-care conditions. Assume that both the normal and complement inputs are available.

   $F(A,B,C,D)=\bar{A}\bar{B}\bar{C}+A\bar{B}D+\bar{A}\bar{B}C\bar{D}$ [CO2]

   $d(A,B,C,D)=ABC+A\bar{B}\bar{D}$

   With no more than two NOR gates.

   [b] A combinational circuit has four inputs and one output. The output is equal to 1 when (1) all the inputs are equal to 1 or (2) none of the inputs are equal to 1 or (3) an odd number of inputs are equal to 1. [CO2]

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(i) Obtain the truth table.
(ii) Find the simplified output function in sum of products.
(iii)Find the simplified output function in product of sums.
(iv) Draw the logic diagram of (ii).

4. [a] A combinational circuit is defined by the following three functions: [CO3]

$F_1 = \bar{x}\bar{y} + xy\bar{z}$

$F_2 = \bar{x} + y$

$F_3 = xy + \bar{x}\bar{y}$

Design the circuit with a decoder and external gates.

[b] Implement the full adder using multiplexers. [CO3]

5. [a]Explain the bidirectional shift register with parallel load. Draw neat diagram. [CO5]

[b]Design a counter with the following binary sequence: 0, 2, 4, 6, 8 and repeat. Use T flip-flops. [CO5]

6. A sequential circuit has two flip-flops (A and B), two inputs (x and y), and an output (z). The flip-flop input functions and the circuit output function are as follows: [CO4]

$JA = xB + \bar{y}\,\bar{B}$ $\quad KA = x\bar{y}\bar{B}$

$JB = x\bar{A}$ $\quad KB = x\bar{y} + A$

$z = xyA + \bar{x}\bar{y}B$

Obtain the logic diagram, state table and state diagram.

7. Write short notes on any two of the following. [CO6]
[a] Postulates of Ordinary algebra and Boolean algebra. Compare the Boolean algebra with ordinary algebra.
[b] BCD to Decimal Decoder
[b] RTL and DTL circuits
[c] TTL circuits

Total no. of Pages: 04 *Roll no.....*

FOURTH SEMESTER
B.Tech. (EE)

END TERM EXAMINATION **May 2024**

EE 206 CONTROL SYSTEMS

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

Note: All questions are compulsory to answer and they are of equal marks. Assume suitable missing data, if any. Use Semi-log paper for Bode Plots and normal Graph paper for root locus/Polar plot/Nyquist Plot. The semi-log/graph paper(s) must include Name, Roll No., Date and student's signature)

Q1. Answer the following questions with justification: 5 (0.5 x10)

(I) In a thermal oven, thermal resistance(R) which is analogous to electrical resistance is defined as
- (i) temperature difference/ rate of heat flow
- (ii) rate of heat flow /rate of temperature change
- (iii) rate of heat flow / temperature change
- (iv) proportional to heat flow

(II) The differential equation $\frac{dy(t)}{dt} + t^2 y(t) = 2x(t)$ is representing
(i)time invariant system (ii)time-variant system
(iii) partly (i) and partly (ii) (iv)none of these

(III) Identify the On-Off control system(s)
- (i) Temperature control in domestic heating
- (ii) Water level control in a large tank
- (iii) Temperature control in window AC
- (iv) All of these

(IV) The time domain differential equation for a displacement of y in a mass(M)- spring(S)- dashpot(D) system due to the applied force of f(t) is $5\ddot{y} + 2\dot{y} + y = f(t)$. The time constant is
(i) 3 (ii) 3.5 (iii) 4.5 (iv) 5

(V) By R-H criterion, the stability of the control system with the following close loop transfer function may be classified as

$$T(s) = \frac{1}{2s^5 + 3s^4 + 2s^3 + 2s + 1}$$

(i)Stable (ii)Unstable (iii)Marginally stable (iv)None of these

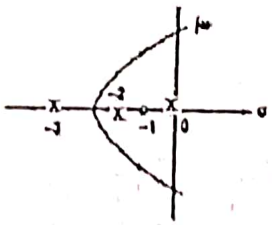
(VI) For the root locus plot, the open loop transfer function is given by

(I) $G(s)H(s) = K\frac{s(s+1)}{(s+2)(s+3)}$

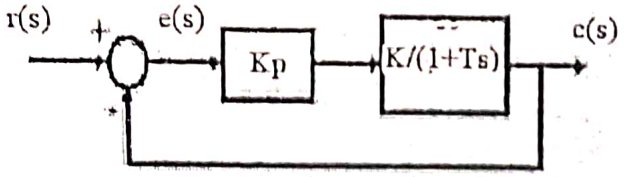
(ii) $G(s)H(s) = K\frac{(s+1)}{s(s+2)(s+3)^2}$

(iii) $G(s)H(s) = K\frac{1}{s(s-1)(s-2)(s+3)}$

(iv) $G(s)H(s) = K\frac{(s+1)}{s(s+2)(s+3)}$



(VII) A simple first order system with proportional control action and unity feedback looks like:



For a step input r(s)= A/s, Steady-state error is given by:

(i) $\frac{1}{1+K_pK}$ (ii) $\frac{A}{1+K_p}$ (iii) $\frac{A}{1+K_pK}$ (iv) $\frac{A}{1+K}$

(VIII) Consider a feedback system with gain margin of about 25. At what point does Nyquist plot crosses negative real axis?

(i) - 2.5 (ii) - 0.04 (iii) - 4.0 (iv) - 0.25

(IX) The frequency at which the magnitude of the system in Bode plot becomes zero dB.

(i)Resonant frequency (ii)Gain cross over frequency

(iii)Phase cross over frequency (iv)Corner frequencies

(X) A P-I-D controller which increases type of system and decreases system settling times is inherently adds

(i) *1 pole at origin and adds 2 zeroes in LHP*

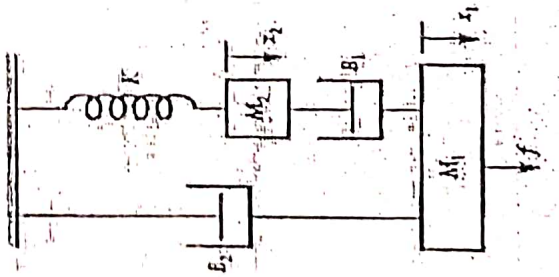
(ii) *2 poles at origin and adds 2 zeroes in LHP*

(iii) *1 pole at origin and adds 1 zeroes in RHP*

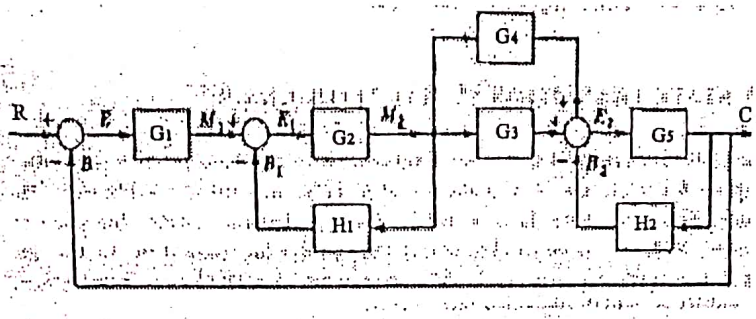
(iv) *1 pole at origin and adds 1 zeroes in LHP*

Q2. State the D'Alemberts principle on the equilibrium of a dynamic system, and using this principle, find out the force equilibrium equations of the following mass(M)-Spring(S)-Dashpots(D) system. Draw the corresponding f-v and f-i electric analog circuits.

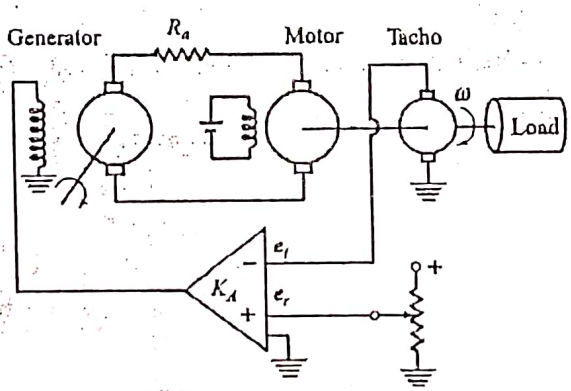
[3+1+1] [CO1]



Q3. Define the Mason's rule to evaluate transfer function. Given below is a control system having the configuration of the following transfer function blocks. Draw the signal flow graph and derive the overall transfer function using the gain formula. [2+3] [CO2]



Q4. In speed control system shown below, the generator field time constant is negligible. It is driven at constant speed giving a generated voltage of K_g volts/field amp. The separately excited motor has a back emf of K_b volts/(rad/sec). It produces a torque of K_T N-m/amp. The motor and its load have a combined moment of



inertia J kg-m^2 and negligible friction. The tacho-generator gives K_t volts/(rad/sec) and the amplifier gain is K_A amps/volt.

Draw the block diagram of the system and determine therefrom the transfer function $\omega(s)/E_r(s)$, where ω is the load speed and e_r is the reference signal which corresponds to desired speed.

[2+3] [CO2]

Q5. A unity feedback system is characterized by an open loop transfer function $G(s) = \frac{K}{s(s+10)}$

Determine the gain K so that the system will have a damping ratio of 0.5. For this value of K determine the settling time, peak overshoot and time to peak overshoot for a unit step input. [2+1+1+1] [CO4]

Q6. Given a unity feedback system with open-loop transfer function G(s),

$$G(s) = K\frac{(s-1)(s-2)}{(s+2)(s^2+2s+2)}$$

Determine,

a) the range of K that keeps the system stable.

b) the value of K, that makes the system marginally stable, and

c) the frequency of oscillation when K is set to the value that makes system oscillate. [2+2+1] [CO5]

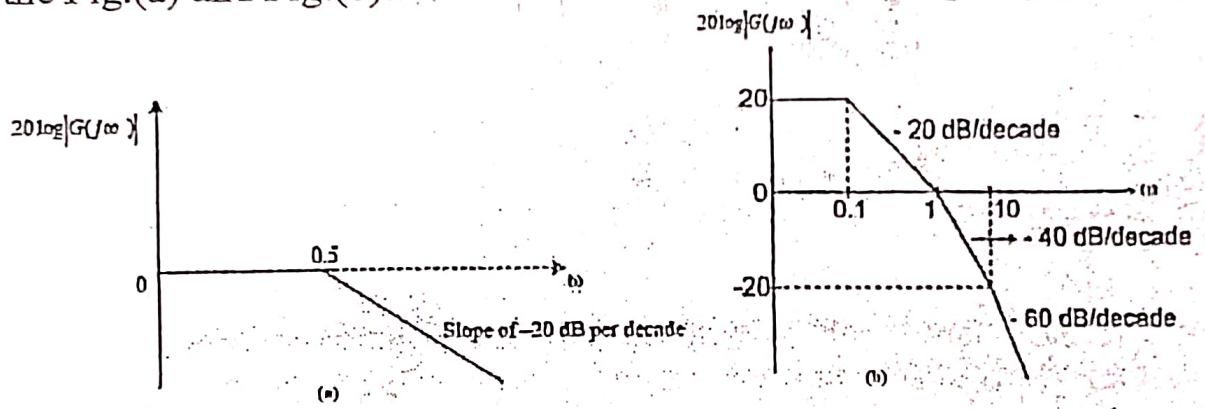
Q7. Construct the Bode Plots for a unity feedback control systems having open loop transfer function:

$$G(s)H(s) = \frac{2000}{s(s+1)(s+100)}$$

From the Bode Plots determine (i) the Gain Cross over and Phase Cross over frequencies, Gain and Phase Margins, and (ii) comment on the stability of the system. [2+2+1] [CO6]

OR

Find the open loop transfer functions from the Bode Plots shown in the Fig.(a) and Fig.(b). [2+3] [CO6]



Q8. Draw and explain the root locus on a graph paper for the open loop transfer function, $G(s)H(s) = \frac{K(s+2)(s+3)}{(s+1)(s-1)}$ [5] [CO6]

OR

Define the Nyquist stability Criterion, and examine the system stability by plotting the Nyquist plot for the open loop transfer function given by $G(s)H(s) = \frac{K}{s(s+1)(s+2)}$. Find the range of 'K' values for stability. [1+3+1] [CO6]

- *End* -

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Total no. of Pages:2 Roll no.....

IV SEMESTER B.Tech(EE)

END TERM EXAMINATION May-2024

EE208 ASYNCHRONOUS AND SYNCHRONOUS MACHINES

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

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

Q.1 Two alternators operating in parallel are supplying a combination of loads. (i) Lighting load of 0.5 Mw at unity pf (ii) 1 MW at 0.9 pf lag (iii) 0.5 MW at 0.9 pf lead (iv) 0.8 Mw at 0.8 pf lag. One alternator is supplying 1.5 MW at 0.95 pf lag. Calculate the load on another alternator. [4][CO2]

Q.2 A 6.6 kV, 50 Hz star connected, 3 phase synchronous motor draws a line current of 50A (0.85 pf lag). The effective resistance and leakage reactance per phase of the motor armature is 0.4 ohm and 9 ohm respectively. Calculate: (i) Electrical power input to the motor (ii) Induced emf (iii) Mechanical power developed internally. [4][CO2]

Q.3 A 6600V, 1200kVA, 3 phase alternator is delivering full load at 0.8 pf lagging. Its reactance is 25% and resistance can be neglected. By changing excitation; the emf is increased by 30 % at this load. Calculate the new values of current and power factor. The machine is connected to infinite bus bar. [4][CO2]

Q.4 A 110kW, 2200V, 50 Hz, 8 Pole, star connected 3 phase induction motor has a star connected slip ring rotor with transformation ratio of 3.5 (stator/rotor). The rotor has a resistance of 0.15 ohm/phase and a leakage inductance of 5 mH/phase. The stator impedance may be neglected. Calculate (i) the starting current (line current) and the starting torque on rated voltage with short circuited slip rings (ii) the external resistance required in rotor circuit per phase to reduce the rated voltage starting current to 27 A and corresponding starting torque. [4][CO1]

Q.5 A 4 pole, 3 phase, 50 Hz induction motor has a star connected wound rotor with a rotor resistance of 0.35 ohm per phase and a rotor reactance of 2.5 ohm per phase. Calculate: (i) speed corresponding to maximum torque (ii) ratio of starting torque to maximum torque (iii) external resistance required per phase in rotor circuit so that the starting torque is one third of the maximum torque. [4][CO1]

Q.6 A 230V, 50 Hz, single phase induction motor has following parameters: R_{1m}=2.5 ohm, X_{1m}=4.6 ohm, X_m= 150 ohm, R'_2=7.8 ohm, X'_2= 4.6 ohm. Determine the main winding current and power factor, when the motor is running at 1425 rpm. [4][CO1]

Q.7 Derive the power flow equation for a salient pole 3 phase synchronous machine with the help of a suitable phasor diagram and hence draw the power vs load angle curve for the same. [4][CO2]

Q.8 Discuss the effect of varying excitation on a 3 phase synchronous motor and working of a 3 phase synchronous motor with under excitation, normal excitation and over excitation. What is the condition of the power factor of the current drawn from the supply in each case? [4][CO2]

Q.9 Explain the constructional details and working principle of single phase reluctance motor. [4][CO4]

Q.10 Explain briefly with suitable diagrams the methods of speed control of three phase induction motors. [4][CO1]

Q.11 What is the principle of operation of a 3 phase induction motor? Explain analytically or graphically how a rotating magnetic field is produced in a 3 phase induction motor. [4][CO1]

Q.12 Write short notes on any two of the following

(i)Synchronous condenser

(ii) Hunting in synchronous machines

(iii) Capacitor start single phase induction motor [4][CO2]

Total no. of Pages: 02 Roll No. 236

IV SEMESTER **B.Tech (Electronics & Communication Engineering)**

END TERM EXAMINATION *May-2024*

EE262 Electromagnetic

Time: 03 Hours *Max. Marks: 50*

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

Q.1[a] Write Final form of Maxwell's equation for time varying field in integral and point form. Derive continuity equation of current and prove that introducing charge at some interior point of the material there is a decay of volume charge density ρ_v. [5][CO2]

[b] The Electric field component of a plane wave in non-magnetic medium is given by $\vec{E} = 25\,sin\,(2\pi * 10^8 t - 5x)\hat{a}_y\,V/m$. Calculate:

(i) Permittivity of the medium
(ii) Direction of wave propagation
(iii) Magnetic field
(iv) Speed of the wave
(v) Phase difference between E and H [5][CO2]

Q.2[a] Define loss tangent of a medium. A manufacturer produces a ferrite material with $\mu = 750\mu_0, \epsilon = 5\epsilon_0\ and\ \sigma = 10^{-6}S/m$ at 10 MHz. Give answer of following:

(i) Would you classify material as lossless, lossy or conducting?
(ii) Calculate $\beta\ and\ \lambda$
(iii) Intrinsic impedance [5][CO2]

[b] State Poynting Theorem. In a medium, $H = 30\,cos\,(2\pi * 10^8 t - 6x)\,\hat{a}_y, mA/m$ (with $\mu_r = 1$). Calculate: [5][CO3]

(i) The intrinsic impedance
(ii) The Poynting vector
(iii) The time-average power crossing the surface 50 cm^2 of plane $x + 2y - 4$

Q.3[a] Derive formulas of reflection coefficient and transmission coefficient for oblique incidence of parallel polarized wave. Calculate **Brewster angle** for ($\varepsilon_{r1} = 1$, $\mu_{r1} = 5$) and ($\varepsilon_{r2} = 3$, $\mu_{r2} = 2$). [6][CO3]

[b] Calculate the dimensions of an air filled rectangular waveguide for which the cut-off frequencies for TM_{11} and TE_{03} modes are both equal to 12 GHz. [4][CO4]

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Q.8 Summarize and tabulate the steady state errors for type-0, type-1 and type-2 systems when they are subjected to various inputs namely, step input, ramp input and acceleration input. [4][CO3]

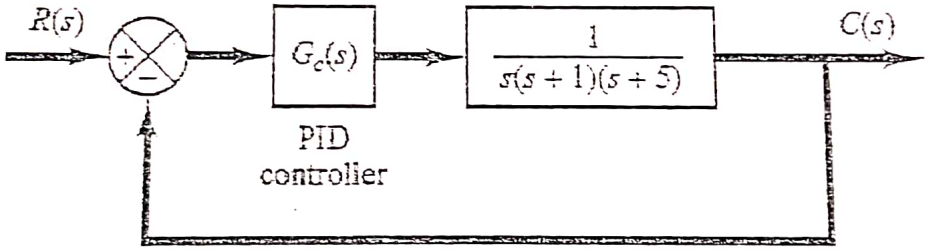
Q.9 What are the basic elements of measurement system and give classification of measuring instruments. [4][CO1]

Q.10 Draw the Bode plot for $G(s) = \frac{7.5}{jw(\frac{jw}{2}+1)}$ transfer function. [4][CO4]

Q.11 Draw the root locus for the system having transfer function as $G(s)$ and negative feedback as $H(s)$. [4][CO3]

Given $G(s) = \frac{K}{s(s+1)(s+2)}$ and $H(s) = 1$

Q.12 Consider the system shown below in which a PID controller is used to control the system. The PID controller has the transfer function as $G_c(s) = K_p\left(1 + \frac{1}{T_i s} + T_d s\right)$. Apply Ziegler-Nichols tuning method and determine the parameters of the controller. [4][CO4]



Q.13 Explain about open loop and closed loop control system with examples. [4][CO2]

Q.14 Name different tuning methods available for PID controller and explain. [4][CO4]

Total Number of Pages 3. Roll No.....

B.Tech. Electrical Engineering *6th SEMESTER*

END SEMESTER EXAMINATION *(May 2024)*

EE-302-Electrical Drives

Time: 3:00 Hours ***Maximum Marks:40***

Note: Q1 and Q2 are compulsory.
Attempt other *three(3)* Questions from rest of the questions.
Assume suitable missing data, if any.
Attempt all parts of a question at one place. *(Marks may not be awarded otherwise)*

CO1, CO2, CO3, CO4, CO5

1 Giving reasons by explaining (*very briefly*), why?

(a) Overload factor for short duty is greater than that of intermittent duty loading.

(b) Fan or pump loads can be catered for speed changes with voltage control of induction machines.

(c) Chopper controlled DC drive operates in I and II quadrant, while thyristorized full converter controlled DC drive operates in I and IV quadrant.

(d) Starting time of induction motor at no load hovers around 22% above the value of the mechanical time constant of the motor.

(e) The DC side resistance of the diode rectifier becomes half for each phase, when transformed to three phase AC side.

(f) Vector control induction motor drive exhibit faster dynamics as compared to scalar control induction motor drive.

(g) Slip energy recovery control is limited to small region near synchronous speed. 1x7

CO3, CO4, CO5

2 Write short notes on any *THREE* of the following.

[a] Concept of Field orientation and development of relation between slip speed and current for Vector Control of Induction Motor. Draw suitable diagrams/phasor diagram/equivalent circuits/etc to support the answer.

[b] Braking schemes for induction motors identifying their suitability of operation during both low and high speeds. Support the answer with analysis and neat diagrams.

[c] Derive the relationship between speed and current considering first order model for starting of separately excited DC motor with armature control.

[d] Obtain the transfer function of the separately excited DC motor for speed control with current feedback loop. Support the answer with analysis and neat block diagrams. 3x3

CO-2

3 [a] An 8-pole, 50-Hz induction motor coupled to a flywheel drives a load which requires a torque T_0 = 100 Nm when running light. For an intermittent period of 8 seconds, a pulse load rising instantaneously to 500 Nm is to be supplied.

What must be the combined inertia of the system such that the peak motor torque does not exceed 400 Nm? The motor characteristic may be taken as linear and giving a torque of 350 Nm at a slip of 5%. 2

[b] A motor has a continuous rating of 100kW. The heating and cooling time constants are 50 and 70 respectively. The motor has a maximum efficiency at 80% full load and is employed in an intermittent periodic load cycle consisting of a load period of 10min followed by a no load period of 10min. Calculate the value of the load tackled in kW during the load period. 2

[c] A 440V, 50 Hz, 4 pole, 1420rpm, delta connected squirrel cage induction motor has following parameters: r_s=0.35Ω; r_r'=0.4 Ω; x_s=0.7Ω; x_r'=0.8 Ω; Motor is fed from a VSI and is operated with a constant *V/f* control up to 50Hz and at rated voltage with variable frequency above 50Hz. Calculate:

(i) Breakdown torque for motoring operation at 75Hz

(ii) Frequency and stator current for motoring operation at 950rpm at full rated torque. 4

4 [a] A 400V, Y connected, 3 phase, 6 pole, 50Hz, WRIM has following parameters: r_s=0.35Ω; r_r'=0.4 Ω; x_s=0.7Ω; x_r'=0.8 Ω; stator/rotor(turns ratio)=2:3; The motor is to be braked by plugging. If static rotor resistance control is employed on the rotor side calculate the duty cycle so that the maximum braking current is limited to 1.5 times full load current. External resistance on DC side of rectifier is chosen such that the breakdown torque is produced at standstill for the duty ratio of zero. Assume 5% slip. 4

[b] A 440V, 3ph, 50 Hz, 4 pole, Y connected WRIM has following parameters referred to stator: r_s=1.9Ω; r_r'=4.575 Ω; x_s=x_r'=3.01 Ω; J=10 Kg-m^2 For a magnetising current of 6A, which corresponds to generated emf (E) of 260V with two lead connection. Calculate the torque and speed for the specified magnetising current, when DC dynamic braking is employed and I_d=12A is drawn from the DC source. 4

5 [a] A DC motor has an armature resistance of 0.5Ω, and motor constant ($K\varphi$) of 3V sec. The motor is driven by 1 ph thyristorised full-wave AC-DC converter. The input to the converter is an AC source of 277V. The drive is used for a forklift. In upward direction, the mechanical load is 100Nm, and firing angle is 20°. In downward direction, the load torque is 200Nm. Calculate the firing angle required to keep the downward speed equal in magnitude to the upward speed. Assume continuous motor current. If operator during upward motion changes the firing angle to keep the motor at holding position, calculate the changed firing angle. 4

[b] A three phase, 440 V, 6 pole, 970 rpm, Y connected, wound rotor induction motor (WRIM) has following parameters referred to stator:

r_1=0.2Ω; r_2'=0.15 Ω; x_1=x_2'=0.4 Ω; stator to rotor turns ratio=3.5

The speed is controlled by static chopper in the rotor circuit. The drive is designed for a speed range of 30% below synchronous speed. The maximum value of firing angle is 170°. Calculate:

(i) Torque for a speed of 750 rpm and $\alpha=140°$

(ii) Firing angle for half the rated torque and speed of 850rpm 4

6 [a] A DC separately excited motor has the following parameters:

$K\phi=3$ V-sec; $R_a=1\ \Omega$; $L_a=10$mH, $V_{rated}=600$V.

The connected load to motor shaft is 20Nm. Total moment of inertia of the drive system is 6Nm sec^2. The rated motor terminal voltage is at 600V. the field remain constant. Neglect the viscous friction. Assume the steady state operating point corresponding to 95% of the final value, constant field and constant load torque. The motor operates at a steady state speed when motor terminal voltage is 500V. Calculate the terminal voltage that stops the motor and keep it holding. Also calculate the time of stopping(5% of initial speed) 4

CO4

[b] A 400V, 50kW, 6 pole, 960rpm, 50 Hz, 3phase, WRIM has following parameters of the machine:

$r_1=0.08\Omega$; $r_2'=0.1\ \Omega$; $x_1=x_2'=0.3\ \Omega$.;The inertia of the motor is 10kg-m^2. The motor is to be stopped from no-load speed by plugging.

Compute the value of the external resistance to be inserted in the rotor circuit so that the braking time is minimum. Also calculate the braking time and energy loss in the motor. 4

CO5

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Total No. of Pages: D.2 Roll No.

SIXTH SEMESTER B.TECH. ELECTRICAL ENGINEERING

END SEMESTER EXAMINATION (May, 2024)

EE-304, POWER SYSTEM ANALYSIS

Time: 3.00 Hours Max. Marks: 40

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

1. (a) What are the different types of buses in power system? Give their significance. 2

   (b) Line admittances of a 4-bus system are as below: 6

Bus code:	1-2	1-3	2-3	2-4	3-4
Admittance:	2-j8	1-j4	0.67-j2.66	1-j4	2-j8

Active and reactive power schedule at various buses is as :

Bus code	P	Q	V	Bus specification
1	---	---	1.06<0	Slack
2	0.5	0.2	Not specified	PQ
3	0.4	0.3	Not specified	PQ
4	0.3	0.1	Not specified	PQ

Form Bus Admittance Matrix (Y_{bus}). Compute voltages at buses 2 and 3 at the end of first iteration using G-S method.

2. (a) What do you understand by Economic load dispatch? Describe various types of system constraints to be considered for successful operation of power system. 4

   (b) The fuel input per hour of plant 1 and 2 are given as:

   $F_1 = 0.20P_1^2 + 40P_1 + 120$ Rs. Per hr.

   $F_2 = 0.25P_2^2 + 30P_2 + 150$ Rs. Per Hr

   Determine the economic operatiing schedule and the corresponding cost of generation if The maximum and the minimum loading on each unit are 100 MW and 25 MW. The demand is 180MW and transmission losses are neglected. If load is equally shared by both units determine the saving obtained by loading the units as per as per equal incremental production cost. 4

3. (a) What are the different types of faults occurring in power system? Discuss the various causes and consequences of a short circuit fault. How do we limit the fault current? 4

   (b) A single phase transmission line operating at 33 kV and a resistance and reactance of 5 ohm and 20 ohm respectively is connected to the generating station through a 5000kVA step up transformer which has reactance of 6%. Connected to the bus bars are two alternators, one 10000 kVA having 10% reactance and another 5000kVA having 7.5% reactance. Calculate kVA at the short circuit fault between phases occurring (a) at the high voltage terminal of the transformer (b) at the load end of the transmission line. 4

4. (a) Derive the necessary equations for calculating the fault current and the bus voltages for a single line to ground fault. 6

   (b) The line currents in a 3 ph system are $I_a = 5/60^0$, $I_b = 5/-60^\circ$, $I_c = 0$. Find the symmetrical components. 2

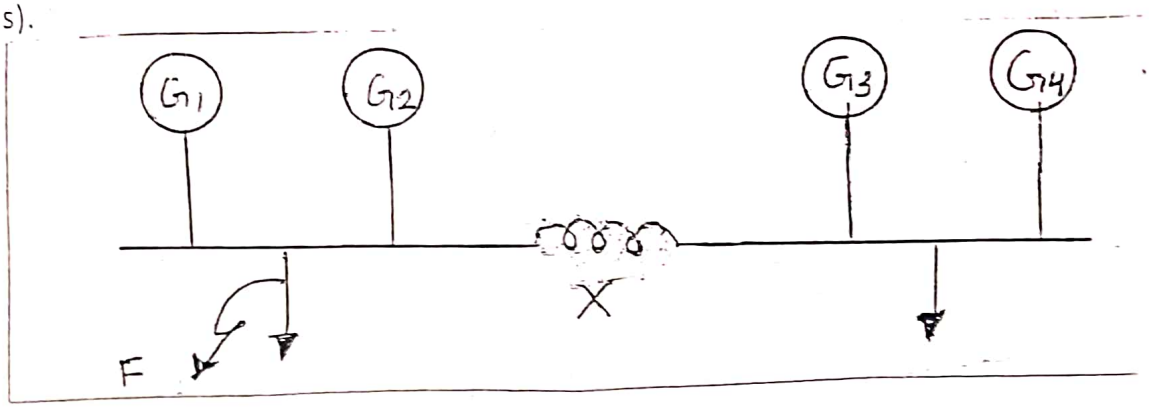
5. (a) What is protective relay? Explain the functional requirement for a protective relay 4

   (b) Explain how the arc is produced between the circuit breaker contacts. How is the arc extinguished? 4

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6. (a) Discuss why do we use reactors in a power system. Explain their constructional features and types with reference to their location in the power system. 4

(b) The following fig. Shows a system having 4 alternators each rated at 11kV, 50 MVA and each having a sub-transient reactance of 15%. Find (a) fault level for a fault on one of the feeders (near the bus) with zero value of reactance X, (b) the reactance of the current limiting reactor X to limit the fault level to 800MVA for a fault on one of the feeders (near the bus). 4



7. Write short notes on any two of the following: 2 X 4

A. Formation of Jacobien matrix.
B. Primary and backup protection
C. Formation of Z_{bus} Matrix

Total No of pages:3

Roll No:_____

SIXTH SEMESTER

B.TECH(EE)

END TERM EXAMINATION

MAY-2024

EE-306 MICROPROCESSORS AND MICROCONTROLLERS APPLICATIONS

TIME:3HRS

MAX. MARKS:40

NOTE: *ATTEMPT ANY FIVE QUESTIONS*

1(a) Design a 8085 memory interface circuit to map the memory. You are provided with two number of 4K X 8 bit RAM memory and one 8K X 8 bit ROM memory . The starting address of ROM memory should be 0000H and the last address of second RAM memory should be FFFFH. Address of both RAM ICs should be in continuous. **4[CO2]**

(b) For Fig.1 find the output port address and write the instruction to display "48" at common anode seven segment LED port. **4[CO2]**

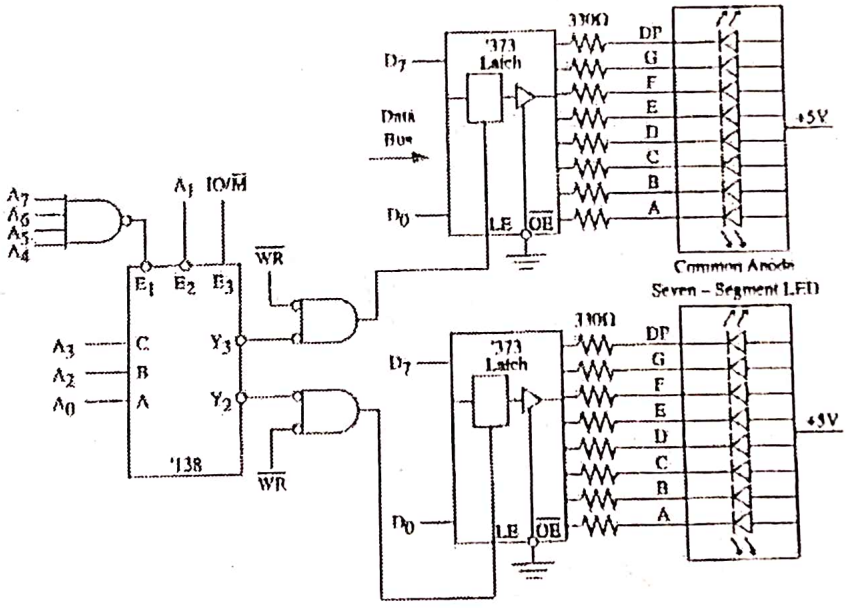


Fig-1

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2(a) Write an assembly language program to find the number of negative numbers in a block of data. The length of block is in memory location 2200H and itself begins in memory location 2201H. Store the number of negative elements in memor location 2300H **4[CO3]**

(b) Draw timing diagram for the instruction STA 2650H **4[CO1]**

3(a) Write a program to generate a square wave with period of 400μs. Use bit D_0 to output the square wave. **4[CO3]**

(b) What do you mean by Vectored interrupts. Draw interrupt structure of 8085 indicating vector locations of all hardware and software interrupts. Why INTR is not a vectored interrupt? **4[CO1]**

4(a) Explain control word of programmable interval Timer 8254. Explain with waveform the Mode 3 (Square wave generator) operation of 8254. **4[CO5]**

(b) Draw interfacing diagram of DMA Controller 8237 with microprocessor. Also explain the process of data transfer from peripheral to system memory under master mode. **4[CO5]**

5(a) Explain different modes of operation of PPI 8255. **4[CO4]**

(b) A user has to take input from PORT A of the 8255 PPI IC. The second input is to be taken from PORT B. With the help of 8085 microprocessor, add both inputs and output the sum on a display connected at port C. Also draw the complete interfacing diagram, identify the address of different PORTS and determine the control word for the same. **4[CO4]**

6(a) Write a program for checking the key debouncing phenomenon in interfacing of keyboard with microprocessor. Also write a program to detect pressed key in a matrix keyboard interface. **4[CO5]**

(b) With the help of block diagram explain keyboard dinterfacing IC 8279. **4[CO5]**

7(a) Draw 8085 microprocessor based interfacing circuit to measure the Strain. Write the instruction to display the value of strain to PORT A of 8255. **4[CO4]**

(b) Draw 8085 microprocessor based interfacing circuit to measure phase angle between voltage and current waveforms of inductive load. Write the instruction to display the value of phase angle at PORT B of 8255. **4[CO4]**

8 Write short notes on any two of the following: **[4,4]**

(a) 8051 microcontroller **[CO5]**

(b) Programmable Interrupt Controller 8259 **[CO5]**

(c) Universal Synchronous Asynchronous Receiver Transmitter 8251 **[CO5]**

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VI/VIII B.Tech.

End-Term Examination **MAY–2024**

EE 316 ELECTRICAL ENERGY STORAGE SYSTEMS

Time: 3:0 Hours *Max. Marks: 50*

Note: ***Question 01 is compulsory***. Answer ***any four*** from the remaining questions. Assume suitable missing data, if any.

CO1

Q.No.1.

(a) What is memory effect? Which type of battery is majorly affected due to this? [1]

(b) Write the electrochemical reactions relating to flow of current and the products that are formed during discharging and recharging of Pb-acid battery cell. [1]

(c) Arrange the specific power density values of PEM fuel-cells, supercapacitors, Lithium-ion battery and lead acid battery in ascending order. [1]

(d) State Peukert's formula for discharge of a battery. Also find the battery capacity and discharge time of a $12V$, $100Ah$ battery, which discharges at the rate of $10A$ (Assume Peukert's number as 1.2). [1]

(e) If an Electric vehicle draws $30kW$ power from a battery of $15kWh$, find the C rate of battery. Also find the time required to charge the battery at 0.2 C rate. [2]

(f) The energy capacity of a battery employed in an electric vehicle is $20kWh$, and is discharged during its 1hour travel from 100% SoC to 20% SoC. The battery is realized with 109 lithium–polymer cells, the cell voltage, ampere hour capacity and internal resistance are $3.7V$, $50Ah$ and $0.7m\Omega$ respectively. [2]

(i) Calculate the average discharge current of the battery during the 1hour travel.

(ii) Calculate the internal battery losses during this travel.

(g) A flywheel is driven by a $20kW$ Electric motor / generator and its rotational speed is $3000rpm$. If the moment of inertia of the system is $175\ kgm^2$, find: - [2]

(i) the stored energy in the flywheel.

(ii) the energy released when the speed reduces to $2000rpm$.

Q.No.2 CO2

(a) Describe the construction and basic principle of Vanadium Redox flow battery with a neat diagram and relevant electrochemical equations. [5]

(b) Explain the present status and potential of Metal Air batteries. Describe the construction and working principle of Zinc air battery. [5]

Q.No.3. CO3

(a) Explain the basic operating principle of hydrogen fuel cell with a neat diagram and also elaborate the important issues in fuel cells. [5]

(b) Draw the equivalent circuit model of a super-capacitor and derive an expression for the dynamic capacitor voltage across the capacitor connected to a DC-DC converter. [5]

Q.No.4. CO4

(a) Explain the working and construction of a flywheel employed as a EESS for EV applications. What are the technological challenges associated with its use in vehicular application? [5]

(b) Explain the various components of a Super conducting Magnetic Energy Storage System. State the important technological advancement required for its wide acceptance. [5]

Q.No.5. CO5

(a) Briefly explain the important features of BMS design. [5]

(b) Explain the mechanism of passive and active cell balancing with relevant electrical circuits. [5]

Q.No.6. CO6

(a) Discuss the various battery charging methods. [5]

(b) List the various models used for battery analysis. Explain the equivalent circuit model used for modelling of battery. [5]

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

6th SEMESTER B.Tech. (EE)

END TERM EXAMINATION *May-2024*

EE308 POWER SYSTEM OPERATION and CONTROL

Time: 3 hrs. Max. Marks: 40

Note: Attempt FIVE questions in all. Q. No.1 is compulsory. Attempt any four questions from the remaining questions. All questions carry equal marks. Assume suitable missing data if any.

Q.1 Explain the following in brief:

i) Why the Transient stability limit is lower than Steady state stability limit? (CO2)

ii) How the Area Control Error (ACE) of a multi area system is different from that of single area system? (CO4)

iii) Why the supplementary control is added to the LFC of power system? (CO3,4)

iv)Surge Impedance Loading (SIL) of a transmission line results in flat voltage profile of the line. (CO5)

v) Static VAR System (SVS) helps in active and reactive power control of power system. (CO5)

vi) Frequency of the power system should be strictly kept in limits. (CO3)

vii) A power system draws leading VARs during off peak hours. (CO5)

viii) Undamped natural frequency of oscillations in a power system subjected to a small disturbance. (CO1) **[1x8]**

Q.2 (a) Discuss the application of Equal Area Criterion for system stability when

i) Sudden increase in load takes place.

ii) A short circuit on one of the parallel feeders takes place which is cleared after some time. (CO2) **[4]**

(b) A 60 Hz generator is delivering 50% of maximum power through a transmission system to an infinite bus. A fault occurs and causes transfer reactance to increase to 400% of the value before fault. When fault is isolated maximum power transfer is 75% of original maximum value. Find the critical clearing angle. (CO2) **[4]**

Q.3 (a) Explain the operation of turbine speed governing system with a neat diagram. Also discuss its Droop characteristics. (CO3) **[4]**

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(b) Two alternators of ratings 100 MW and 200 MW are feeding a system. The frequency is 50 Hz and each of the generator is running at half load. The system load increases by 75 MW. Find the value of R for each unit so that they may share a load in proportion to their ratings. Assume that as a result of the load increase the frequency drops to 49.75 Hz. (CO3)[4]

Q.4 (a) Draw a block diagram showing LFC and voltage control loops in a power system. Explain why the two loops operate independent of each other. (CO3)[4]

(b) A single area system has the following data:

Time constant of governor : 0.2 sec; Time constant of turbine : 2 sec
H= 5 sec. ; R = 4% (Hz/p.u. MW)
Load changes by 1% for 1% change in frequency. The rated capacity is 1500 MW and f= 50 Hz. Find

i) An equation expressing $\Delta F(s)$ in terms of step change in load and various system parameters.
ii) The largest step change in load if frequency is not to change by more than 1% in steady state if integral controller is not used.
iii) Static frequency change if integral controller is used. (CO3) [4]

Q.5 (a) Why do power systems operate in an interconnected arrangement? Derive the expression for change in frequency and change in tie line power for step change in loads of control areas 1 and 2. (CO4) [4]

(b) A two system has the following data:

Area A : Rated capacity : 500 MW,
Speed regulation : 2.5 Hz/p.u. MW
Area B : Rated capacity : 2000 MW,
Speed regulation : 2 Hz/p.u. MW

In each area 1% change in load occurs for 1% change in frequency. Find the steady state change in frequency and change in tie line power if 20 MW change in load occurs in (i) Area A only (ii) Area B only. (CO4) [4]

Q.6 (a) Show that the voltage difference between two nodes in a network is proportional to the reactive power. Discuss any two methods of voltage control. (CO5) [4]

(b) Determine the transformer tap ratios when the receiving end voltage is equal to the sending end voltage, the high voltage line operates at 230 kV and transmits 80 MW at 0.8 pf and the impedance of the line is (40+j150) ohms. Assume $t_s t_r = 1$. (CO5) [4]

Q.7 (a) Draw the complete block diagram with transfer functions for LFC of two area control system. (CO4) [4]

(b) A 5000 MW area A is interconnected with a 10000 MW area B. The parameters of each based on its own ratings are:

$R = 2.5$ Hz / p.u. MW

$B = 0.01$ p.u. MW/ Hz

Area B experiences a load increase of 120 MW. Find the static frequency drop and the change in tie line power. (CO4) [4]

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Total no. of Pages: 04 *Roll no.....*

Sixth Semester
B.Tech.

End Term Examination **May-2024**

EE324 DESIGN, ESTIMATION & COSTING OF INDUSTRIAL ELECTRICAL SYSTEMS

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

Note: Attempt all questions.
Assume suitable missing data, if any.
Use colour pens for illustrations / wiring diagrams

Q.1[a] Explain the term Class-I and Class-II equipment. [1][CO2]

[b] Explain the difference between IS:732 and IS:2274. [1][CO2]

[c] Declared standard single phase and three phase distribution voltage in Delhi? [1][CO1]

[d] Draw the standard symbols for *group of five 40 W lamps*, *socket outlet 15 A*, *ceiling-mounted lamp*, and *main fuse-board with switches for power circuit.* [2] [CO1]

Q.2(a) Explain colour coding used in 3-phase 4 wire system with earthing. Draw a simple diagram showing single phase installation having separate energy-meters for light and power loads. [3][CO3]

Q.2[b] Explain the term "service connection" as applied to residential installations. Explain the terms "grid" and "public lamp" as specified in Indian Electricity Act, 2003. [2][CO2]

Q.3 A two-BHK dwelling unit is to be provided with electric wiring. The load requirements are as follows:

Location	Light points	Fan Points	5A Socket outlet	15A Socket outlet	AC *	Door bell
Bedroom 1	2	1	1	1	1 Ton	---

Bedroom 2	2	1	1	1	1 Ton	----
Drawing room	3	2	1	1	1.5 ton	1
Kitchen	1	1 (Exhaust)	1	1		----
Toilet (2 No.'s)	1	1 (fresh air fan)	1	----		----
Balcony (1 No.)	1	1	1	----		----
Front corridor	1	-----	----	----		----

*Each AC can be supplied from the power circuit. Suitable considerations to be taken. 3-star rated 1 ton AC consumes 1174 W and 1.5 ton consumes 1761 W.

Decide the number of sub-circuits required for the above installation as per Indian Electricity rule.

Show the details of connection diagram of the distribution board.

Design the switch board for the drawing-dining room. Relevant dimensions are given in the figure at the last. [5][CO3 & 4]

Q.4 For Q3 above, sketch the plan of the above flat showing the position of various electrical points. A sample plan is given below. Modify and redraw the same to accommodate all locations given in above table in Q4. Assume the toilets to be of 1.5m x 2.1 m each, kitchen of 2m x 3m. internal corridor can be assumed for sake of symmetry.

Assuming floor to ceiling height as 3 m, DB at a height of 1.5 m from ground, SB at 1.3 m from ground, height of batten and light brackets at 0.5 m from the ceiling, 15 A socket at 0.2 m from the ground, find the length of the wiring required. Also determine the size of various copper conductors required along with proposed wiring diagram. Take appropriate allowances for wastage of conductors and earth wire. Use conduit wiring.

Prepare the broad schedule of material required. Small consumables can be left out. No costing to de done for the material. Determine the labour cost only, assuming the daily labour rate of Rs. 750/- and Rs. 650/- for wireman and helper respectively.

[10] [CO4 & 5]

Q.5 [a] Explain various classes of insulation, and motors based on temperature and current rating as applicable. [4] [CO5]

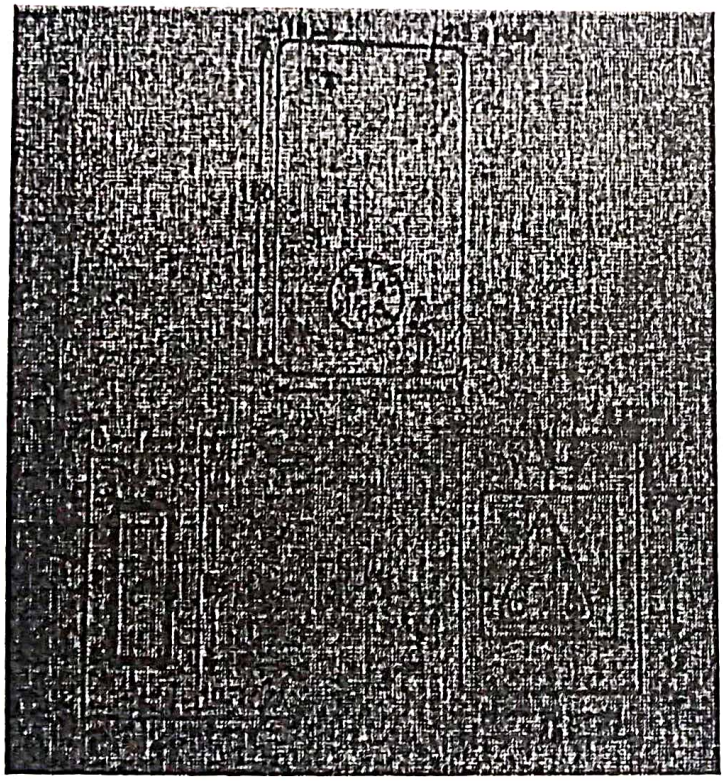
[b] Explain the broad features of NBC 2016. What is covered in vol 1 and 2. [3] [CO1, 2, 3, 4]

Q. 6 Enlist the various types of materials used in HT or LT overhead distribution line. What are the essential accessories required for conductor installation. [4] [CO7]

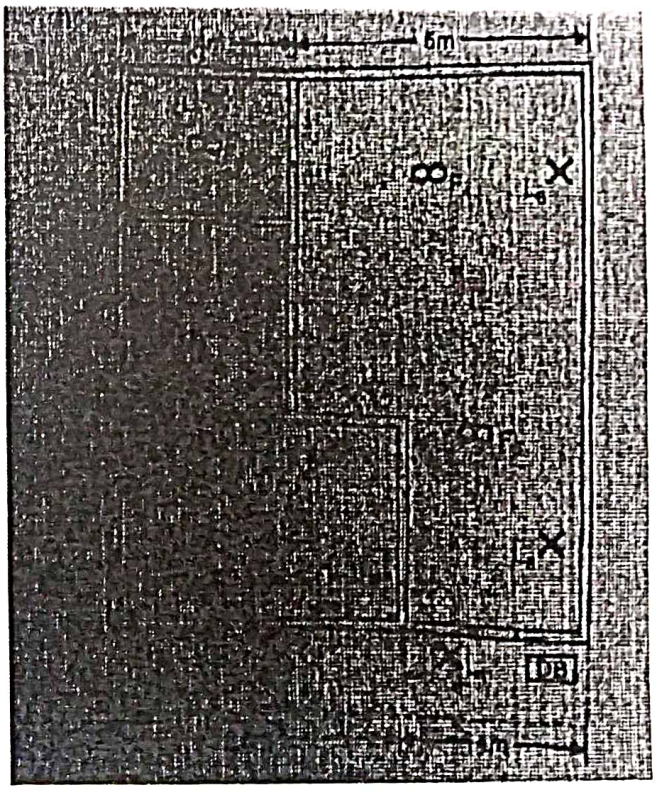
Q.7 Prepare an estimate of material and quantity for providing an overhead industrial service connection to a flour mill of 25 HP. The flour mill is located at 100 meters from the nearest pole. A 3-phase 4 wire 400/230 V supply is to be provided. The connection is to be provided up to the energy meter. Draw the sketch also. [4] [CO6]

Q.8 [a] Enlist the various types of substations. Explain the layout of indoor substation with the help of single line diagram and typical layout. [5] [CO8]

[b] Estimate the main material requirement for a 1100 m, 415/230 V three-phase line with four wires in vertical configuration. The lines emanate from a substation to feed a load of 50 kW. Take the span between the two poles as 50 m. The conductor used is ACSR 6/1 x 2.59 mm. [5] [CO7]



Dimensions of tumbler switch,
5 A socket and Fan regulator



Sample Plan of a 2 BHK flat.
Redraw as per the question description.

TABLE 4.1: Current ratings of copper conductor single core cables (VIR, PVC or polythene insulated including tough rubber, PVC or lead sheathed)

Size of Conductor		*Two cables d.c. or single-phase a.c.*		*Three or Four cables balanced three-phase a.c.*	
Nominal area (mm^2)	*Number and dia of wire (mm)*	*Current rating (amps.)*	*Approximate length of run for one volt drop (m)*	*Current ratings (amps.)*	*Approximate length of run for one volt drop (m)*
1.0	1/1.12	5	4.9	5	5.8
1.5	3/.737	10	3.0	10	3.7
2.5	3/1.06	15	3.4	13	4.3
4.0	7/.737	20	3.7	15	5.8

Total no. of Pages:02

2541

Roll no.....

6th/8thst SEMESTER **B.Tech.**

END TERM EXAMINATION *May-2024*

COURSE CODE: EE446

COURSE TITLE: Data Communication and Computer Networks

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

Note : First question is compulsory.
Answer any FIVE questions from the remaining.
Three marks question should not exceed 2 pages.
2 marks question should not exceed 1 page.
Assume suitable missing data, if any.

Q.1 Answer the following short questions. [2×10] [CO1-CO7]

(i) What is the basic difference between baseband transmission and broadband transmission?
(ii) State the different types of WANs.
(iii) Obtain the encoded sequence for *00,01,10,11* using 2B/3B coding.
(iv) How is analog data converted to digital data using Delta Modulation?
(v) What is the significance of Guard Bands in FDM?
(vi) Why are escape characters (ESC) introduced while framing of data?
(vii) Write the simple parity-check codewords for *0000, 0001, 0011, 1011.*
(viii) Calculate the Hamming distance needed for 2-bit error correction?
(ix) What does ALOHA stand for? What does its protocol say?
(x) How is Slotted ALOHA better than pure ALOHA?

[3+3] [CO1,2]

Q.2

(i) We have a channel with a 1-MHz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal level?

(ii) What are the different wired mediums used for data communication?

[3+3] [CO2]

Q.3

(i) How does data travel in a packet switched network?

(ii) Explain how sliding window protocol is different from stop-and-wait protocol?

[3+3] [CO3]

Q.4

(i) Obtain the CRC code if x^3+1 is the dataword, and x^3+x+1 is the divisor.

(ii) A receiver receives data as 1111010. Check and correct (if any) the data using Hamming Code.

[3+3] [CO3,4]

Q.5

(i) Explain how Controlled Access can be provided to multiple users sharing a common medium.

(ii) What are the different types of addresses used in computer networks? State with example.

[3+3] [CO4,5]

Q.6

(i) Juxtapose the features of IPv4 and IPv6 network addresses.

(ii) Discuss the different services offered by Network, Transport and Application Layer.

[3+3] [CO6,7]

Q.7

(i) State any six client-server application layer protocols.

(ii) What do you understand by security in computer networks?

Total no. of Pages 04 *Roll no.....*

VI & VIII Semester
B.TECH

END TERM EXAMINATION **May-2024**

EE 448 Big Data Analytics

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

Note: All the questions are compulsory.

Q1) Write the correct answer and justify: **[10] [CO 1,2,3,4,5]**

(i) What is the output of the following Python code snippet? **"print(8 // 3)"**

A.) 2.67 B.) 2 C.) 3 D.) Syntax Error

(ii) Which of the following is a correct variable assignment in Python?

A.) '2variable = Big' B.) 'variable_name = "Data"'

C.) '@var = "Analytics' D.) 'None = 448'

(iii) What data type is **test_elements** in this given Python code:

test_elements = [448, 17, 'BDA', 2024]

A.) Array B.) Dictionary C.) List D.) Tuple

(iv) In a diagnostic test in mathematics given to students, the following marks (out of 100) are recorded: 46, 52, 48, 11, 41, 62, 53, 54, 96, 40, 98, 44. Which average will be a good representative of the above data?

A.) Median B.) Mean C.) Both Mean and Median D.) NOTA

(v) Suppose you have trained a polynomial model $y(x) = w_0+w_1x+:::+w_M x^M$ via least-squares regression, and you find that it has a low training error, but a high testing error. Which of the following is likely to reduce the testing error?

A.) Dividing each of the learnt weights by 2.

B.) Increasing the number of training data points and re-training.

C.) Decreasing the number of training data points and re-training.

D.) Increasing M and re-training.

(vi) The probability of rejecting the null hypothesis when it is true is called

A.) Level of confidence

B.) Level of significance

C.) Power of the test

D.) None of these

(vii) If the critical region is located equally in both sides of the sampling distribution of test-statistics, the test is called

A.) One tailed

B.) Two tailed

C.) Right tailed

D.) Left tailed

(viii) If X follows the Normal distribution **N(0,16)** and **P(X < 1) = 0.84** then

P(|X| < 1) is _____.

(ix) If each value of a series is multiplied by **10**, the median of the new series is _____ the original median value.

(x) The algebraic sum of the deviations of the given set of observations from their arithmetic mean is _____.

Q2) A.) A clothing company produces men's jeans. The jeans are made and sold with either a regular cut or a boot cut. In an effort to estimate the proportion of their men's jeans market in Mumbai that prefers boot-cut jeans, the analyst takes a random sample of **212** jeans from the company's two Mumbai City retail outlets. Only **34** of the sales were for boot-cut jeans. Construct a **80%** confidence interval to estimate the proportion of the population in Mumbai City who prefer boot-cut jeans. **[*Refer Table*]** **[5] [CO3]**

B.) According to a report, the average cost of bariatric (weight loss) surgery is about Rs. 22,500. You think this information is incorrect. You randomly select 30 bariatric surgery patients and find that the average cost for their surgeries is about Rs. 21,545 with a standard deviation of Rs. 3015. Is there enough evidence to support your claim at $\alpha = 0.05$? Use a P- value. **[*Refer Table*]** **[5] [CO3]**

Q3) A.) In real-world data, tuples with missing values for some attributes are a common occurrence. Describe various methods for handling this problem. **[5] [CO4]**

B.) If X is continuous random variable, then find the median of the random variables with density function: [5] [CO1]

(I) $f(x) = e^{-x}, \quad x \geq 0,$

(II) $f(x) = 1, \quad 0 \leq x \leq 1.$

Q4) A.) Let Y contain M ground truth points in a linear regression problem. Let X be the augmented input data matrix and W be the weight parameter vector such that they follow Y = XW, then derive the analytical solution of "W" in terms X and Y? **[4] [CO5]**

B.) Suppose that you have **M = 21** training examples with **n = 4** features, then what are the dimensions of **W, X,** and ***Y***? Show the calculations. **[2] [CO5]**

C.) Run the Gradient Descent algorithm on the error function

$f(x, y) = 5 + x^2 + y^2 + 5xy$ with a starting guess $x^{(0)} = 1$, $y^{(0)} = 2$ and using step size of **0.1**. Output the next two guesses $(x^{(1)}, y^{(1)})$ **, and** $(x^{(2)}, y^{(2)})$. **[4] [CO5]**

Q5) A.) Why is feature normalization necessary in Machine Learning? Suggest some techniques? **[5] [CO4]**

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. **[5] [CO5]**

Reference: You may refer the following table (**Table 1- PTO**) for **Question 2.**

Total no. of Pages:2

Roll no..... 258

VI/VIII SEMESTER B.Tech.

END TERM EXAMINATION *May-2024*

EE 450 Cloud Computing Fundamentals

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

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

Q.1 (a) Which service model would best suit the needs of the software company for developing their web application without managing infrastructure? Justify your answer.

(b) Which service model would be most appropriate for the software development company looking to store large datasets securely in the cloud while maintaining full control over data access and management? Justify your answer.

(c) Which service model would be most suitable for a small business seeking to streamline its customer relationship management processes without the need for software development? Justify your answer.

(d) Which deployment model would best suit an organization operating in highly regulated industries such as finance, healthcare, and government, where strict compliance requirements regarding data security, privacy, and residency are paramount? Justify your answer.

(e) Mention any four essential characteristics of the cloud as per NIST. [2+2+2+2+2] [CO1]

Q.2 Describe the functionality of the following terms and their equivalent services in AWS: Hadoop, Virtual machine, Load Balancer, Clickstream Analysis, Content Delivery Network.

[2+2+2+2+2] [CO3, CO4]

Q.3 (a) What is an IP address? How do IPv4 and IPv6 differ in terms of the number of bits?

(b) What are the limitations of IPv4? How are these limitations addressed in IPv6?

(c) Define gateways and route tables. Explain the role of gateways and route tables in networking using an example.

[2+3+5] [CO2]

Q.4 (a) Explain about managed storage and unmanaged storage with respect to cloud services.

(b) Explain in detail about the internal functioning of file, block and object storage.

(c) Describe caching and dynamic acceleration with respect to CDN.

[2+6+2] [CO2]

Q.5 (a) What are the benefits of virtualization? Provide at least three.

(b) Define Hypervisor. Explain the fundamental internal components of hypervisor architecture with diagrams. How do these components interact to facilitate virtualization?

(c) Explain the Find-Bind-Execute paradigm in Service-Oriented Architecture (SOA). [3+4+3] [CO3, CO4]

Q. 6. (a) Mention the difference between a web page and a web service.

(b) Explain Distributed Denial of Service attacks by including the type of DDoS.

(c) Define data encryption and explain the three different states of data encryption.

(d) Define the following terms: IAM Group and IAM policy.

[2+3+3+2] [CO4, CO5]

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

SECOND SEMESTER B.Tech. (EP)

END SEMESTER EXAMINATION (May-2024)

EP-102 COMPUTATIONAL METHODS

Time: 3 Hours *Max. Marks: 50*

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

1. (a) What are the various source of errors? Explain the same by taking an example of pendulum motion. Derive the general formula to find out the maximum permissible error. [5] [CO # 2]

   (b) How Secant method is different from Method of False Position? Find out the expression of the n^{th} approximated root of a function $f(x) = 0$ using Secant Method with the help of properly labelled figure. [5] [CO # 3]

2. **(a)** Find out the root of equation $f(x) = xe^x - 1 = 0$ between 0 and 1 using four approximation of Secant Method. [5] [CO # 3]

   (b) Show that [5] [CO # 4]

   (i) $\delta^2 = \nabla\Delta = \Delta - \nabla$

   (ii) $\mu\delta = \frac{1}{2}\Delta E^{-1} + \frac{1}{2}\Delta$

3. **(a)** The velocity V of a particle at a distance S from a point of its path is given by table below

S (meter)	0	10	20	30	40	50	60
V (meter/sec)	47	58	64	65	61	52	38

   Estimate the time taken to travel 60 meters using Simpson's 3/8 rule. [5] [CO # 1, 4]

   (b) Find the first two derivatives of given function y at $x = 56$ using the data given in the below table. [5] [CO # 4]

x	50	51	52	53	54	55	56
y	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

4. (a) Explain and derive Newton cote's formula and deduce the expression of Trapezoidal method. Also write down the condition to use Boole's method for single-integration. **[5] [CO # 4]**

(b) Evaluate the double integral: $I = \int_0^{\pi/2} \int_0^{\pi/2} sin(x+y)dxdy$ using Simpson three-eight method by dividing the x- and y range into three equal subintervals. **[5] [CO # 4, 5]**

5. (a) Solve the differential equation $y'' + 2xy' - 4y = 0$, $y(0) = 0.2$ & $y'(0) = 0.5$, to find the value of y at 0.1 using fourth order Runge-Kutta Method. **[5] [CO # 4]**

(b) Solve the given first order differential equation using Taylor's Series Method using expansion upto 4^{th} derivative term and find the value of $y(0.1)$ upto fifth decimal place.

$y' = y^2 + xy, y(0) = 1.$ **[5] [CO # 4, 5]**

6. (a) Apply Stirling's formula to find the value of $f(1.22)$ from the following table: **[5] [CO # 4, 5]**

x	0.0	0.50	1.0	1.5	2.0	2.5	3.0
$f(x)$	0.0	0.19146	0.34134	0.43319	0.47725	0.49379	0.49865

(b). Find $f(1)$ from the following table using Newton's divided difference formula **[5] [CO # 4, 5]**

x	-1	0	2	5	10
$f(x)$	-2	-1	7	124	999

Total No. of Pages: 03

Roll No.....

SIXTH SEMESTER

B.Tech. (Engineering Physics)

END SEMESTER EXAMINATION

May 2024

EP 104: FUNDAMENTALS OF ELECTRODYNAMICS

Time: 3.00 Hours

Max. Marks: 50

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

1. (a) Explain the physical significance of gradient, divergence and curl. Calculate **[5] [CO1,4]**

(i) Gradient of a scalar function $f(x,y,z) = x^3y^2z\ln\frac{x}{y}$

(ii) Divergence of vector field $V = s(2 + \sin^2\emptyset)\hat{s} + s\sin\emptyset\cos\emptyset\,\hat{\emptyset} + 3z\hat{z}$

(iii) Curl of vector field $V = r\sin\theta\,\hat{r} + c.\left(e^{-ikr}/r\right)\hat{\emptyset}$

(b) Two infinite parallel planes carry equal but opposite uniform charge densities ±σ. Find the field in each of the three regions:

(i) to the left of both, (ii) between them, (iii) to the right of both. **[5] [CO1]**

2. (a) Define volume current density. Thus drive the continuity equation and explain its physical significance. Suppose the current density in the wire is proportional to the distance from the axis (s),

$$J = ks$$

(for some constant k). Find the total current in the wire. **[5] [CO2,3]**

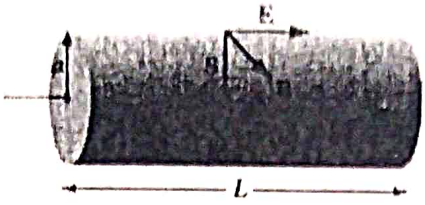
(b) Explain the significance of displacement current in Maxwell equation. Consider the given electric field E (s,t)

$$E(s,t) = \frac{\mu_0 I_0 \omega}{2\pi}\sin(\omega t)\log\frac{a}{s}\hat{z}$$

Calculate the displacement current density J_d and the total displacement current I_d. **[5] [CO3]**

3. (a) State and drive the Poynting vector theorem. Write the physical significance of each term in it. **[5] [CO4]**

(b) What is the magnitude of the Poynting vector at the surface of a long cylindrical wire of the radius a, Length L, carrying current I, when its ends are kept at a potential difference V? **[5] [CO4]**



4. **(a)** Derive the electromagnetic wave equation in free space using Maxwell equations. Also, show that the direction of electric field vector (**E**) and magnetic field (**B**) are mutually perpendicular to each other and to the direction of propagation of the wave. **[5] [CO3]**

(b) The intensity of sunlight hitting the earth is about 1300 W/m^2. If sunlight strikes a perfect absorber, what pressure does it exert? How about a perfect reflector? What fraction of atmospheric pressure does this amount to? **[5] [CO5]**

5. **(a)** Consider a copper and silver metals with resistivities 1.68×10^{-8} and 1.59×10^{-8} ohm-meters, respectively. Assume the permittivity and permeability of these metals are approximately same as of that of free space. Then solve the following problems **[2.5x2] [CO1,2,5]**

(i) Silver is an excellent conductor, but it's expensive. Suppose you were designing a microwave experiment to operate at a frequency of 10^{10} Hz. How thick would you make the silver coatings?

(ii) Find the wavelength and propagation speed in copper for radio waves at 1 MHz. Compare the corresponding values in air (or vacuum).

(b) Deduce the expression for the total power radiated due to an electric dipole. **[5] [CO2,5]**

6 **(a)** Define waveguide. Consider monochromatic electromagnetic waves confined to the interior of a hollow metallic pipe. What you understand from TE ("transverse electric"); TM ("transverse magnetic"); and TEM waves. Show that TEM waves cannot occur in the hollow metallic pipe waveguide. **[5] [CO5]**

(b) A plane wave traveling through vacuum in the z direction encounters a perfect conductor occupying the region $z \geq 0$, **[5] [CO4]**

$$E(z, t) = E_0 [\cos(kz - \omega t) - \cos(kz + \omega t)] \hat{x}, (z < 0).$$

(i) Find the accompanying magnetic field (in the region $z < 0$).

(ii) Assuming $B = 0$ inside the conductor, find the surface current density K on the surface $z = 0$, by invoking the appropriate boundary condition.

Given Data:

$\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/Nm^2$ (permittivity of free space)

$\mu_0 = 4\pi \times 10^{-7}\ N/A^2$ (permeability of free space)

Spherical. $d\mathbf{l} = dr\,\hat{\mathbf{r}} + r\,d\theta\,\hat{\boldsymbol{\theta}} + r\sin\theta\,d\phi\,\hat{\boldsymbol{\phi}}$; $d\tau = r^2\sin\theta\,dr\,d\theta\,d\phi$

Gradient: $$\nabla t = \frac{\partial t}{\partial r}\hat{\mathbf{r}} + \frac{1}{r}\frac{\partial t}{\partial \theta}\hat{\boldsymbol{\theta}} + \frac{1}{r\sin\theta}\frac{\partial t}{\partial \phi}\hat{\boldsymbol{\phi}}$$

Divergence: $$\nabla \cdot \mathbf{v} = \frac{1}{r^2}\frac{\partial}{\partial r}(r^2 v_r) + \frac{1}{r\sin\theta}\frac{\partial}{\partial \theta}(\sin\theta\, v_\theta) + \frac{1}{r\sin\theta}\frac{\partial v_\phi}{\partial \phi}$$

Curl: $$\nabla \times \mathbf{v} = \frac{1}{r\sin\theta}\left[\frac{\partial}{\partial \theta}(\sin\theta\, v_\phi) - \frac{\partial v_\theta}{\partial \phi}\right]\hat{\mathbf{r}} + \frac{1}{r}\left[\frac{1}{\sin\theta}\frac{\partial v_r}{\partial \phi} - \frac{\partial}{\partial r}(r v_\phi)\right]\hat{\boldsymbol{\theta}} + \frac{1}{r}\left[\frac{\partial}{\partial r}(r v_\theta) - \frac{\partial v_r}{\partial \theta}\right]\hat{\boldsymbol{\phi}}$$

Laplacian: $$\nabla^2 t = \frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial t}{\partial r}\right) + \frac{1}{r^2\sin\theta}\frac{\partial}{\partial \theta}\left(\sin\theta\frac{\partial t}{\partial \theta}\right) + \frac{1}{r^2\sin^2\theta}\frac{\partial^2 t}{\partial \phi^2}$$

Cylindrical. $d\mathbf{l} = ds\,\hat{\mathbf{s}} + s\,d\phi\,\hat{\boldsymbol{\phi}} + dz\,\hat{\mathbf{z}}$; $d\tau = s\,ds\,d\phi\,dz$

Gradient: $$\nabla t = \frac{\partial t}{\partial s}\hat{\mathbf{s}} + \frac{1}{s}\frac{\partial t}{\partial \phi}\hat{\boldsymbol{\phi}} + \frac{\partial t}{\partial z}\hat{\mathbf{z}}$$

Divergence: $$\nabla \cdot \mathbf{v} = \frac{1}{s}\frac{\partial}{\partial s}(s v_s) + \frac{1}{s}\frac{\partial v_\phi}{\partial \phi} + \frac{\partial v_z}{\partial z}$$

Curl: $$\nabla \times \mathbf{v} = \left[\frac{1}{s}\frac{\partial v_z}{\partial \phi} - \frac{\partial v_\phi}{\partial z}\right]\hat{\mathbf{s}} + \left[\frac{\partial v_s}{\partial z} - \frac{\partial v_z}{\partial s}\right]\hat{\boldsymbol{\phi}} + \frac{1}{s}\left[\frac{\partial}{\partial s}(s v_\phi) - \frac{\partial v_s}{\partial \phi}\right]\hat{\mathbf{z}}$$

Laplacian: $$\nabla^2 t = \frac{1}{s}\frac{\partial}{\partial s}\left(s\frac{\partial t}{\partial s}\right) + \frac{1}{s^2}\frac{\partial^2 t}{\partial \phi^2} + \frac{\partial^2 t}{\partial z^2}$$

Total No. of Pages: 2 Roll No. 264

FOURTH SEMESTER B.Tech. [ENGINEERING PHYSICS]

END SEMESTER EXAMINATION May- 2024

EP-202: CONDENSED MATTER PHYSICS

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

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

1. (a) Copper has *FCC* structure, and its atomic radius is 1.278 Å. Calculate its density by considering the atomic weight of copper as 63.54. [4][CO2]

   (b) What is Madelung constant? Determine the Madelung constant for a three dimensional sodium chloride crystal structure. [4][CO1]

2. (a) State Bragg's law for *X*-ray diffraction in crystals and derive Bragg's diffraction condition in terms of the reciprocal lattice vector. [4][CO 1]

   (b) There are 2.54×10^{22} free electrons per cm^3 in sodium. Calculate its Fermi energy and average energy of free electrons in sodium at 0 K? [4][CO 3]

3. (a) Describe the hysteresis curve. How would you use hysteresis curves to select material for a specific application? [4][CO 4]

   (b) Define polar and non-polar dielectrics. Explain briefly the various types of polarization mechanisms in dielectrics. [4][CO 4]

4. (a) Derive the dispersion relation for one dimensional monoatomic lattice and show that the phase velocity is equal to group velocity at low frequencies. [5] [CO2]

   (b) Describe Drude-Lorentz's free electron theory of metals and its failures. [3][CO 3]

5. (a) Explain the BCS theory of superconductivity. [5][CO 5]

(b) The critical temperature for a metal with isotopic mass 199.5 is 4.185 K. Calculate the isotopic mass if the critical temperature falls to 4.133 K. [3][CO 5]

6. Write short notes on the following: [3+3+2= 8][CO 1, 4, 5]

(a) Point and space groups

(b) SQUIDs

(c) Piezoelectric Materials

All the Best

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Total no. of Pages:2 Roll no.....

4th SEMESTER

B.Tech

END TERM EXAMINATION *May-2024*

EP204 **OPTICS**

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

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

Q.1(a) Consider a Gaussian beam propagating along z direction whose amplitude distribution on the plane z = 0 is given by

$$A(\xi, \eta, 0) = A\, exp\left(\frac{-\xi^2 + \eta^2}{w_0^2}\right)$$

Obtain the expression for the intensity distribution of the propagating beam. [4][CO#3]

Q.1(b) A Gaussian beam is coming out of a laser. Assume $\lambda = 6000$ Å and that at z = 0, the beam width is 1 mm and the phase front is plane. After traversing 10 m through vacuum what will be (a) the beam width and (b) the radius of curvature of the phase front. [4][CO#3]

Q.2(a) Consider a plane wave incident normally on a circular aperture of radius 'a'. Calculate the intensity and radii of first dark ring for the corresponding Fraunhoffer diffraction. [4][CO#3]

Q.2(b) Consider a rectangular aperture of dimensions 0.2 mm, 0.3 mm. Obtain the positions of the first few maxima and minima in the Fraunhoffer diffraction pattern along directions parallel to the length and breadth of the rectangle. Assume $\lambda = 5 \times 10^{-5}$ cm and that the diffraction pattern is produced at the focal plane of a lens of focal length 20 cm. [4][CO#3]

Q.3(a) Differentiate between spatial and temporal coherence. Give the formulae for coherence length and time. Also explain the relation between monochromaticity and coherence time. [4][CO#1]

Q.3(b) Two plane glass plates are placed on top of one another and on one side a cardboard is introduced to form a thin wedge of air. Assuming that a beam of wavelength 6000 Å is incident normally, and that there are 100 interference fringes per centimetre, calculate the wedge angle. [4][CO#2]

Q.4(a) Analyse using Fresnel integrals the diffraction of a plane wave incident normally on a long narrow slit. Further analyse the transition of Fresnel diffraction to Fraunhoffer diffraction. [4][CO#3]

Q.4(b) Consider a straight edge being illuminated by a parallel beam of light with $\lambda = 6 \times 10^{-5}$ cm in Fresnel diffraction. Calculate the positions of the first two maxima and minima on a screen at a distance of 50 cm from the edge.
[4][CO#3]

Q.5(a) Explain the principle, construction and working of CO_2 laser with the help of suitable diagram indicating the various vibrational levels taking part in the transition. [4][CO#4]

Q.5(b) If a zone-plate has to have a principle focal length of 50 cm corresponding to $\lambda = 6 \times 10^{-5}$ cm, obtain an expression for the radii of different zones. What would be its principle focal length for $\lambda = 5 \times 10^{5}$ cm? [4][CO#3]

Q.6(a) Explain the principle of Fourier Transform Spectroscopy (FTR) and derive the relations of coherence length and coherence time for a source emitting two monochromatic lines. [4][CO#1]

Q.6(b) Consider a quasi-monochromatic source characterized by a spectral distribution

$$I(\nu) = \frac{1}{\delta\nu} I_0 \qquad \nu_0 - \frac{1}{2}\delta\nu < \nu < \nu_0 + \frac{1}{2}\delta\nu$$
$$= 0 \qquad \text{otherwise}$$

Calculate $\gamma(\Delta)$ and show that for path difference $\Delta \gg \frac{c}{\Delta\nu}$, the contrast will be very poor. [4][CO#1]

Q.7(a) Explain the principle, construction and working of Michelson interferometer and also explain any two advantages of the Michelson interferometer. [4][CO#2,5]

Q.7(b) A parallel beam of sodium light ($\lambda = 5890$ Å) strikes the film of oil floating on water. When viewed at an angle of 30° from the normal, 8th dark band is seen. What is film thickness? ($\mu_{oil} = 1.5$) [4][CO#2]

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FOURTH SEMESTER

B.Tech. (EP)

END SEMESTER EXAMINATION

May-2024

EP206: Microprocessor and Interfacing

Time: 3:00 Hours

Max. Marks : 40

Note : **Ques.1 is compulsory.** Attempt 4 questions in all. All questions carry equal marks. Assume suitable missing data, if any.

Q.1.(a) Explain the following instructions in PIC-16F877:

(i) RETFIE
(ii) MOVF f, d
(iii) CLRWDT
(iv) BTFSS f,b

[L2][CO5] [2]

(b) Give the significance of the following signals in 8086: A_0, HLDA, S_4 and S_3. [L2][CO2][2]

(c) How are arithmetic and logical shift instructions different in 8086. [L3][CO1][2]

(d) Generate a 20-bit physical address in 8086 if ES=8765H and DI=8765H. Suppose that DS=1200H, BX=0100H and SI=0250H, determine the address accessed by the following instruction, assuming real mode operation:

MOV [100H], DL [L3][CO2][2]

(e) Discuss the cycle stealing mode in the DMA Controller 8257 and give the functionality of Address Register and Terminal Count Register. [L2][CO3][2]

Q.2. (a) Explain the functionality of (i)Trap Flag and (ii)Direction Flag in 8086; and TO, PD and IRP bits of status register in PIC-16F877. [L2][CO1][CO5][5]

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(b) Write an assembly language program in 8086 to find the smallest number in a set of ten numbers located at an address of 1000:1001 onwards. [L5][CO3][5]

Q.3. (a) Explain the output and other relevant signals in 8253 when working in a square wave generator mode, assuming the count is given (i)6 and (ii)9. [L4][CO4][5]

(b) Which is better- storing a 16-bit data at an even address or an odd-address? Why? Explain the following terms in PIC-16F877: (i) Brown-Out Reset and (ii) Watch-Dog Timer. [L3][CO1][CO5][5]

Q.4.(a) With the help of an example, describe the action performed by microprocessor 8086 for the following instructions:
(i) AAM, (ii) SCASB, (iii) XCHG, (iv) ROR and (v) XLAT
[L3][CO1][5]

(b) Consider that the interrupt vector 33 is in progress. Evaluate the ISR address for a hardware interrupt vector type 33. Determine the addressing modes of the following instructions:

i. JMP [5]
ii. LEA SI, [1200]
iii. MOV CX, [BX+DI+4]

[L4][CO2][5]

Q.5. Interface an 8-bit DAC to 8086 through 8255 and write the following programs for this interface. Assume that the port address for the control register is 9EH.
(i) To generate a triangular wave
(ii) To generate a square wave
[L5][CO4][10]

END

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

FOURTH SEMESTER B.Tech. (EP)

END SEMESTER EXAMINATION *May, 2024*

EP208: COMPUTATIONAL METHODS

Time: 3 Hours *Max. Marks: 50*

Note: All questions carry equal marks.
Attempt any five (05) questions.
Assume suitable missing data, if any.

Q.1 (a) Given $f(x) = \sin(x)$, construct the Taylor series approximations of order 0 to 3 at $x = \pi/3$ and state their absolute errors. [5] [CO1]

(b) If $R = 10x^3y^2z^2$ and errors in x, y, z are 0.03, 0.01, 0.02, respectively at $x = 3, y = 1, z = 2$. Calculate the absolute error and percentage relative error in evaluating R? [5] [CO1]

Q.2 (a) Find a real root of the equation $x \log_{10} x = 1.2$ by regula-falsi method correct to four decimal places. [5] [CO2]

(b) Establish an iteration formula to find the reciprocal of a positive number N by Newton-Raphson method. Hence find the reciprocal of 154 to four significant figures. [2+3] [CO2]

Q.3 (a) Derive a relation between Newton Divided and Forward Differences. Also, evaluate $f(9)$ using Newton's divided difference formula by the given values: [2+3] [CO3]

x	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

(b) Given

$\theta°$:	0	5	10	15	20	25	30
$\tan\theta$:	0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774

Using Stirling's formula, estimate the value of $\tan 16°$. [5] [CO3]

Q.4 (a) Use the trapezoidal rule to evaluate the double integration $\int_{-2}^{2}\int_{0}^{4} x^2 - xy + y^2\, dxdy$ and compare the results with the exact value. [5] [CO4]

(b) Evaluate $\int_{0}^{1} \frac{dx}{1+x}$ correct to three decimal places using Romberg's method. Hence find the value of $\log_e 2$. [5] [CO4]

Q.5 (a) Solve by Taylor's series method the equation $\frac{dy}{dx} = log\,(xy)$ *for* $y(1.1)$ and $y(1.2)$, when $y(1) = 2$. [5] [CO5]

(b) Using modified Euler's method, find an approximate value of y when $x = 0.3$, given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$. [5] [CO5]

Q.6 (a) Using Runge-Kutta method, solve $y'' = xy'^2 - y^2$ for $x = 0.2$ correct to four decimal places. Initial conditions are $x = 0, y = 1, y' = 0$. [5] [CO5]

(b) Find the value of y by Gauss Backward interpolating formula at $x=1936$ using the following table: [5] [CO3]

x	1901	1911	1921	1931	1941	1951
y	12	15	20	27	39	52

******END******

Total No. of Pages :3 Roll No. .....

SIXTH SEMESTER B.Tech. [EP]

END SEMESTER EXAMINATION (May 2024)

EP- 302 FIBER OPTICS & OPTICAL COMMUNICATION

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

Note: Answer any eight questions.
Assume suitable missing data, if any.
Symbols have their usual meanings

1. (a) Consider a planar symmetric waveguide with $n_1 = 1.5$ and $n_2 = 1.0$ and $d = 0.555$ μm. At $\lambda_0 = 1.3$ μm, calculate V and the propagation constant β for TE as well as TM mode.
[Use b(TE) = 0.6280 and b(TM) = 0.4491]
(b) The values of the propagation constant β of TM_m modes are smaller than those of the corresponding TE_m modes. Explain.

[3,2] [CO:1,5]

2. (a) Discuss absorption losses in optical fibers, comparing and contrasting the intrinsic and extrinsic absorption mechanisms.
(b) Briefly describe the three types of fiber misalignment which may contribute to loss at a joint between two single mode fibers.

[3,2] [CO:1,4,5]

3. (a) Briefly explain the techniques which are adopted to obtain line width narrowing in semiconductor laser diodes.
(b) Briefly Explain the Vapor Phase Axial deposition method for the fabrication of optical fibers.

[3,2] [CO:2,4,5]

4. Starting from the Maxwell's Equations for dielectric medium, establish an eigen value equation for step index optical fiber. Point out the method to solve the above mentioned Eigen value equation.

[5] [CO:3,5]

5. (a) Obtain the expression for waveguide dispersion in step index optical fiber.

(b) Using the approximation for the normalized propagation constant in a single mode step index fiber given by

$$b(V) \approx \left(1.1428 - \frac{0.9960}{V}\right)^2$$

calculate the waveguide dispersion in a step index fiber with $n_1 = 1.450840$, $n_2 = 1.446918$ and $a = 4.1$ μm at a wavelength of 1300 nm.

[3,2] [CO:3,5]

6. (a) Plot normalized radial intensity distribution of LP_{01}, LP_{32} and LP_{12} modes for a step index fiber.

(b) Sketch a diagram for normalised frequency vs normalised propagation constant for fundamental and first higher order propagating mode in case of step index optical fiber.

[3,2] [CO:3,5]

7. What is threshold gain? Obtain expression for threshold gain in a laser diode.

Sketch the output spectrum of the laser diode below threshold current and above threshold current.

[3,2] [CO:2,5]

8. (a) A photodiode has a quantum efficiency of 65% when photons of energy 1.5×10^{-19}J are incident upon it. Find the wavelength at which the photodiode is operating. Calculate the incident optical power required to obtain a photocurrent of 2.5μA.

   (b) Determine the wavelength at which the quantum efficiency and the responsivity of a PIN photodetector are equal.

   [3,2] [CO:2,5]

9. (a) A double heterojunction LED emiting at peak wavelength of 870 nm has radiative and non radiative recombination times of 60 ns and 100 ns respectively.
   Determine the total carrier recombination life time and the power internally generated within the device at a drive current of 40 mA. If the refractive index of the light source material is n = 3.5. Find the power emitted from the device.

   (b) Enumerate the limitations of ray theory of light guidance.

   [3,2] [CO:1,2,5]

Total No. of Pages: 03 *Roll No……*

SIXTH SEMESTER **B.Tech. (Engineering Physics)**

END SEMESTER EXAMINATION ***May 2024***

EP 304: Fabrication and Characterization of Nanostructures

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

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

1. **(a)** What is the relevance of Miller Indices. Graph the plane and determine the axis intersects of a surface with the Miller Index (013). Explain the meaning of {100} and its importance. **[5] [CO1, CO4]**

(b) The X-ray diffraction pattern of copper recorded with Cu Ka radiation (1.54 Å) is given below. Seven diffraction peaks exist in the diffraction pattern, and the 2θ values for these peaks are listed in given Table. Analyze and index the peak given and calculate the lattice parameter. **[5] [CO2, CO4]**

Materials: Copper **Radiation: Cu Kα**
(1.54 Å)

Peak (#)	2θ (°)
1.	43.16
2.	50.30
3.	73.99
4.	89.85
5.	95.03
6.	116.92
7.	136.59

2. **(a)** What are the important parameters in vacuum evaporation which affects the deposition rate? Also derive and compare graphically the expression for film thickness uniformity based on the source-substrate geometry. **[5] [CO3,CO5]**

(b) Explain how a plasma is created when an electric field is applied, also discuss the various regions of the plasma. Sketch the potential distribution in a DC plasma maintained between two electrodes. **[5] [CO2, CO3]**

3. **(a)** Why surface energy is important for nanomaterials? What are the different mechanism to reduce the surface energy of nanomaterials. Why low Miller indices in general have lower surface energy than that with high Miller indices. **[5] [CO1,CO3]**

(b) Calculate the surface energy of a diamond crystal with surface along (111) facet. Whereas the energy per bond between 2 carbon atoms is 376 kJ/mol (Assume diamond has FCC crystal structure with unit cell constant a = 5.6 Å, and all bonds have same strength). **[5] [CO1]**

4. **(a)** What is the difference between Field Emission Scanning Electron Microscopy (FESEM)and Scanning Electron Microscope (SEM)? What are the factors which influence the yield of the emission of secondary electrons and explain their importance? **[5] [CO2,CO4]**

(b) With reference to nucleation process in the nanomaterials growth in accordance with Thermodynamic Equilibrium Approach

(1) Differentiate between homogenous and heterogenous nucleation process.

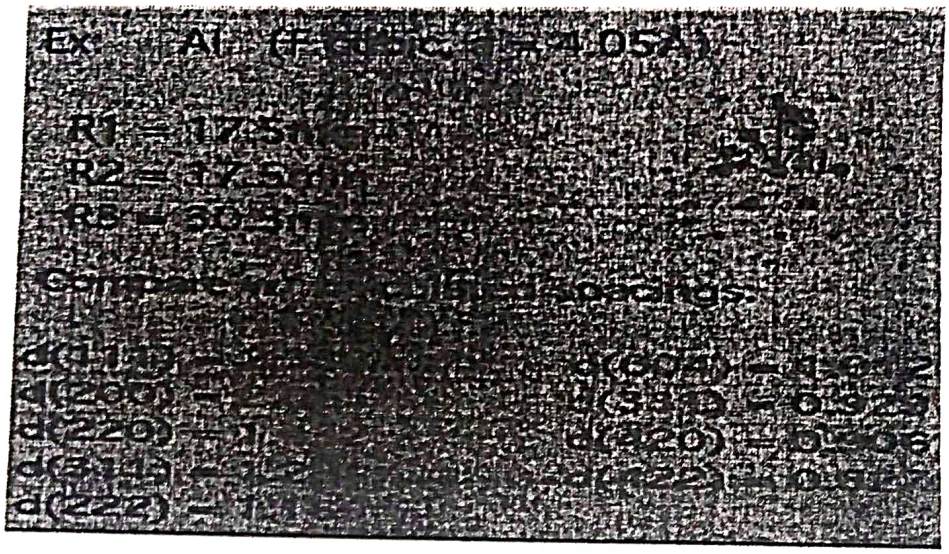
(2) Determine the critical energy barrier (ΔG) for homogenous nucleation and illustrate the change of volume free energy ($\Delta\mu_v$), surface free energy ($\Delta\mu_s$), and total free energy (ΔG), as a function of nucleus radius. **[5] [CO3]**

5. Differentiate between the following: **[2x5] [CO1,3,4]**

a) Ion Implantation and Ion beam Assisted Deposition
b) Positive Photoresist and Negative Photoresist
c) Stokes and Antistokes Lines in Raman Spectrum
d) RF Glow Discharge and DC Glow Discharge
e) Balanced and Unbalanced Magnetron Sputtering

6. **(a)** How the high resolution transmission electron microscopy (HRTEM) is different than transmission electron microscopy, explain with proper working diagram. **[4] [CO4]**

(b) Consider the selected area electron diffraction (SAED) pattern given in figure below. The obtained SAED pattern is for Al crystal from a transmission electron microscopy which is working at an accelerating voltage of 200 kV and has camara length of 1 meter. Determine the interplanar spacing (d) and the lattice planes thus calculate the angle of diffractions for the different planes? **[6] [CO4, CO5]**



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VIth SEMESTER

B.Tech. (Engineering Physics)

END TERM EXAMINATION May 2024

COURSE CODE: EP – 306 COURSE TITLE: Microwave Engineering

Time: 3.00 Hours Max. Marks: 40

Note: Attempt any Five Questions
Assume suitable missing data, if any

Q. 1 (a)List the limitations of conventional tubes at Microwave frequencies. Explain with schematic diagram. [4] [CO #1]

(b) What are the applications of Microwaves? write down the various microwave bands with its frequency range. [4] [CO #2]

Q. 2 (a)Describe the two-cavity Klystron amplifier, with the aid of a schematic diagram. Make the clear distinction between velocity modulation and current modulation, and explain how current modulation is necessary if the tube is to have Significant power gain. [4] [CO#3]

(b) A two cavity Klystron amplifier has the following parameters: beam voltage Vo=1000V, resistance Ro=40kΩ, beam current Io = 25mA, operating frequency f= 3GHz, gap in either cavity d= 1mm, spacing between the two cavities L=4cm, effective shunt impedance Rsh=30kΩ. Determine (i) the electron velocity just leaving the cathode (ii) the gap transit angle θg . [4] [CO#3]

Q. 3 (a)What are the applications and limitations of the reflex klystron? [4] [CO#3]

(b) What is a Travelling Wave Tube (TWT)? With the aid of a schematic diagram, explain about the helical slow -wave structure. [4] [CO#4]

Q. 4 (a) What is the Magnetron? Derive the expressions for the Hull cutoff voltage and Hull cutoff magnetic field of a cylindrical cavity Magnetron. [4] [CO# 5]

(b) What is Mode jumping in a cavity Magnetron? What remedial steps can be taken to prevent the same? [4] [CO# 5]

Q 5.Explain the J-E characteristics of Gunn diode with the help of two valley model theory. Discuss the applications of Gunn diode. A typical n-type GaAs Gunn diode has the following parameters : Threshold field Eth= 2800 V/cm, applied field E= 3200 V/cm, device length L =10μm, doping concentration n_o= 2 x 10^{14} cm^{-3}, operating frequency f= 10GHz. Determine: (i) the electron drift velocity (ii) the current density. [8] [CO#2]

Q.6 (a) What is directional coupler? Define coupling factor and Directivity of a directional coupler. [4] [CO# 2]

(b) What is S-parameters? Derive the S-matrix of a directional coupler. [4] [CO# 2]

Q.7 (a)Differentiate between E-plane tee and H-plane tee junctions. [4] [CO# 2]

(b) What is circulator? explain using schematic diagram. [4] [CO# 2]

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SIXTH SEMESTER B.Tech.

END TERM EXAMINATION May-2024

COURSE CODE _EP-316_____ COURSE TITLE__Cosmolgy & Astrophysics_____

Time: 03:00 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.

Q.1 a) What is parallax? [5][CO1]

b)What is the distance of a star along the polar axis of the earth's orbit,if the parallax angle of the star is measured as 0.002 arcsecond [5][CO4]

c) Write Wien's displacement law and how can it be used in astrophysical measurements? [5][CO2]

Q.2 a)Show that the solution of gravitational central force motion is a general conic equation. [5][CO4]

b)A satellite was launched at a velocity of 28000 km/h at an altitude of 640 km,If the burnout velocity of the last stage is parallel to earth's surface ,compute the maximum altitude from earth that the satellite will reach.Given radius of the earth =6400 km [5][CO4]

c) Write the expression for Planck's radiation law.Suggest any use of this in modern cosmology. [5][CO4]

Q.3 a)What is the Hubble law ,also write it quantitatively using hubble parameter and velocity of receeding galaxies.If we know that the hubble constant today is H_o and that the universe today is matter dominated then estimate the value of cosmic time today. [5][CO4]

b)Write the Friedmann I and Friedmann II equation for an expanding relativistic universe.What is its use in modern cosmology. [5][CO4]

c) Using the Friedmann II equations show that for a matter dominated universe,the scaling factor is proportional to $t^{2/3}$.

[5][CO4]

Q.4 a) Write a note on cosmic microwave background. [5][CO3]

b) b) What are rotation curves of galaxies. Drawing a sample plot of rotation velocities vs distance from the galactic core reason how it supports the existence of dark matter on the outer region of galaxies. [5][CO3]

c) A blob of hydrogen gas observed perpendicular to its line of sight.If the frequency of the gas is ν and the gas is relativistic,what is the frequency of the observed emission. [5][CO3]

Q.5 a)What is Boltzmann excitation equilibrium equation and Saha ionization equilibrium equation. [5][CO3]

b) Consider a pure hydrogen gas at a temperature of 10000 K. What is the ratio of the populations of the ground state (n =1) To the first excited state(n=2). [5][CO3]

c) With the help of the Friedmann I equation,reason why the late time acceleration of the universe can only be due to a component like dark energy with a negative pressure. [5][CO3]

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VI SEMESTER B.Tech.]

May-2024

END TERM EXAMINATION

COURSE CODE EP-328

COURSE TITLE – SEMICONDUCTOR OPTOELECTRONICS

Time: 03:00 Hours

Max. Marks: 50

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

Q.1(a) Differentiate between direct and indirect semiconductors. What are parameters we need to know to calculate the carrier concentrations in energy bands? Explain.

(b) A Si ingot is doped with 10^{16} As atoms/cm^3. Find the carrier concentrations and the Fermi level at room temperature (300 K). Intrinsic carrier density is 1.45×10^{10} cm^{-3}. [4, 6]

Q.2 What are the drawbacks of the homo-junction LED? With the help of energy band diagram, explain the working of double hetero-junction LED. How does the peak wavelength change with temperature?

(b) An AlGaAs LED is designed for a peak emission at 822 nm at 27 °C. (i) What is the bandgap of the material? (ii) The bandgap of the ternary alloy $Al_xGa_{1-x}As$ follows the following expression

$E_g(eV) = 1.424 + 1.266x + 0.266x^2$

What is the composition of the AlGaAs in this LED? [5, 5]

Q.3. Derive expression for the small signal gain coefficient. Also deduce expression for threshold gain. Explain the phenomenon of saturation gain. [10]

Q.4 (i) Explain the structure, working and advantages of multiple quantum well lasers.

(ii) Explain the principle, working and V-I characteristics of a solar cell. Define the Fill Factor of a solar cell.

A solar cell under illumination of $600 Wm^{-2}$ has a short circuit current of 16.1 mA and open circuit voltage of 0.485 V. What are the short circuit current and open circuit voltages when the light intensity is doubled? [4, 6]

Q.5 (i) A Si *pin* Photodiode has an active light receiving area of diameter 0.4 mm. When radiation of wavelength 700 nm and intensity of 0.1 $mWcm^{-2}$ is incident it generates a photocurrent of 56.6 nA, What is the responsivity and quantum efficiency of the photodiode at 700 nm?

(ii) Explain the construction and working of an APD. What are the factors on which the speed of the APD depends? What are its major drawbacks and how can these be overcome? [4, 6]

Q.6 (i) Discuss the principle and working of the Electro-absorption modulator and VCSEL.

(ii) What is meant by optoelectronic integrated circuits (OEICs). Discuss the features of modern OEICs. [6, 4]

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EIGHTH SEMESTER

B.TECH. [EP]

END SEMESTER EXAMINATION

(MAY - 2024)

EP-404 ALTERNATIVE ENERGY STORAGE AND CONVERSION DEVICES

Time: 3 Hours

Max. Marks: 40

Note: Answer *Any FIVE* questions. Question No. 1 is compulsory.

Assume suitable missing data, if any.

1. Answer all the questions.

(a). Explain the summer and winter solstices with proper diagram. (CO3) [2]

(b). Calculate the average earth's temperature in the absence of atmosphere. (CO1) [2]

(c). Write the composition of wood bio-mass. (CO3) [2]

(d). Write difference between fuel cell and rechargeable cell/ battery. (CO4) [2]

(e). Explain the terrestrial and extraterrestrial regions with suitable diagram. (CO2) [2]

(f). Find out the approximate energy density of ocean wave of density of water is roughly 1000 kg/m^3 and the height of wave is 35 meters. (CO5) [2]

2(a). A silicon diode, operating at 300 K, is exposed to 6000-K black body radiation with a power density of 1000 W/m^2. Its efficiency is 20% when a load that maximizes power output is used. Estimate the open-circuit voltage delivered by diode ($\varphi_g = 2.50 \times 10^{21}$ photons m^{-2}s^{-1}). (CO2) [4]

(b). Explain 2-D and 3-D solar concentrator. Show that the maximum temperature obtained in 3-D solar concentrator is approximately 5900 K. (CO3) [3]

3(a). What is 'anaerobic digestion'. Showing the chemical reaction for relevant bacterial processes, discuss the anaerobic digestion process of glucose to extract the methane from waste. (CO3) [4]

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(b). Draw a flow chart and discuss the various steps of ethanol production from sugar cane with proper quantification. (CO3) [3]

4(a). Distinguish between Drag and Lift type wind turbine. Show that the power delivered by a wind turbine is proportional to the cube of the wind velocity and given a; $P_D = \frac{16}{54} \rho v^3 A \eta$; where η is efficiency of wind turbine. A, swept area of the wind turbine. (CO3) [4]

(b). Discuss about 'solidity' and 'angle of attack'. Using Rankine-Froude theorem for upstream raise and downstream fall in pressure of a wind turbine, show that power extracted is equal to 'Betz Limit' of the power in the wind. (CO3) [3]

5(a). Explain operating temperature of various types of fuel cells. Showing the cathode and anode cell reactions, describe the construction and working of yttrium stabilized zirconia (YSZ) type solid oxide fuel cells (SOFCs). (CO4) [4]

(b). Discuss the working process and efficiency of Lithium-ion batteries with proper chemical reactions at cathode and anode. (CO4) [3]

6(a). List the type of hydropower plants. Discuss the production of electricity by most efficient hydropower plant by drawing a suitable diagram. Also write down the maximum power generated in MW and the efficiency of the plant. (CO5) [4]

(b). What are the volatile solids and fixed solids used in a digester? Find out the power density of the digester in terms of allowable loading rate, if digester fraction and ideal yield are 0.4 and 125 MJ (CH4) /Kg (VS), respectively. (CO2) [3]

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EIGHT SEMESTER
B.Tech

END SEMISTER EXAMINATION May-2024

EP-414-Space and Atmospheric Science-II

(ELECTIVE COURSE)

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

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

Q.1. What is a Radar? Describe different types of Radars and their applications in the field of Atmospheric Sciences. **(10M) (CO-1)**

Q.2. What is a wind profiler? Explain in detailed how wind profilers are useful in aviation, tropical cyclone, thunderstorm, environment and meteorology. **(10 M) (CO-2)**

Q.3. What are the minor constituents that are present in lower layer of atmosphere? Explain various natural and anthropogenic reasons that are responsible for the production of trace gases. What kind of adverse effects that these trace gases can have on human beings, animals and agriculture. **(10 M) (CO-3)**

Q.4. Describe the chemistry behind the production of tropospheric Ozone and its effect on various things in the lower atmospheric layer. Describe the role of Ozone in stratosphere. Explain its depletion in stratosphere and discuss how this can be prevented. **(10 M) (CO-4)**

Q.5. What are aerosols and describe their sources along with the mechanisms involved in their production. Describe their effect on climate and human health. **(10 M) (CO-2)**

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VI SEMESTER

B.Tech.

END TERM EXAMINATION ***May-2024***

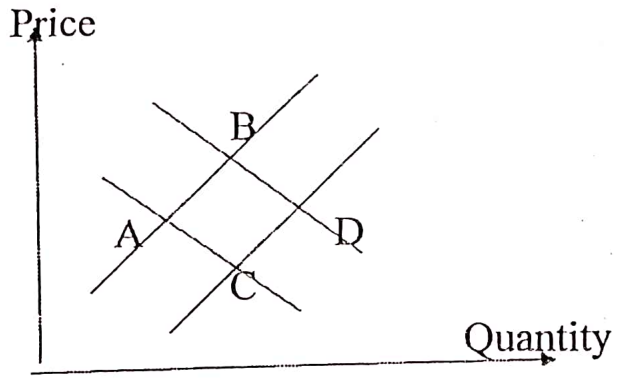
HU302a Engineering Economics

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

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

Q.1 a What do you mean by UN's Sustainable Development Goals (SDGs)? Design a plan to achieve anyone of the SDGs in the university Campus.
[2+3=5][CO#1&6]

b



Equilibrium has moved from A to B and then, B to D. Discuss the forces and probable reasons for it. [5][CO#2&5]

Q.2 a What do you mean by Opportunity Cost? Discuss Opportunity Cost of following:

(i) Two graduate engineers opted to become entrepreneur after graduation.
(ii) They started their enterprise in the outhouse of their building.
(iii) Invested their own money which they earned from online work during their college times. [2+3=5][CO#2&5]

b The accounts of XYZ manufacturing LTD. for the year ended 31st March 2023 show following:

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Particular	Rs.
Stock of Material on 01.4.2023	87,200
Materials purchased	369000
Drawing office salaries	40000
General office salaries	15000
Bad debts written off	12000
Salesperson's salary & commission	17000
Depreciation written off of furniture	10000
Rent, tax and insurance of factory	41900
Productive Wages	176400
General expenses	40000
Gas and water (factory)	2680
Travelling expenses	2680
Managers Salary	75000
Depreciation of plants and tools	9,100
Cash discount allowed	4060
Repair of plats and tools	6230
Carries outwards	6030
Direct expenses	10010
Rent, taxes, insurance (office)	2800
Gas, water (office)	560
Stock of material 31.3.2022	87920

Calculate (i) Cost of material consumed (ii) prime cost (ii) Factory Cost (1+2+2)[CO#4]

Q.3 a "Ms. X has just started her start-up and she will achieve the break-even by the end of 2028". What does it mean? What precautions Ms. X should take? Discuss if Ms. X is stationed at Delhi. [2+3=5] (CO#1 & 3)

b The fixed cost for the years, 2024-25 is 8,00,000. Variable Cost per unit is Rs. 40. The estimated sale for the period are valued at Rs. 20,00,000. Each unit sells at Rs. 200.

(i) Find the Beak-even point.

(ii) If Rs. 16, 00,000 will be the likely sales turnover for the next budget period, calculate the estimated contribution and profit.

(iii) If a profit target of Rs. 6,00,000 has been budgeted, compute the turnover required. [2+3=5][CO#1&3]

Q.4 a Differentiate between Gross Domestic Product (GDP) and Gross National Product(GNP). Discuss main components of GDP using the income approach. [2+3=5][CO#1&3]

b Mr. X decides to make semi-annual payments of Rs. 50,000 each into a bank account that pays an annual interest rate of 8% compounded weekly. How much money will Mr. X has accumulated in this bank account at the end of 20 years. [2+3=5][CO#1&4]

Q.5 a Briefly explain five functions of Money in an economy. [5][CO#1&3]

b Two years ago, a machine was purchased at a cost of Rs. 4,00,000 to be useful for ten years. Its salvage value at the end of its life is Rs. 60,000. The annual maintenance cost is Rs. 60,000. The market value of the present machine is Rs. 3,20,000. Now, a new machine to cater to the need of the present machine is available at Rs. 380,000 to be useful for eight years. Its annual maintenance cost is Rs. Rs. 45,000. The salvage value of the new machine is Rs. 40,000. Using an interest rate of 11%, find whether it is worth replacing the present machine with the new machine? [5][CO#5]

Q.6 a What are the differences between International and Domestic trade? Are you against or in favour of opening up of the economy? Give reasons for your answer [2+3=5][CO#2&5]

b The following table shows the output of cocoa and rubber that is produced by two countries 'X' and 'Y'.

Countries	Cocoa (tons)	Rubber (tons)
X	550	2,000
Y	550	750

Suppose the resources are divided equally between the two products

i. Which country has an absolute advantage in production of cocoa?

ii. Calculate the opportunity cost of producing one ton of cocoa and rubber in each country.

iii. Construct the output table after specialisation.

[1+2+2=5][CO#1&3]

Q.7 a What do you mean by Fiscal Policies? Describe when Government practice fiscal policies. [2+3=5][CO#1&3]

b The following data is for two mutually exclusive investment alternatives X and Y associated with a small engineering project.

	A (in Rs)	B (in Rs)
Capital investment	3,500	5,000
Annual Revenue	1,900	2,500
Annual expenses	6,45	1,020
Useful life	4	6
Salvage value	0	0

If the annual interest rate =10% per year, show which alternative is more desirable by using equivalent worth methods [5][CO#4]

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Total no. of Pages: 2 Roll no .....

SEMESTER-VITH & VIIITH

B.Tech.

END TERM EXAMINATION May-2024

HU- 306 Money, Banking and Finance

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

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

Q.1 What is adverse selection? Explain how does "*market for lemons*" turn into adverse selection. [5+5] [CO 3 & 4]

Q.2 (i)What do you mean by financial market and what are its various functions?

(ii)Explain money supply along with the measures adopted by RBI so far to measure it. [5+5] [CO 1 & 2]

Q.3 (i) "Interest is the reward for parting with liquidity." Explain.

(ii)What do you mean by demand for money and what are the varied views of different school of thoughts on it? [5+5] [CO 5 & 4]

Q.4 What is market interest rate and how is it different from real interest rate? What factors are responsible for the changes in the market rate of interest. [5+5] [CO 3]

Q.5 Define money and what are the different types of money found? Elucidate its various functions in detail. [5+5] [CO1]

Q.6 How is a central bank different from a commercial bank? Explain the process of credit creation by commercial banks. [5+5] [CO2 &3]

Q.7 Write a short note on **Any Two** [5+5] [CO 2]

a) Principal-agent Problem

b) Capital Market

c) Hedging Theory

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

VI__SEMESTER

B.Tech.

END TERM EXAMINATION ***May-2024***

HU308 Mathematical Economics

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

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

Q.1 a What do you mean by Mathematical Economics? What may be the probable reasons for increasing interest of engineering students in the subject? Discuss. [2+3= 5][CO#1&4]

Q.1 b A company decides to set up a small production plant for manufacturing electronic clocks. The cost for initial set up is Rs. 9 lakhs. The additional cost for producing each clock is Rs. 300. Each clock is sold at Rs. 750. During the first month, 1500 clocks are produced and sold.

(i) Determine the total cost function C(x) for the production of x clocks.
(ii) Determine the revenue function R(x)
(iii) Determine the profit function P(x)
(iv) How much profit or loss the company incurs during the first month when all the 1500 clocks are sold?

[1+1+1+2=5][CO#2]

Q.2 a Give mathematical interpretation of Malthusian Theory of Population. [5][CO#3]

Q.2 b [i] if the demand function is $x = \frac{20}{p+1}$ Find price elasticity of demand at the point where p=4

[ii] The demand function of the commodity X1 and X2 are

$X_1 = P_1^{-1.3} P_2^{0.7}$

$X_2 = P_1^{0.6} P_2^{-0.5}$

Find out whether two commodities X_1 and X_2 are substitute or complementary goods. [2+3=5][CO#2]

Q3 a Discuss Consumer Surplus and Producers Surplus mathematically? [2+3=5][CO#1&3]

b The demand and supply law for a commodity are $Pd = \frac{8}{x+1} - 2$ and $Ps = \frac{1}{2}(x+3)$ respectively. Find out the consumer and producer surplus. (2+3=5) [CO# 4]

Q.4 a What is the economic significance of partial derivatives? Discuss with examples. [5][CO#3]

b [i] A firm produces three products A, B and C which it sells in two markets. Annual sales in in units are given below Units sold

Market	A	B	C
I	8000	4000	16000
II	7000	18000	9000

If the prices per unit of A, B and C are Rs. 2.50, Rs. 1.25 and Rs. 1.50 and the costs per unit are Rs. 1.70, Rs. 1.20 and Rs. 0.80 respectively. Find total profit in each market by using Matrix algebra.

[ii] A manufacturer produces two types of products X and Y. Each product is first processed in machine M_1 and then sent to another Machine M_2 for finishing. Each unit of X requires 20 minutes time on machine M_1 and 10 minutes time on M_2, whereas each unit of Y requires 10 minutes time of M_1 and 20 minutes time on M_2. The total time available on each machine is 600 minutes and is fully utilised in the production of X and Y. Calculate the number of units of two types of products produced by constructing a matrix equation and then, solving it by matrix inversion method. [2+3=5][CO#4]

Q.5 a Discuss salient feature of an Econometric models. [5][CO#3]

b A firm has following Total Cost and Demand Function,

$TC = 1/3X^3 - 7X^2 + 111X + 50$,

$X = 100 - P$

Where TC= Total Cost; X=Quantity and P=Price

[i] What is the Average Revenue Function in terms of X.

[ii] Find profit maximising level of output and the profit at that level of output. [2+3=5][CO#4]

Q.6 a What is Marginal Propensity to Consume? How it effects saving? Discuss. [2+3=5][CO#3]

b. [i] If Marginal Propensity to Consume =2/5; find the consumption function; given the consumption is 100, when income is zero.

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[ii]The rate of sales of a product is given by $f(x)= 100-950e^{-x}$ Where x is the number of months the product is on the market. Find the total sales during the first year. [2+3=5][CO#4]

Q.7 a What do you mean by Cobweb model? Discuss its significance and limitations. [2+3=5][CO#3]

Q.7 b Investigate the behaviour of price in a market with demand and supply given below

$D_t = 86- 0.6Pt$

$St = -10+ 0.2 P_{t-1}$ [5][CO#4]

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Total no. of Pages: 01

Roll no.....

VI/VIIISEMESTER

B.Tech.

END TERM EXAMINATION *May-2024*

HU 310 INTERNATIONAL ECONOMICS

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

Note : Attempt 1 Question from Section A and 2 questions from section B

Section A

Q.1 Explain the differences in the political and cultural environment impacts the global businesses.

Or

Explain how the differences in the economic and cultural environment impacts the global businesses

[20] [CO1&2]

Section B

Q.2 Explain the concept of Global Value Chains. Explain how they have changed the trade patterns across the world. [15][CO3&4]

Q.3 What is globalization? Explain the various dimensions of globalization. [15][CO3&4]

Q.4 Mention some ethical issues in international business using examples. [15][CO3&4]

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Total no. of Pages:

EVEN SEMESTER

B.Tech

END TERM EXAMINATION, *May-2024*

HU 312 - COURSE TITLE: MICROECONOMICS

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

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

a) Q.1 a. "Elasticity of demand is not just the inverse of the slope". Comment. [3][CO1]

b. "Bring out the relationship between price elasticity of demand, average revenue and marginal revenue. Why should a firm not sell below the price where elasticity is less than one?[3][CO1]

c. Explain cross elasticity of demand and income elasticity of demand. [4][CO1]

Q.2 What is indifference curve? What are the main properties of an indifference curve for two normal goods? What will be shape of an indifference curve when one of the two goods is a free natural good? [10] [CO 2]

Q.3 What are the conditions for consumer's equilibrium in ordinal utility (indifference curve) approach? Why does a consumer choose a combination of two goods where marginal rate of substitution equals the commodity price ratio? [10] [CO 2]

Q.4 a. What is production function? How does a production function serve as a useful purpose in production analysis? [5][CO 3]

b. Show graphical derivation of *TP*, *MP* and *AP* curves. Show also the three stages of production. What economic purpose do the stages of production serve? [5] [CO3, CO4]

Q.5 Distinguish between short-run and long-run equilibrium of a firm operating under perfect competition. What is difference, if any, in conditions of equilibrium in the two cases? [10][CO4, CO5]

Q.6 How is pricing under monopoly different from that under perfect competition? Can a monopoly firm fix any price for its product? [10] [CO5]

Total No. of Pages- 1

Roll No. 294

B.Tech

END TERM EXAMINATION **MAY- 2024**

COURSE CODE: HU 314
COURSE TITLE: RHETORIC AND PUBLIC SPEAKING

TIME: 1:30 HRS. **MAX. MARKS: 50**

NOTE: ALL QUESTIONS ARE COMPULSORY

1. Illustrate the classical rhetorical appeals of Ethos, Logos and Pathos in effective speech organization. (10) (CO1)
2. Demonstrate with the help of some famous speeches, the use of language, and delivery to persuade, inform or entertain audiences. (10) (CO2, CO4)
3. Explain the important rhetorical strategies employed in various advertisements. (10) (CO2)
4. Explain and Analyze the significance of 'The Art of Rhetoric' by Aristotle in the Rhetoric tradition. (CO1)
5. Compose a speech on "Climate Change" designed specifically for School Students. (10) (CO3, CO5)

Total No. of Pages- 1

Roll No. 294

B.Tech

END TERM EXAMINATION

MAY- 2024

COURSE CODE: HU 314

COURSE TITLE: RHETORIC AND PUBLIC SPEAKING

TIME: 1:30 HRS.

MAX. MARKS: 50

NOTE: ALL QUESTIONS ARE COMPULSORY

1. Illustrate the classical rhetorical appeals of Ethos, Logos and Pathos in effective speech organization. (10) (CO1)
2. Demonstrate with the help of some famous speeches, the use of language, and delivery to persuade, inform or entertain audiences. (10) (CO2, CO4)
3. Explain the important rhetorical strategies employed in various advertisements. (10) (CO2)
4. Explain and Analyze the significance of 'The Art of Rhetoric' by Aristotle in the Rhetoric tradition. (CO1)
5. Compose a speech on "Climate Change" designed specifically for School Students. (10) (CO3, CO5)

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Total no. of pages: 01 Roll no.....

End-Term Exam May 2024

Course Code: HU-318

Course Title: Professional Writing Skills

Max. Marks: 50 Time: 3.00 Hours

Note: Read instructions carefully and answer accordingly.

Q 1. Write short notes on the following: (CO1) 10

a) Effective Presentation Skills

b) Professional Communication

Q2. Write a resume to be sent to your dream company. (Assume details). (CO2) 10

Q3. Give your argument for a group discussion on 'Wastage of money spent in election campaigning.' (CO2) 10

Q4. Discuss the role of technology in professional communication. (CO 4) 10

Q 5. Write an essay on one of the following: (CO 5) 10

a) If I were the PM of India I would..... b) The importance of Writing skills

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Total no. of page: 01 Roll No.....

EVEN SEMESTER (VI&VIII)

B. Tech.

END-TERM EXAMINATION MAY- 2024

HU-328 THEATRE AND STAGECRAFT

Duration: 3.00 Hours Maximum Marks: 50

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

	Marks	COs
Q. 1 Explain types of theatre layouts.	10	CO1
Q. 2 What are the main elements in training the actor?	10	CO2
Q. 3 Elaborate on all the main characters of 'The Marchant of Venice'.	10	CO3
Q. 4 What are the main outcomes of your project Ghumantu Pathshala under the umbrella of Viksit Bharat Abhiyan?	10	CO4
Q.5 Give arguments for a G.D. on 'life is a stage of performance where all are playing their fixed roles'.	10	CO5

Total No. of Pages: 01 *Roll no* 297

Semester: VIII

Course: B.Tech.

END TERM EXAMINATION *May-2024*

HU- 404: Public Finance and Policy

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

Note: Attempt any five questions

All questions carry equal marks. Marks are indicated at the end of each question

Assume suitable missing data, if any

Q.1. Explain major functions of Public Finance. Discuss different instruments to perform these functions? (5+5), [CO-1]

Q.2. What do you understand by 'Market Failure'? Explain the reasons for market failures to produce efficient outcomes? (3+7), [CO-2]

Q.3. Distinguish between direct and indirect taxes. Discuss the economic effects of taxation. (4+6), [CO-3]

Q.4. What do you understand by optimal income taxation? In this context explain the linear and non-linear income taxation. (4+6), [CO-3]

Q.5. What is GST? Discuss the proposed benefits and concerns regarding Goods and Services Tax (GST) in India. (2+8), [CO-4]

Q.6. Discuss the salient features of the 15th Finance Commission Report of India. (10), [CO-4]

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

(i) Pure and Impure Public Goods (ii) Tax Incidence (iii) Salient features of India's Interim Budget 2024. (5+5) [CO-2, 3, 4]

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Total no. of Pages: one Roll no.....

8th SEMESTER **B.Tech./B.Des./BBA/BAE/M.Sc./M.Des./M.Tech./MBA/Ph.D/ B.Tech. (Eve)**

END TERM EXAMINATION MAY-2024

COURSE CODE ___HU-407

COURSE TITLE_ Wealth and Poverty of Nations -Indian Economic Development

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

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

Q.1 Explain the major concerns of Development in India. [10][CO#1]

Q.2 Do you agree that the contribution of Education to Human Capital is complimentary to health? Why? [10][CO#2]

Q.3 How does Adverse selection occur in healthcare market? How is this different from Moral Hazard? [10][CO#2]

Q.4 Critically examine the measures of Inequality? [10][CO#3]

Q.5 What is poverty? What are the major steps taken by the Government for poverty alleviation? [10][CO#3]

Q.6 Explain the main issues relating to sustainable development for some of the major sectors of the economy [10][CO#4]

Q.7 Write a short notes on any of the two from the following: [5+5][CO#3,4]

1) Carrying Capacity of Environment
2) Human Capital Formation
3) Axioms of Inequality

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

VIII SEMESTER

B.Tech.

END TERM EXAMINATION ***May-2024***

HU 410 Language and Social Media

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

Note : Attempt all Questions.
Assume suitable missing data, if any.

1. Explain the following with examples: CO 1, 2 (10)
i) Code Switching
ii) Code mixing

2. Corelate the impact of social media on the language and thought process of young users. least five principles to ensure that young children use language carefully on virtual platforms. CO 4 (10)

3. Using a demonstrative case study of a single brand/company advertisement, analyse the overall impact of social media campaigns on various brands and their public perception. What would you do differently, if you were the social media strategist in this campaign? CO2,3 (10)

4. Classify the different aspects of media language. Compare and contrast the role of non-linguistic applications and linguistic features of language on social media engagement? CO 3,4 (10)

5. Your college is going to organize a Cultural & Educational Fest. As the student coordinator for this fest, design the following to meet the following objectives: a) student participation and auditions; b) provide information about events, prominent guests and other details; c) create the right buzz for pre-event activities to ensure engagement. C0 5 (10)
i) a Whatsapp message for circulation within your institution
ii) a Creative write-up for intercollege outreach through various social media platforms.

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Total no. of pages: 01 Roll no.....

End-Sem Exam May 2024

Course Code: HU-412

Course Title: Adaptation and Translation

Time: 3 Hours Max. Marks: 50

Note: Read instructions carefully and answer accordingly.

Q1. Describe adaptation as a trans-creative process. (10 marks) (CO 2)

Q 2. What are the cultural challenges of translation? Discuss with a reference to *Raag Darbari.* (10 marks) (CO 1)

Q 3. What social and cultural differences do you find between *Othello* and *Omkara?* (10 marks) (CO 3)

Q 4. Answer any **two** of the following: (10 marks) (CO 3,1)

a. Differentiate between translation and transliteration.
b. What is audio-visual translation?
c. Discuss the challenges of translation.

Q3. Write critically about any translated work which you admire. (10 marks) (CO 5)

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

EVEN SEMESTER

PhD. Course Work

END TERM EXAMINATION, *May-2024*

COURSE CODE: HU 703 **COURSE TITLE: ECONOMETRICS**

Time: 03:00 Hours *Max. Marks: 60*

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

Q.1 Define autocorrelation and discuss its significance in analysing time series data. Explain how you detect autocorrelation and what are the remedies? [15][CO1, CO2]

Q.2 Define multicollinearity and discuss its causes, consequences, and methods for detection and remedy. Explain how multicollinearity affects regression coefficients, standard errors, and the overall model performance. [15] [CO2, CO3]

Q.3 Define heteroscedasticity. Explain how heteroscedasticity affects the assumptions of ordinary least squares (OLS) regression, including its impact on regression coefficients, standard errors, hypothesis testing, and confidence intervals. Discuss its detection and remedy. [15] [CO3,CO 4]

Q.4 What are dummy variables? Elaborate the uses of dummy variables in regression analysis. [15] [CO4, CO5]

Q.5 Discuss the difference between pooled OLS (Ordinary Least Squares) regression and fixed effects regression in panel data analysis. When would you prefer using fixed effects over pooled OLS? [15][CO4, CO5]

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

FIRST SEMESTER

Ph.D Course Work

END TERM EXAMINATION *May-2024*

COURSE CODE HU-708

COURSE TITLE- Gender and Technology

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

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

Q.1 Differentiate Sex and Gender? Discuss their different ways of association with technology? [4+6=10][CO#1and 3]

Q2. What do you mean by Women Empowerment? Discuss what role technology may playing in women empowerment. [10][CO# 3]

Q.3 What do you mean by 'Gender Biasness'? Do you think the Artificial Intelligence also may be gender biased? Give real world examples in support of your answer. [4+6=10][CO#1and 3]

Q.4 Discuss Cybercrime against Women? What precautions may be taken against probable Cybercrime? Discuss. [4+6][CO#2 and 3]

Q.5 What do you mean by Diversity and Inclusion? Discuss importance of diversity and inclusion in organisational leadership? [10] [CO#2]

Q.6 What do you mean by Gender Budgeting? Prepare a gender budget for a hypothetical manufacturing organisation? [4+6=10][CO#2 & 3]

Q.7 Discuss significance of technology in implementation of 'Lakhpati Didi' programme of the Government of India. [10] [CO#3]

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Total no of Pages 2 **Roll no.....**

2nd Semester

B.Tech. (Ist Year)

End Term Examination ***May-2024***

IT 102 Course Title: Discrete Structures

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. Consider the following logical statement S expressed in conjunctive normal form (CNF): [5] [CO1]

$S=(P \wedge Q \wedge R) \vee (\neg P \wedge Q \wedge \neg R) \vee (P \wedge \neg Q \wedge R) \vee (\neg P \wedge \neg Q \wedge R)$

Now, let P, Q, and R represent three different conditions, each of which can either be true (T) or false (F). Determine under what conditions S evaluates to true.

b. State and Prove the rules of inference for propositional logics. [5] [CO1]

Q.2 a. In a certain town, there are 100 people who like either pizza, burgers, or both. Among them, 60 people like pizza, 70 people like burgers, and 30 people like both pizza and burgers. [5] [CO2]

(i) How many people in the town like neither pizza nor burgers?

(ii) If there are 150 people in total in the town, how many people like neither pizza nor burgers?

b. Prove that for all positive integers n, the sum of the cubes of the first n positive integers is equal to the square of the sum of the first n^n positive odd integers. [5] [CO2]

In other words, prove that:

$$1^3 + 2^3 + 3^3 + \cdots + n^3 = (1 + 3 + 5 + \cdots . + (2n - 1))^2$$

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Q.3 a. Find a_{50}, where a_n is represented by the recurrence relation: [5] [CO3]

$a_n = -2a_{n-1} - 4a_{n-2}$, n is an integer ≥ 3, a_1=1, a_2=3 [5] [CO3]

b. Find the generating function for the Fibonacci sequence defined by

$a_n = a_{n-1} + a_{n-2}$, n≥2 , with a_0=0, a_1=1

Q.4 a. Let A = {a, b, c, d, e} and let R and S be relation on A whose matrices are given below. Compute the matrix of the smallest relation containing R and S. Also list the elements of this relation using Warshall's Algorithm. [5] [CO4]

$$M_R = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \end{bmatrix} \quad ; \quad M_S = \begin{bmatrix} 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

b. Draw oriented graph for given cut set matrix: [5] [CO6]

$$[C] = \begin{bmatrix} 0 & 0 & 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Q.5 a. Reduce the Boolean Expression and realize using minimum number of gates: [5] [CO5]

$$A = XY + X(Y + Z) + Y(Y + Z)$$

[5] [CO5]

b. Minimize the following Boolean Function and realize using NOR and NAND gate only. $F = \pi_m(1,3,4,6,8,9,11,13,15) + \sum_d(0,2,14)$

Total No. of Pages: 1

Roll No.....

II SEMESTER

B.Tech

END TERM EXAMINATION *May-2024*

IT104 **Object Oriented Programming**

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

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

Q.1 Write Short notes with examples (4*2=8)

i. Object oriented programming (CO 1)
ii. Dynamic binding (CO 2)
iii. Operator overloading (CO 3)
iv. Abstract Class (CO 3)

Q.2 (a) Write a program to calculate the circumference/perimeter of square, circle, rectangle and triangle using function overloading. (4) (CO 2)

(b) Explain inheritance of templates using example. (4)(CO 4)

Q.3 (a) Explain the access modifiers in Java with example. (4) (CO 6)

(b) Distinguish between overloaded functions and function templates with examples. (4) (CO 4)

Q.4 (a) What is an exception? Explain the concept of Rethrowing exceptions? Explain with example. (4) (CO 5)

(b) What is multithreading in Java? Explain the life cycle of a thread. (4) (CO 5)

Q.5 (a) What is Interface? Write a Java program to create an Animal interface with a method called Sound() that takes no arguments and returns void. Create a class each for Dog, Cat, and Lion that implements Animal to print their sound. (4) (CO 5)

(b) Write a Java program to insert, update, iterate and delete the elements in a Vector. (4) (CO 6)

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

IV SEMESTER **B.Tech**

END TERM EXAMINATION ***May-2024***

IT 202 Database Management System

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

Note:
- Attempt **any 4** questions.
- All questions carry equal marks.
- Questions should be attempted sequentially with proper numbering of the parts or sub-parts together with headings and sub-heading.
- Use examples for explaining your answer.

Q1. Answer the following: 2X5 **[CO#2,5,6]**

a) Explain serializability.
b) What is 'ACID' w.r.t database?
c) Explain clustering in indexes (indices)?
d) Outline the role of commit and rollback.
e) Group by works with aggregate function. Explain.

Q2. a) What is a deadlock? Explain the timestamp ordering protocol. 3 **[CO#4-6]**

b) Draw the precedence graph of the following and state about their serializability (conflict): 2x1.5 **[CO#5,6]**

i) S:

T1	T2	T3
R(X)		
	R(X)	
		W(A)
W(A)		

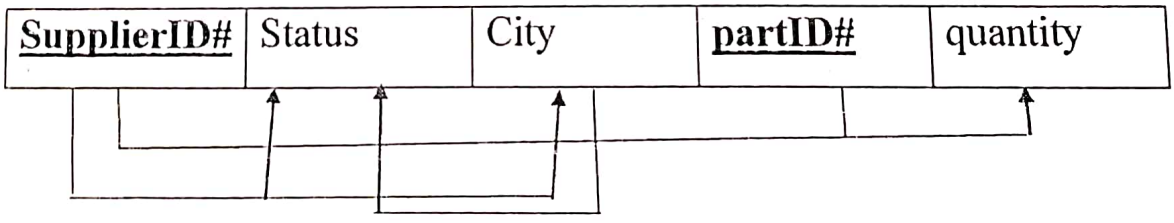
ii) S: r2(a), r1(a), w1(c) , r3(c), w1(b), r4(b), w3(a), r4(c), w2(d), r2(b), w4(a), w4(b), c1, c2, c3, c4;

c) How does two-phase locking guarantee serializability? Explain the lock conversion schemes available in lock-based mechanism. Write the pseudo code for the operations available in each lock category. 4 **[CO#4-6]**

Q3. a) Explain the concept of linear hashing with their merits and demerits. 3 **[CO#4]**

b) Consider a file of 8192 records. Each record is 16bytes long and its key field is of size 6 bytes. The file is ordered on a key field, and the file organization is unspanned [the record of a file is stored inside the block only if it can be stored completely inside it] .The file is stored in a file system with block size 512 bytes and the size of a block pointer is 10 bytes. If the primary index is built on the key field of the file, and the multilevel index scheme is used to store the primary index, what is the number of first-level and second level blocks in the multilevel index? 3 **[CO#4]**

c) What are MVDs (multi value dependency)? Explain with example. Give the existing normal form of the given schema and normalize it to the highest normal form possible: 4 **[CO#1,2,3]**



Q4. a) Does the relational model, as seen by an SQL query writer, provide physical and logical data independence? Explain. 3 **[CO#1,2]**

b) How to map the following to RDBMS: 1x3 **[CO#1-3]**

i) Composite Attribute

ii) Multivalued Attribute

iii) specialization with partial participation

c) Consider the following schema and frame the queries as asked: 1x4 **[CO#2,3]**

Manufacturer (m_id, m_name, factory_location, discount_offered)

Parts (p_id, p_name, p_price, material_used, temperature_to_store)

Manufactures (m_id, p_id)

Orders (o_id, part_id, manufacturer_id, total_price, distance)

Distance: distance from the factory to the location of delivery

i) Write an SQL query for displaying the count of factories location-wise.

ii) List the name(s) of the manufacturer who manufactures parts -P1 and P3 but not P2 [using relational algebra]

iii) A view to show the Material-used, factory location, part name of the parts which are delivered at a location more than 1000kms.

iv) Change/increase the total price of the order to 10% where the raw material used was '*silver*'

Q5. a) Explain the difference between 1x3 **[CO#1,2,4]**

i) Sparse and dense index

ii) Where clause and having clause

iii) Strict and cascade less schedule

b) Which operators are available in tuple calculus? Explain with examples. 3 **[CO#3,4]**

c) Write short notes on **(any 2)** 2x2 **[CO#5]**

i) Unrepeatable read problem

ii) Phantom records

iii) Write and read sets

--END--

Roll no.....

Total no. of Pages: 02

IVth, VIth, VIIIthSEMESTER

B.Tech.

May-2024

END TERM EXAMINATION

COURSE CODE IT 204 COURSE TITLE Operating System

Time: 03:00 Hours Max. Marks: 40

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

Q.1 a) Define and elaborate in detail the different types of operating systems? [4][CO1]

b) What is starvation? Consired Shortest Remaining time first and Non-Premptive Shortest remaining time first scheduling, which of them may lead to starvation and why, explain in detail? [4][CO2]

Q.2 a) What is scheduler and explain its role? What are the different types of schedulers. Explain about their usage in detail? [4][CO2]

b) An operating system uses Shortest Remaining Time first (SRT) process scheduling algorithm. Consider the arrival times and execution times for the following processes:

Process	Execution time	Arrival time
P1	20	0
P2	25	15
P3	10	30
P4	15	45

What is the average waiting time and turnaround time? [4][CO2]

Q3 a) What is race condition? How race condition occurs in producer and consumer problem? Explain in detail by giving all the psuedocodes? [4] [CO3]

b) Consider the methods used by processes P1 and P2 for accessing their critical sections whenever needed, as given below. The initial values of shared boolean variables S1 and S2 are randomly assigned.

Method Used by P1

```
while (S1 == S2) ;
Critica1 Section
S1 = S2;
```

P.T.O.

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Method Used by P2
while (S1 != S2) ;
Critical Section
S2 = not (S1);
Explain necessary conditions to enter critical section and explain which of them are valid and which of them are not valid for the given implementation? Support your resoning with examples? [4][CO3]

Q.4 a) What is the need of Page replacement? Consider the following reference string.
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1
Find the number of Page Faults with FIFO, Optimal Page replacement with four free frames which are empty initially. Which algorithm gives the minimum number of page faults? [4][CO5]

b) Consider the following snapshot of the system

Process	Max	Allocation	Available
	A, B, C, D	A, B, C, D	A, B, C, D
P0	6 0 1 2	4 0 0 1	3 2 1 1
P1	2 7 5 0	1 1 0 0	
P2	2 3 5 6	1 2 5 4	
P3	1 6 5 3	0 6 3 3	
P4	1 6 5 6	0 2 1 2	

Using Banker's algorithm, answer the following questions:-
i) How many resources of type A, B, C, D are there?
ii) What are the contents of need matrix?
iii) Find if the system is in safe state? If it is, find the safe sequence. [4][CO4]

Q5. Explain in deatil on the following?
a) File concept, File organization and acess mechanism
b) I/O devices, organization of I/O functions and I/O buffering [4+4][CO6]

4th SEMESTER

B. Tech.

END TERM EXAMINATION **May-2024**

IT206 COMPUTER ORGANISATION & ARCHITECTURE

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

Note: All questions are compulsory. Kindly check the paper code before starting 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#]
Q1.	a) State the clear differences between Computer Architecture (CA) and Computer Organization (CO).	[2] [CO1]
	b) Show and discuss a 4-bit Adder-Subtractor using full adders and XOR gates. OR Design a 4-bit decrementer combinational circuit using four full-adder circuits and discuss its operation in details.	[4] [CO1]
	c) Show a 4-bit combinational shifter circuit and discuss its working.	[4] [CO1]
Q2.	a) Show the list of registers for basic computer in a tabular form with their functions.	[2] [CO2]
	b) Draw the control unit of basic computer and discuss its working in details.	[3] [CO2]
	c) What do you mean by Instruction Cycle (IC) of a computer system and how many phases IC can be divided. Discuss with micro-instructions and timing signals in details.	[3] [CO2]
	d) Draw the Flowchart for Instruction Cycle (initial configuration).	[2] [CO2]

Q3. a) Write the micro-operations need to execute the following instructions: [6] [CO3]

I. LDA: Load to AC

II. BSA: Branch and Save Return Address

III. ISZ: Increment and Skip if Zero

b) Draw the flowchart for interrupt cycle. Also demonstrate the interrupt cycle with the help of an example. [4] [CO3]

OR

Explain the daisy chaining priority interrupt with a neat and clean diagram.

Q4. a) A computer system has 16 registers, an ALU (arithmetic logic unit) with 32 operations, and a shifter with eight operations, all connected to a common bus system. [6] [CO3]

i. Formulate a control word for a micro-operation.

ii. Specify the number of bits in each field of the control word and give a general encoding scheme.

iii. Show the bits of the control word that specify the micro-operation R4 → R5+R6.

b) Draw and discuss the general flowchart of multiplication of floating-point (FP) numbers in computer system. [4] [CO3]

OR

Show the step-by-step multiplication of (-9)x (-13)= +117 with the help of Booth Algorithm.

Q5. a) What do you mean by Pipelining? Demonstrate pipeline organization with the help of following example to perform the combined multiply and add operations with a stream of numbers. Ai * Bi + Ci, for i = 1, 2, 3, . . . , 7. [3] [CO4]

OR

What do you mean by pipeline conflicts? How many types of conflicts occur in the system that cause the instruction pipeline to deviate from its normal operation? How these conflicts

can be resolved to improve the performance of system?

b) What do you mean by addressing modes? Explain all possible addressing modes with the help of examples. [3] [CO4]

c) Draw the address map for microcomputer having four RAM chips of each size 256 bytes and one chip of size 1024 bytes. [2] [CO4]

OR

Draw the Match logic for one word of associative memory and discuss in details.

d) Discuss the Clock page replacement algorithm with suitable diagram. [2] [CO4]

**********End**********

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

4TH SEMESTER

[B.TECH. – IT]

END TERM EXAMINATION **MAY- 2024**

IT208 ALGORITHMS DESIGN AND ANALYSIS

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

Note: Attempt any 5 Questions.
Each Question Carries Equal Marks.
Assume suitable missing data, if any.

Q1

a) Explain asymptotic notations. and solve each of the following recurrences (5)[CO 1]

i. T(N) = T(N/10) + T(9N/10) + O(N) (using recursion tree)

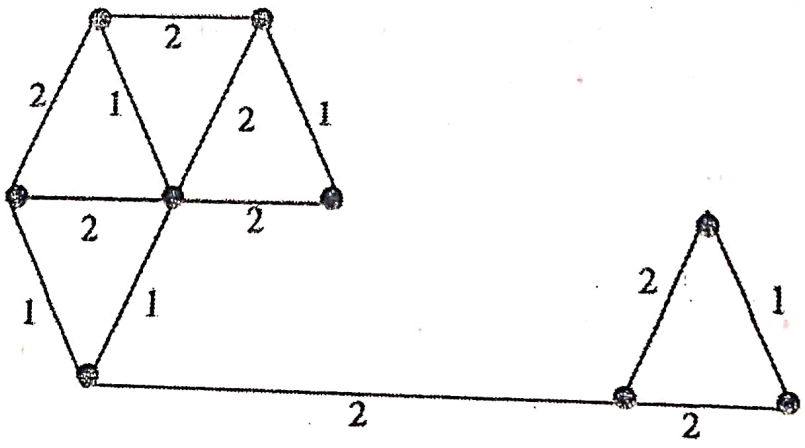
ii. $T(n) = 2T(n/4) + n^{1/2}$ (using master method)

b) Find the maximum element in an array using Divide & Conquer Approach. The array is in ascending order till the maximum element and then is in decreasing order till the end as given below. Write the algorithm and analyse it for complexity. (5)[CO 2]

Input: arr[] = {1, 3, 50, 10, 9, 7, 6}
Output: 50

Q2

a) Use Prim's minimum spanning tree algorithm to find minimum spanning tree for the given weighted graph. Also analyse the complexity of the algorithm (5) [CO 3]



b) Write an algorithm for longest common Subsequence problem using dynamic programming techniques and use it to solve for the following X and Y subsequences. X= [A,B,C,B,D,A,B], Y=[B,D,C,A,B,A]. Use the algorithm to construct the tables ***(c and b)*** for calculating the **length** as well as the **path** of the longest common subsequence. (5) [CO 3]

Q3

(a) Define backtracking phenomenon? Draw the state space and cut the state space for the 4- queen problem by applying backtracking? Explain the various constraints with examples. (5) [CO 5]

(b) Solve the Travelling Salesman Problem having the following cost matrix using Dynamic approach. 0 represents no path (5)[CO 3]

	A	B	C	D
A	0	4	2	3
B	2	0	3	2
C	4	3	0	3
D	7	4	8	0

Q4

(a) Explain the greedy approach for finding an optimal solution and how is it different from the dynamic approach? Show that the activity selection problem has an optimal substructure property and greedy choice property. (5) [CO 4]

OR

(a) Explain prefix codes and their advantages. Give Huffman algorithm for the same and obtain prefix codes for the following instance and analyze complexity of Huffman algorithm. (5) [CO 4]

Character	a	b	c	D	E	f	g	H
No of occurrences (in thousands)	9	5	3	2	6	8	1	7

(b) Given **N** items with weights **W[0..n-1]**, values **V[0..n-1]** and a knapsack with capacity **C**, select the items such that (5) [CO 6]

i. The sum of weights taken into the knapsack is less than or equal to C.

ii. The sum of values of the items in the knapsack is maximum among all the possible combinations.

Use Least Cost Branch and Bound to solve the below problem and calculate the Maximum Profit using State Space Diagram.

N = 4 , C = 15

W	2	4	6	9
V	10	10	12	18

Q5. Briefly explain with the help of examples:- (10)[CO 7]

(a) P Problem

(b) NP-Hard Problem

(c) NP-Complete Problems.

(d) Polynomial versus nonpolynomial time complexity

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Total No. of Pages _02__ Roll No. .....

_Sixth__ SEMESTER B.Tech [IT]

END SEMESTER EXAMINATION May-2024

IT-302 COMPILER DESIGN

Time: 3:00 Hours Max. Marks : 40

Note : Answer all questions. Q.3 has a choice.
Assume suitable missing data, if any.

Q.1 For the given grammar:

$S \rightarrow id=E$, $E \rightarrow (E)$, $E \rightarrow E+E$, $E \rightarrow E-E$, $E \rightarrow E \times E$, $E \rightarrow id$

a) Write the Syntax Directed Definition for 3-address code generation based on the given grammar.

b) Draw the annotated parse tree for the given string:

$a=(b+c)\times(d-e)$

c) Traverse through the tree to generate the 3-address code for the given string: $a=(b+c)\times(d-e)$. [15] [CO5]

Q.2 For the given grammar:

$S \rightarrow id=E$, $E \rightarrow (E)$, $E \rightarrow E+E$, $E \rightarrow E-E$, $E \rightarrow E \times E$, $E \rightarrow id$

a) Construct the SLR(1) parsing table.

b) Construct the sequence of moves table to check for syntax error in the given string: $a=(b)\times(d)$

c) Describe how an error recovery scheme can be incorporated in the above design of SLR(1) parser.

[15] [CO4]

b. Draw a context diagram, level1 DFD of the above requirement of the system. [5][CO3]

or

Draw a detailed dataflow diagram for library management [5][CO3]

Q.5 a. Justify the statement "Software maintenance is costlier" [5][CO5]

b. What is performance testing and Explain How test cases are generated? [5][CO6]

or

b. Discuss the differences between black box and white box testing models. [5][CO6]

Total no. of Pages:02

Roll no.....

IVth, VIth, VIIIthSEMESTER

B.Tech.

May-2024

END TERM EXAMINATION

COURSE CODE IT 306

COURSE TITLE Artificial Intelligence and Expert Systems

Time: 03:00 Hours

Max. Marks: 40

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

Q.1 Define and elaborate in detail the following terms.

a. Fully Observable and partially observable environment.

b. Deterministic vs Stochastic environment

c. Model based agent

d. Goal based agent

[8][CO1]

Q.2 a) Using the best first search algorithm solve the 8 Puzzle problem given below.

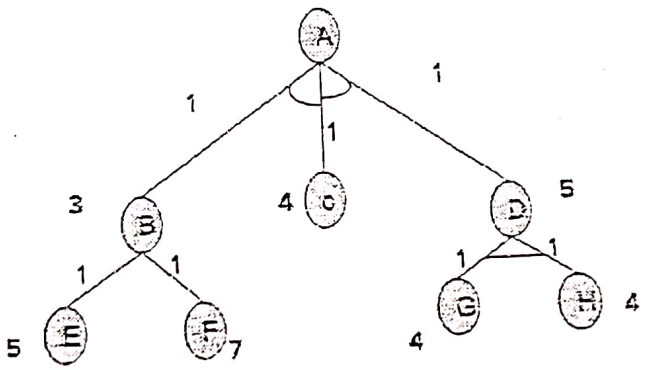
2		3
1	8	4
7	6	5

Initial State

1	2	3
8		4
7	6	5

Final State

b) Using AO* algorithm solve the following problem.



[4+4][CO2]

Q.3 Consider the following sentences:

- John likes all kinds of food.
- Apples are food.
- Chicken is food.
- Anything anyone eats and isn't killed by is food.
- Bill eats peanuts and is still alive.
- Sue eats everything Bill eats.

a) Translate these sentences into formulas in predicate logic.

b) Prove that John likes peanuts using backward chaining.

c) Convert the formulas of part a into clause form.

d) Prove that John likes peanuts using resolution.

[8][CO3]

Q.4 a) Methane biofilters can be used to oxidize methane using biological activities. It has become necessary to compare performance of two test columns, A and B. The methane outflow level at the surface, in nondimensional units of X = {50, 100, 150, 200], was detected and is tabulated below against the respective methane inflow into each test column. The following fuzzy sets represent the test columns:

$$\underset{\sim}{A} = \left\{\frac{0.15}{50} + \frac{0.25}{100} + \frac{0.5}{150} + \frac{0.7}{200}\right\} \quad \underset{\sim}{B} = \left\{\frac{0.2}{50} + \frac{0.3}{100} + \frac{0.6}{150} + \frac{0.65}{200}\right\}$$

Calculate the union, intersection, and the difference for the following.

b) What is Genetic Algorithm. With respect to genetic algorithm explain crossover and mutation with proper examples.

[4+4][CO5]

Q.5 a) Draw and discuss the architecture of expert system. Also give differences between conventional system and expert system.

[4][CO6]

b) Write a Prolog program to calculate the factorial of a given number.

[4][CO4]

Total no. of Pages:02

Roll no..... 320

VI SEMESTER

B.Tech

END TERM EXAMINATION *May-2024*

COURSE CODE: IT312 COURSE TITLE: Cyber Forensics

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

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

Q.1 a. Define ARP and RARP protocols.

b. What is Answer Bot?

c. List and describe types of Linux shells with examples.

d. What are the three A's of cyber forensics?

[4X2][CO1,CO2,CO3]

Q.2 Design a malicious program for copying files. Write its program code in C/C++. [8][CO1]

Q.3 Design digital evidence processing steps for the situation given below:

"A Video file has been accessed and copied for the victim's computer" [8][CO2]

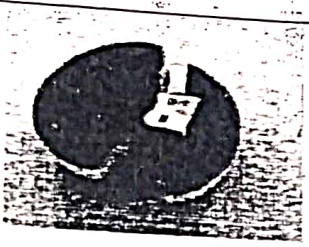
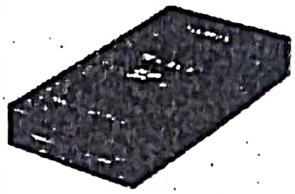
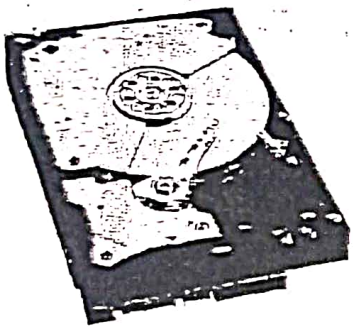
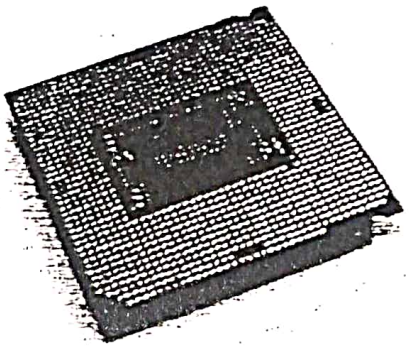
OR

What is volatile information? Briefly explain the process of collecting volatile data under Windows for live response. [8][CO2]

Q.4 What is an android malware? Explain the static and dynamic malware analysis. Out of both which one is performed first and why [8][CO4]

(21)

Q.5 Identify and explain the following devices:

[a]	[b]
	
[c]	[d]
	

[8][CO3]

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Total No. of Pages: 02 *Roll No.....*

B.Tech. (All) **6th/8th Semester END-TERM EXAMINATION** **May-2024**

COURSE CODE: IT316 **COURSE TITLE: High-Speed Networks**

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

Note: Assume suitable missing data, if any.
[M]: Marks allocated to the question.

Q. 1. (a) Define Quality of Service (QoS) and its importance in networking. Explain the key metrics used to measure QoS in communication networks **[CO5] [5]**

(b) Explain the effect of congestion on a network and network performance with graphical representation? How does Explicit congestion notification alleviate congestion? **[CO5] [5]**

OR

(c) What are the various Traffic and congestion related attributes in ATM, how do they contribute to the Traffic management framework? **[CO3] [5]**

Q. 2. (a) Compare header fields and features to prove how is IPv6 is an improvement over IPv4? **[CO6] [5]**

(b) Describe the Border Gateway Protocol (BGP) and its role in interdomain routing. Discuss the scalability challenges and security considerations of deploying BGP in large-scale networks. **[CO6] [5]**

Q. 3. (a) Describe the Resource Reservation Protocol (RSVP) and its role in QoS support. Discuss the limitations and challenges of deploying RSVP in large-scale networks. **[CO1] [5]**

(b) RTP along with RTCP provides most suitable soft real time communication over Transport layer protocols? Justify **[CO5] [5]**

OR

(c) Explain the concept of Multiprotocol Label Switching (MPLS) and its advantages in packet forwarding. Discuss how MPLS labels are assigned and used to route packets through an MPLS network. **[CO5] [5]**

Q. 4. (a) What are goals of Random Early Detection, explain how the RED algorithm achieves these goals. [CO4] [5]

(b) Explain the concept of Differentiated Services (DiffServ) and its approach to QoS provisioning. Provide examples of QoS treatments [CO4] [5]

OR

(c) Describe with the help of suitable diagram the general depiction of the implementation architecture for Integrated Service Architecture [CO4] [5]

Q. 5. (a) Define queuing models/discipline and its role in managing packet traffic in network routers. Discuss different queuing disciplines commonly used in network router [CO2] [5]

(b) Traffic shaping achieve consistent network performance as a Traffic management technique. Justify [CO3] [5]

****END****

Total No. of Pages: 03 Roll No._____

SIXTH SEMESTER B.Tech. (ALL)

END SEMESTER EXAMINATION May-2024

IT-324a DEEP LEARNING

Time: 3:00 Hours Max. Marks: 40

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

Q.1) **a)** Consider a simple Recurrent Neural Network (RNN) with one input unit, one hidden unit and one output unit. The RNN uses the sigmoid activation function for the hidden unit and the output unit. The weight matrix from the input to hidden unit $w_{ih} = \begin{bmatrix} 0.6 \\ -0.4 \end{bmatrix}$, the weight matrix from the hidden to output unit $w_{ho} = [0.8 \quad -0.7]$, and the bias vector is $b = \begin{bmatrix} 0.5 \\ -0.3 \end{bmatrix}$. Given an input vector $x = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ and an initial hidden state $h_0 = [0.3]$, calculate the output of this RNN after one time step (i.e.,y_1). [5][CO5]

b) Explain the role of Long Short-Term Memory (LSTM) networks in addressing the vanishing and exploding gradients problem in Recurrent Neural Networks (RNNs). Provide a step-by-step description of how LSTM networks handle long-term dependencies and why they are more effective than traditional RNNs in such scenarios. Use diagrams or flowcharts to illustrate your answer and ensure clarity in your explanation. [5][CO5]

Q.2 **a)** How does the self-attention mechanism work in a Transformer network? Consider a self-attention mechanism in a Transformer model with a query vector Q [3,1,4], a key vector K =[1,2,0] and a value vector V= [2,5,1]. Compute the output vector using the softmax function for attention weights. [5][CO5]

b) Explain the key differences between a Variational Autoencoder (VAE) and a traditional Autoencoder. Discuss how the VAE's latent representation differs in terms of distribution modeling compared to a standard Autoencoder. [5][CO5]

Q.3 **a)** Consider a Deep Learning model designed for image classification tasks. The model architecture consists of several layers, including

convolutional layers (CONV), pooling layers (POOL), and fully connected layers (FC). Each layer has specific parameters and impacts the size of the feature maps. The number of parameters (weights) and biases for each CONV layer. The size of the feature maps after each layer (excluding the INPUT layer). [5][CO4]

Layer	Feature maps dimension	No. of Parameters	No. of Biases
INPUT	128*128*3	0	0
CONV-7-32			
POOL-2			
CONV-3-64			
POOL-2			
CONV -3-64			
POOL -3			
FC 128			

OR

Consider a neural network with the following architecture:

- Input layer with 1000 neurons
- Hidden layer 1 with 500 neurons
- Hidden layer 2 with 300 neurons
- Output layer with 10 neurons

The network uses dropout regularization with a dropout rate of 0.3 applied to both hidden layers during training.

i. Calculate the number of parameters in the network before dropout regularization. [1][CO3]

ii. Calculate the number of parameters in the network after dropout regularization. [1][CO3]

iii. Explain how dropout regularization helps in preventing overfitting and improving the generalization of the neural network. [2][CO3]

iv. Discuss any potential drawbacks or limitations of dropout regularization that one should be aware of when using it in neural networks. [1][CO3]

b) Consider three activation functions sigmoid(x), tanh(x) and softmax(x), Derive expression representing gradient of these activation functions. Arrange them based on the amplitude of their gradient at a point where x=0.3. [5][CO3]

Q.4 a) Given a scenario where a research scholar is proficient in Python but not familiar with deep learning frameworks, recommend which framework (TensorFlow, PyTorch, Keras) would be suitable for their needs. Justify your recommendation based on ease of use, community support, and performance considerations. [5][CO6]

b) Describe ResNet-50's skip connections and their role in combating vanishing gradients. Explain how ResNet-50 achieves deeper training compared to VGG-16, highlighting its architectural advancements. Discuss a scenario favouring ResNet-50 over shallower architectures, citing its design benefits and advantages. [5][CO4]

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Total No. of Pages : 1 Roll No.....

6TH TH SEMESTER [B.TECH.- IT]

END SEMESTER EXAMINATION (MAY- 2024)

IT-328 ETHICAL HACKING

Time: 3:00 Hours Max. Marks : 50

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

1. [a] Explain the different types of scanning done by active hackers, and give a few countermeasures that can be employed by a security administrator against Port-scans on their network. (5)[CO 2]

[b] Explain the various techniques that hackers can use to gather information about the target. (5)[CO 2]

2. [a] Explain the different types of attacks a hacker may use to identify passwords. (5)[CO 3]

[b] Explain the DNS and IP Sniffing in ethical Hacking (5)[CO 3]

3. [a] Discuss the different phases involved in session Hijacking. (5)[CO 3]

[b] Write a technical note on cross-site scripting. (5)[CO 3]

4. [a] Explain different Wireless Hacking Methods and discuss the different ways of increasing security of home wireless networks. (5)[CO 5]

[b] Explain the role of WEP in authentication and the weakness of WEP keys that can be exploited to crack them. (5)[CO 5]

5. Answer the following brief (5*2=10)[CO1]

i) Explain the term "vulnerability" in terms of Ethical Hacking.

ii) Differentiate between black hats and white hats.

iii) What is Traceroute? How does it operate?

iv) Discuss the term "footprinting".

v) Explain ARP poisoning with an example.

Total no. of Pages:2 Roll no.....

VI/VIII SEMESTER

B.Tech.

END TERM EXAMINATION May-2024

IT420 COMPUTER VISION

Time: 03:00 Hours Max. Marks: 40

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

Q.1 a) Explain the concept of depth perception in the context of human vision and how it contributes to our understanding of 3D environments. Additionally, describe the principles behind stereo vision and how it mimics human depth perception. Discuss the advantages and limitations of stereo vision compared to other depth sensing techniques, and provide examples of real-world applications where stereo vision plays a crucial role. [5][CO4]

b) Explain the concept of the Lucas-Kanade optical flow algorithm. How does it work, and what are its key assumptions and applications? [5][CO4]

Q.2 Find the matrices U, Σ, V for $A = \begin{bmatrix} 3 & 0 \\ 4 & 5 \end{bmatrix}$. The rank is r = 2. [5][CO4]

OR

Given the following data, use PCA to reduce the dimension from 2 to 1.

Features / Patient	Systolic BP	Diastolic BP
Patient 1	126	78
Patient 2	128	80
Patient 3	128	82
Patient 4	130	82
Patient 5	132	84
Patient 6	130	86

[5][CO6]

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Q.3 a) Describe the concept of a snake (active contour) model in image processing. How does it work, and what are its key components and parameters? Discuss how snake models are used for tasks such as image segmentation and boundary detection. [5][CO5]

b) What are the disadvantages of Fourier transform in multiresolution analysis? How wavelet helps in multiresolution analysis? [5][CO5]

Q.4 "Suppose you are building a spam email classifier using Naive Bayes in computer vision. You have a dataset of 1000 emails, where 500 emails are labeled as spam and 500 emails are labeled as non-spam (ham). Each email is represented by a bag-of-words model with 5000 unique words/features.

a) Compute the prior probabilities P(spam) and P(ham) based n the given dataset.

b) For a new email with the following word counts:

i. 50 occurrences of the word 'free'

ii. 20 occurrences of the word 'offer'

iii. 10 occurrences of the word 'discount'

Compute the posterior probabilities P(spam|email) and P (ham|email) using naïve Byes. Determine the predicted class (spam or ham for new email. [5][CO2]

Q.5 a) Given an input grayscale image. Make its histogram, perform histogram equalization and show the resulting transformed image and its histogram. [7][CO3]

Grayscale Image:

$$\begin{bmatrix} 100 & 120 & 130 & 140 \\ 150 & 160 & 170 & 180 \\ 190 & 200 & 210 & 220 \\ 230 & 240 & 250 & 255 \end{bmatrix}$$

b) What are the limitations of Hough transform, how lines can be detected in an image using this method. [3][CO6]

Total no. of Pages:1 329 Roll no.....

VI SEMESTER BTECH

END TERM EXAMINATION May-2024

MG-302 Fundamentals of Management

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

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

Q.1 Using suitable examples, explain five of the unethical issues in Marketing **[10 Marks][CO#3]**

Q.2 Differentiate between Tacit and explicit knowledge. Discuss the DIKW model. **[10 Marks][CO#3]**

Q.3 Explain briefly the financial instruments traded in the stock market. **[10 Marks][CO#2]**

Q.4 What is dividend, and what key factors should a financial manager consider when making a dividend decision? **[10 Marks][CO#1]**

Q.5 Explain the theories X, Y, and Z. **[10 Marks][CO#1]**

Total No. of Pages: 2 Roll No. _____

II SEMESTER B.Tech. (MCE)

END TERM EXAMINATION May-2024

MC102 DISCRETE STRUCTURE

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

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

Q.1 Assess the following argument, using the rules of inference and logic equivalences evaluate the conclusion: [5][CO1][L5]

Premises: $(\neg p \vee q) \rightarrow r,\ r \rightarrow (s \vee t),\ \neg s \wedge \neg u,\ \neg u \rightarrow \neg t$

Conclusion: p

Q.2 Solve the following recurrence relation: [5][CO4][L3]

$a_n = 3a_{n-1} + 10a_{n-2} + 7.5^n,\ a_0 = 4\ \&\ a_1 = 3$

Q.3 [a] Calculate how many ways 5 people are selected from a group of 10 physics and 5 maths teachers such that atmost 1 physics teacher is always selected in the selection made. [2][CO4][L3]

[b] Determine how many 8-bit binary strings either starts with 11 or ends with 000? [3][CO4][L3]

Q.4 Explain the Binomial theorem and hence find the expansion of $(1 - x + x^2)^4$. [5][CO4][L2]

Q.5 Design the Hasse diagram to illustrate the partial ordering of the set of all subsets of {1,2,3,4} over having at least two numbers partially ordered by $\supseteq$. Describe any maximal, minimal, greatest and least elements. [5][CO2][L6]

Q.6 Show that the function $f : R \rightarrow R$, given by $f(x) = 4x - 1\ \forall x \in R$, is one-to-one and onto function. [5][CO3][L3]

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Q.7 Answer *any two* of the following:

[a] List and summarize various types of lattices. [5][CO2][L1]

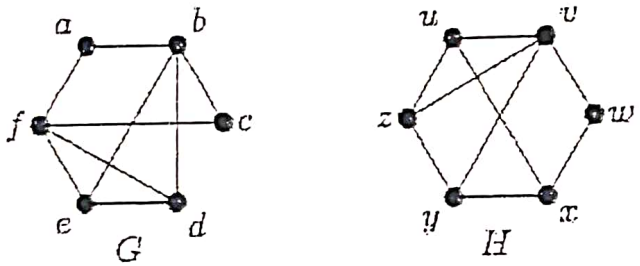
[b] Show that the reduced form of the Boolean expression $F(P, Q, R) = (P+Q)(P+R)$ is $P+QR$ using Boolean identities. [5][CO4][L3]

[c] Using Karnaugh's map, minimize the following Boolean function in SOP form: [5][CO2][L3]

$F(A, B, C, D) = \Sigma m(0, 2, 5, 7, 8, 10, 13, 15)$

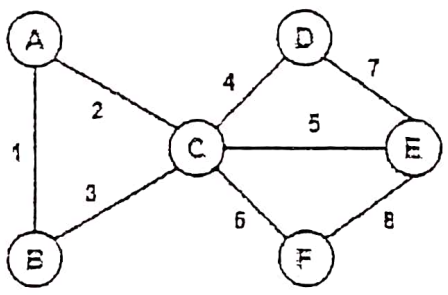
Q.8 Answer *any two* of the following:

[a] Analyze and explain whether the following graphs are isomorphic or not: [5][CO3][L4]



[b] Explain types of graph colouring with the help of an example. [5][CO3][L2]

[c] Evaluate the minimum cost and illustrate the minimum spanning tree for the graph given below using Prim's algorithm: [5][CO3][L5]



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SECOND SEMESTER B.Tech.

END SEMESTER EXAMINATION May, 2024

MC104 - Complex Analysis

Time: 3 Hr. Max. Marks: 50

Note: Attempt any five questions. Each question carry equal marks.

[5] CO-1 1. (a) Show that the triangle with vertices z_1, z_2 and z_3 is equilateral if

$$z_1^2 + z_2^2 + z_3^2 = z_1z_2 + z_2z_3 + z_3z_1.$$

[5] CO-1 (b) Define stereographic projection. Hence, find the image of the points 1, i, $1+i$ and $1-i$ on the sphere of radius $1/2$ and center $(0, 0, 1/2)$.

[5] CO-2 2. (a) Differentiate between analytic and differentiable functions. Find the region in which $f(z) = \log z$ is analytic.

[5] CO-2 (b) Determine the analytic function $f(z) = u + iv$ such that

$$u - v = e^x(\cos y - \sin y).$$

[5] CO-3 3. (a) Find the image of $|z - 2i| = 2$ under the transformation $w = \dfrac{1}{z}$.

[5] CO-3 (b) Construct a linear fractional transformation that maps the points 1, i, and -1 on the unit circle $|z| = 1$ onto the points -1, 0, 1 on the real axis. Determine the image of the interior $|z| < 1$ under this transformation.

4. (a) Using Cauchy's integral formula, evaluate $\oint_C \frac{e^{2z}}{(z+1)^4}\,dz$ where [5] CO-4

C is the circle $|z| = 2$.

(b) Let z_0 is a complex number interior to any simple closed contour [5] CO-4

C. Then, show that $\oint_C \frac{dz}{(z-z_0)^n} = \begin{cases} 2\pi i & n = 1 \\ 0 & n \neq 1 \end{cases}$; $n \in \mathbb{Z}$.

5. (a) Define zero of order n for a function $f(z)$ analytic in some disk [5] CO-
$|z - z_0| < R$. Find the order of zero $z = 0$ for

$$f(z) = z(1 - \cos^2 z).$$

(b) Expand $f(z) = \frac{1}{(z-1)^2(z-3)}$ in a Laurent series that is valid [5] CO-

for $0 < |z-1| < 2$. Also, evaluate $\oint_C \frac{1}{(z-1)^2(z-3)}\,dz$ where

C is the rectangle defined by $x = 0$, $x = 4$, $y = -1$ and $y = 1$.

6. (a) State Morera's theorem, Liouville's theorem and fundamental [5] CO-4
theorem of algebra.

(b) Show that $\int_0^{2\pi} \frac{1}{(2+\cos\theta)^2}\,d\theta = \frac{4\pi}{3\sqrt{3}}$. [5] CO-5

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IV^{th} SEMESTER

B. Tech.(MC)

End Term Examination

May 2024

MC – 202 Real analysis

Time: 3 Hours

Max. Marks: 50

Note: Attempt any five and all questions carry equal marks.

(1) (a) State and prove Integral of a Derivative in the Riemann integral.

(b) If the function f is defined on $[a, b]$ by

$$f(x) = c, \ x \in [a, b],$$

where c is a constant, then show that $f \in \mathcal{R}[a, b]$ and

$$\int_a^b f(x)dx = c(b-a). \qquad \text{(CO4) (10)}$$

(2) (a) If $\mathcal{P}^*$ is a refinement of a partition $\mathcal{P}$, then for a bounded function f prove that

$$L(\mathcal{P}^*, f) \geqslant L(\mathcal{P}, f) \text{ and } U(\mathcal{P}^*, f) \leqslant U(\mathcal{P}, f).$$

(b) State and prove Splitting integral property of Riemann integral. (CO4) (10)

(3) (a) Define metric space and show that the function ρ defined by

$$\rho(\mathbf{x}, \mathbf{y}) = \sqrt{\sum_{i=1}^{n} (x_i - y_i)^2}, \quad \forall \mathbf{x}, \mathbf{y} \in \mathbb{R}^n,$$

in the set $\mathbb{R}^n$ of all ordered n-tuples is a metric.

(b) Define the open sphere and open set and prove that each open sphere is an open set, in a metric space (X, ρ). (CO3) (10)

(4) (a) Let (X, ρ) be a metric space. If a Cauchy sequence has a convergent subsequence, then show that the sequence is convergent.

(b) Describe the open and closed spheres in discrete metric space. (CO3) (10)

(5) (a) Suppose (s_n) and (t_n) are sequences of real numbers and

$$\lim_{n\to\infty} s_n = L \text{ and } \lim_{n\to\infty} t_n = M,$$

where $L, M \in R$ then show that

$$\lim_{n\to\infty} s_n t_n = LM$$

(b) Define the nested intervals. Let (I_n) be a sequence of non-empty closed bounded intervals such that

$$I_n = [a_n, b_n], \quad I_{n+1} \subset I_n, \quad \text{for all } n \geq 1,$$

$$\text{and} \quad (b_n - a_n) \to 0 \text{ as } n \to \infty,$$

then prove that $\bigcap_{n=1}^{\infty} I_n$ contains one and only one point. (CO2) (10)

(6) (a) A real sequence (s_n) is convergent to a real number l, i.e.,

$$\lim_{n\to\infty} s_n = l,$$

in other words, for every $\varepsilon > 0$ there exists a positive integer $m(\varepsilon)$ such that

$$|s_n - l| < \varepsilon, \ \forall n \geq m.$$

Justify the dependency of m on ε with the help of an example.

(b) Prove that the set of rational numbers is not a complete ordered field. (CO1) (10)

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Semester – 4

B.Tech.

End Term Examination **MAY-2024**

MC- 204 (scientific computing)

Time : 3:00 Hrs Max Marks = 40

NOTE : Attempt any five questions. All questions carry equal marks.

Assume any missing data.

1. (a) For the following data, find the interpolating polynomial and an approximation to the value of f(7).

x	0.5	1.5	3.0	5.0	6.5	8.0
f(x)	1.625	5.875	31.0	131.0	282.125	521

(b) Among Newton divided difference and Lagrange, interpolation which method is better and why?

(c) Define the following terms:
1. Spectral Radius
2. ill-conditioned equations [4+2+2]

2. Given the following values of f(x) = log x, find the approximating value of f′(2.0) and f′′(2.0) using newton interpolation.

I	0	1	2
x_i	2.0	2.2	2.6
f_i	0.69315	0.78846	0.95551

[8]

3. Find the quadrature formula

$$\int_0^1 \frac{f(x)\,dx}{\sqrt{x(1-x)}} = \alpha_1 f(0) + \alpha_2 f(1/2) + \alpha_3 f(1)$$

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which is exact for polynomials of degree up to 2, hence evaluate

$$\int_0^1 \frac{dx}{\sqrt{x(x-x^3)}}.$$

[8]

4. Solve the initial value problem

$$u' = -2t^2 u^2, \quad u(0) = 1$$

with h = 0.2 in the interval [0, 0.4] using the fourth order Runge – Kutta method. Compare with exact solution. [8]

5. Using the Predictor corrector method, solve the initial value problem

$$u' = -2t\,u^2, \quad u(0) = 1 \quad \text{on } [0,1] \text{ with } h = 0.2.$$

[8]

6. (a) Discuss the convergence of Regula-Falsi method.
   (b) Find the approximate value of

$$I = \int_0^1 \frac{dx}{1+x}.$$

Using (i) trapezoidal rule, (ii) Simpson's rule. Obtain a bound for the errors. The exact value of I=ln2 = 0.693147 correct to six decimal places.

[4+4]

Total No. of Pages: 04 *Roll No .....*

FOURTH SEMESTER **B.Tech. [MC]**

END SEMESTER EXAMINATION ***May-2024***

MC206 COMPUTER ORGANIZATION & ARCHITECTURE

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

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

Q.1.

[a] Consider the snapshot of the main memory content as shown below:

MEMORY ADDRESS	CONTENT	
200	LOAD TO AC	MODE
201	500	
. .	. .	
399	999	
400	1000	
401	1001	
.	.	

The first instruction requires two memory locations and is stored at locations 200 and 201. LOAD TO AC indicates the instruction type, i.e. it loads the contents to Accumulator. MODE represents the Addressing Mode used by the instruction. 500 represents the address field within the instruction. Further assume that there is one source register R having value of 400. The memory content at address 399 is 999, at address 400 is 1000, at address 401 is 1001 and so on at every next location, the memory content increases the

previous content by one. Find the effective address as well as the operand to be loaded into the Accumulator for the following addressing modes: [5][CO2][L3]

(i) Direct
(ii) Immediate
(iii) Indirect
(iv) Relative
(v) Register

[b] What is DMA. Explain the working of DMA controller by showing its connections with the CPU. [5][CO6][L2]

Q.2

[a] Distinguish between Strobe Control and Handshaking mechanisms of Asynchronous Data Transfer between CPU and I/O Devices. [5][CO5][L4]

[b] Consider a 4-way set associative mapping with 16 cache blocks. The memory block requests are in the order- 0, 255, 1, 4, 3, 8, 133, 159, 216, 129, 63, 8, 48, 32, 73, 92, 155. Evaluate the hit ratio respective to : [5][CO4][L3]

(i) LRU page replacement policy

(ii) FIFO page replacement policy

Q.3

[a] What is the average access time to transfer 96kB of data, if the data transfer rate is 20kbps, seek time is 10 msec and the disk rotates at a speed of 6400 RPM? [5][CO3][L5]

[b] Consider a 4-stage instruction pipeline and four instructions need to be executed on the pipelined processor. The instructions consume different number of clock cycles at different stages as shown in the table:

	S1	S2	S3	S4
I1	1	3	1	2
I2	1	1	1	1
I3	1	3	1	1
I4	1	1	2	1

The following code has to be executed on the pipelined processor:

```
for(j=1; j<=100; j++)
{     I1;
      I2;
      I3;
      I4;
}
```

I1 instruction is first executed followed by I2, I3 and I4. After I4, I1 instruction begins again in the loop followed by I2, I3, I4, I1, and so on. The process repeats 100 times. After how many clock cycles the output of the instruction I2 for j=2 will be available? [5][CO6][L4]

Q.4

[a] Write a short note on Isolated I/O and Memory-mapped I/O. [5][CO5][L2]

[b] Consider the memory size of 4GB, and further assume that one word takes 4 bytes of space in memory. Given the block size of memory is of 8 words, and cache size is 16KB. Find the number of tag bits if 4-way set associative mapping is used to map the memory blocks into the cache. [5][CO4][L3]

Q.5

[a] What are priority interrupts? Explain how the priority interrupts are handled by Daisy chaining mechanism. [5][CO5][L2]

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B.Tech[MC

FOURTH SEMESTER

May 207

END SEMESTER EXAMINATION

MC208, Linear Algebra

Time: 3.0 Hours

Max. Marks: 6(

Note: *Question-1 is compulsory. Attempt ANY eight questions from Questions 2-11. All questions carry 5 marks except Q1. Assume suitable missing data, if any.*

1. State and prove Rank-Nullity theorem. [10 marks] [CO-1,

2. let $T : V_3 \to V_3$ be the linear transformation defined as $T(x, y, z) =$ $(x + 2y - z, y + z, x + y - 2z)$. Find a basis and dimension of its rang and kernel. [CO-

3. Show that if W_1 and W_2 are the two subspaces of a vector space V, the prove that $W_1 \cap W_2$ is also a subspace of V. [CO-2,

4. Find the row and column space of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & 1 \\ 1 & 3 & 5 & -2 \\ 3 & 8 & 13 & -3 \end{bmatrix}$. Als write their dimensions. [CO-

5. Transform the given basis $\{(1, 1, 0), (0, 0, 1), (0, 1, 1)\}$ of R^3 into the orthc normal basis of R^3. [CO-

6. Let V be an inner product space and $x, y \in V$, then prove that

$$\|x + y\|^2 + \|x - y\|^2 = 2(\|x\|^2 + \|y\|^2)$$

[CO-3,

7. Write the symmetric matrix corresponding to the quadratic form

$$Q(x, y, z) = 2x^2 + 6xy - y^2 + 8xz - 4yz + 2z^2$$

and check whether it is positive definite? [3+2][CO-

8. Find the angle between the polynomials $f(t) = 3t - 5$ and $g(t) = t^2$ in the polynomial inner product space. [CO-4]

9. Define the adjoint of a linear transformation T and hence write the adjoint of

$$T(x, y, z) = (3x + 2y - 4z, x - 2y + z, x + 2y - 3z)$$

[CO-3,4]

10. Find the Jordan canonical form J and an invertible matrix Q such that $J = Q^{-1}AQ$ where $A = \begin{bmatrix} 2 & 1 & 3 \\ 0 & 2 & -1 \\ 0 & 0 & 2 \end{bmatrix}$ [CO-5]

11. Let W be the subspace of R^4 spanned by the vectors $u_1 = (1, 2, 5, -3), u_2 = (2, 3, 1, -4), u_3 = (3, 8, -3, -5)$. Find the basis of W and extend to a basis of R^4. [CO-2]

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

VI SEMESTER B.Tech (MC-302)

END TERM EXAMINATION *May-2024*

MC 302 DATABASE MANAGEMENT SYSTEM

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

Note : Attempt any five (5) questions only.
Assume suitable missing data, if any.

Q1. (a) Differentiate between the following: **[3][CO1]**

(i) Schema and instance

(ii) Data definition language and Data manipulation language

(b) Design an ER diagram for a commercial bank. This commercial bank maintains information about entities: Depositor, Account, Loan and Branch. State any assumption made in the design of the ER diagram. **[3][CO2]**

Assumptions (given):

(i) An Account can belong to multiple Depositors.

(ii) A Loan can belong to multiple Depositors.

(iii) A Depositor can create multiple Accounts at Branch.

(c) What is meant by Recursive relationship type? Give two examples of Recursive relationship type. **[2][CO2]**

Q.2 (a) Write relational algebra for the given queries. **[1+1+1+1=4][CO2]**

Books (*ACC_NO, ISBN, Title, Edition, Year*)

Members (*Member_id, Member_name, Member_Type*)

Issued to (*ACC_NO, Member_id, Date_Of_issue*)

(i) Name of all the members whose member_type is "Life Time"

(ii) Accession Number(s)(ACC_NO) and Title(s) of third edition books published in 2024.

(iii) Title(s) and date(s) of issue of books taken by member name 'PRIYA'.

(iv) Titles of books not taken by any member.

(b) Consider the following database schema of college to write queries in sql.

Student (*Roll_Number, Student_name, City*)

Teachers (*Teacher_ID, Teacher_name, Teacher_subject*)
College (*Roll_Number, Teacher_ID*)

(i) Find the names of Students who live in Delhi.

(ii) Find the name of the teacher who teaches the Database Management System subject.

(iii) Find the name of teacher of who teaches Computer Organization subject to John Smith (student).

(iv) Insert a new tuple into relation teachers and delete records of students whose city is "Raipur". **[1+1+1+1=4][CO3]**

Q3 (a) Explain the difference between Non-trivial functional dependency and Multivalued functional dependency with suitable examples. Give a loss-less join, dependency preserving decomposition into 3NF of schema R = (A, B, C, D, E) with a set of FDs F = $\{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$ **[2+2=4][CO4]**

(b) Normalize the given Relation (Student) upto BCNF. **[4][CO4]**

S_ID	Name	Address	Contact_No	Prog_ID	Prog_Name
S01	Lalit Yadav	Jaipur, Rajasthan	900215, 56785	P1	BBA
S02	Reetu Rai	Patiala, Punjab	22553,89764+	P2	BBM
S03	Adarsh Jha	Pune, Maharashtra	67675	P1	BBA
S04	Santoshi Kapoor	Jabalpur, Madhya Pradesh	32325	P3	BHM
S05	Durga Dangwal	Kanpur, Uttar Pradesh	23451, 12567	P2	BBM

Q4 (a) Construct a B+ tree for the following set of key values: {2,3,5,7,11,17,19,23,29,33}. Assume that the tree is initially empty and the values are added in ascending order. Consider that four pointers will fit in one node of the tree. Show the form of the tree after the following sequence of following operations: **[2+2=4][CO5]**

(i) Insert 9

(ii) Insert 10

(iii) Delete 23

(iv) Delete 19

(b) Differentiate between the following: **[2+2=4][CO5]**

(i) Static hashing and dynamic hashing.

(ii) Differentiate between B-Tree and B+ Tree.

Q5. (a) What is Schedule? Define the concepts of recoverable, cascade-less and strict schedules and compare them in terms of their recoverability. **[2][CO6]**

(b) List ACID properties. Explain the usefulness of each. **[4][CO6]**

(c) Discuss the typical phases of an optimistic concurrency control method. **[2][CO6]**

Q.6 (a) An ordered file consists of 30,000 records and stored on a disk of block size 1024 bytes and records are of fixed size, unspanned organization. Record length = 100 bytes. **[1.5+1.5=3][CO5]**

(i) Find Blocking factor for data file. Number of blocks needed and block access for the datafile.

(ii) How many block access if using a primary index file with an ordering key field of the file 9 bytes and block pointer size 6 bytes. Determine the Blocking factor and number of blocks needed for index file.

(b) Answer the following questions: **[2+1+2=5][CO4 CO5]**

(i) A relation R(A, B, C, D, E, G) satisfies the given FDs: A→BCDE, CD→E. Find the minimal cover of the given functional dependency.

(ii) Consider a relation R(A, B, C, D, E) with the following dependencies: $AB \rightarrow C$, $CD \rightarrow E$, $DE \rightarrow B$. Is AB a candidate key of this relation? If not, is ABD? Explain your answer.

(iii)Discuss the various options for creating a secondary index on a non-key, non-ordering field of a file.

All the Best

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

VI SEMESTER

B.Tech. (M&C)

END TERM EXAMINATION ***May-2024***

MC 304 Theory of Computation

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

Note : Assume suitable missing data, if any.

Q.1 Answer the following with justification: {Mod,L1,L2} [10][CO1,2]

[a] Could it be the case that, while minimizing automaton M, we end up with the equivalence classes $\pi_1 = \{\{q_2\}, \{q_0, q_1, q_3\}, \{q_4, q_5\}\}$ and $\pi_2 = \{\{q_2, q_4\}, \{q_0, q_1, q_3\}, \{q_5\}\}$?

[b] Can two grammars of different types generate the same language?

[c] If $\sum$ is finite, then $\sum^*$ is finite.

[d] Is the language $\{a^n b^n \mid n \geq 1\}$ accepted by pda by final state and empty store ?

[e] Define analytically/mathematically the sets T(A) and N(A) for a pusdown automata A.

Q.2 [a] Construct a Moore machine equivalent to the mealy machine below: {Easy,L1,L2} [5][CO2]

Present state	Next state			
	Input a = 0		Input a = 1	
	state	output	state	output
$\rightarrow q_1$	q_3	0	q_2	0
q_2	q_1	1	q_4	0
q_3	q_2	1	q_1	1
q_4	q_4	1	q_3	0

Figure 1: Mealy to Moore Conversion

[b] Construct a Turing Machine that accepts the set of all strings over {0,1} ending with *010*. {Diff,L6} [5][CO3]

Q.3 ATTEMPT ANY TWO PARTS IN THIS QUESTION.

[a] Using Pumping lemma prove that the language $\{1^p \mid p \text{ is prime}\}$ is not a context free language. {Diff,L3} [5][CO2]

[b] Construct a finite automata without empty moves which is equivalent to the regular expression: $(0+1)^*(00+11)(0+1)^*$.

{Mod, L6} [5][CO3]

[c] Using algebraic method for Arden's Theorem, find the regular expression accepted by the automata given below: {Mod,L3} [5][CO1]

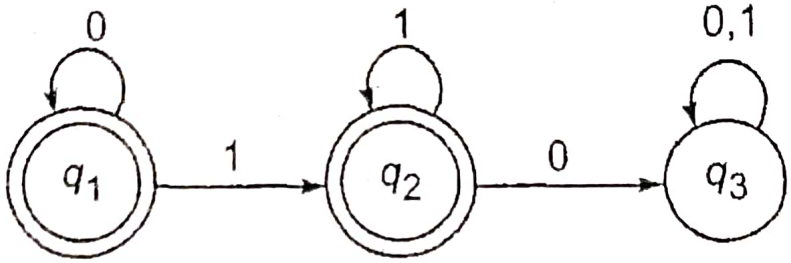


Figure 2: Arden's Theorem

Q.4 ATTEMPT ANY TWO PARTS IN THIS QUESTION.

[a] Reduce the following grammar to Chomsky Normal Form.

$S \rightarrow ASA \mid bA, \quad A \rightarrow B \mid S, \quad B \rightarrow c$ {Easy,L3} [5][CO4]

[b] Let $G = (V_N, \sum, P, S)$ be a CFG. Then, $S \Rightarrow^* \alpha$ if there is a derivation tree for G with yield α. Here, $\Rightarrow^*$ represents reflexive transitive closure of the relation $\Rightarrow$. {Diff,L3} [5][CO2]

[c] Convert the following grammar $S \rightarrow aSb \mid A, \quad A \rightarrow bSa \mid S \mid \Lambda$ to a pushdown automata that accepts same language:

A. by empty stack

B. by final state.

{Diff,L5 } [5][CO4]

Q.5 ATTEMPT ANY TWO PARTS IN THIS QUESTION.

[a] Find the reduce grammar equivalent to the grammar

$S \rightarrow aAa,\quad A \rightarrow bBB,\quad B \rightarrow ab,\quad C \rightarrow aB$ {Mod,L3}

[5][CO3]

[b]What type of moves are possible in a Turing machine. Explain. Consider the Turing machine M given by transition diagram below. Obtain the computation sequence of M for processing the input string 0011. {Easy,L1,L2} [5][CO3]

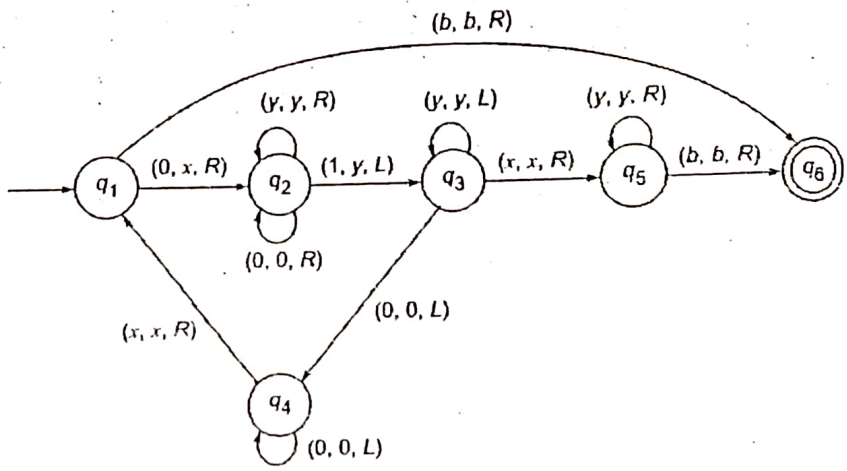


Figure 3: Turing Machine, M

[c] Prove/Disprove that each of the classes of languages in Chomsky classification (Type 0, Type 1, Type 2 and Type 3) is closed under concatenation. {Diff,L4} [5][CO1]

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Roll No._____

Total no. of pages :2

6th SEMESTER

B.Tech (MC- Engg

END SEMESTER EXAMINATION

MAY 202

MC – 306 Financial Engineering

Time : 3 hrs

Max. Marks: 5

Note: Q.No.1 is compulsory, answer any other three questions.
Statistical table is allowed. Assume missing data, if any.

1. (a) The current stock price is Rs. 250. A six month call option on this stock with strike price Rs. 255 is priced in two steps. It is given that continuously compounded risk free rate is 4%, stock pays no dividend and the volatility of the stock is 20%. Determine the price of call options. C

(b) Consider a portfolio of two assets a1 & a2 with no short sell, with the following statistical parameters C
$\mu_1 = 10\%, \mu_2 = 15\%$, $\sigma_1 = 18\%$, $\sigma_2 = 36\%$, $\rho_{12} = 0.2$.
Find the value of minimum risk, the expected return and weight of the assets.

(c) The stock price is Rs.85. The continuously compounded risk free interest rate is 6% and the annual volatility is 20%. European Call options are written with a strike price of Rs.85 and time to expiration of 3 months. The stock will pay a dividend continuously at the rate of 1%. Use the Black – Scholes formula to find the price of one such call option. C

(d) Let $X(t) = \mu t + \sigma W(t), -\infty < \mu < \infty, 0 < \sigma < \infty$ *and* $W(t)$ *is a stsndard B.M.* be a stochastic process. Find the condition such that $\{X(t), t \geq 0\}$ is a martingale. C

2. (a) A stock price following SDE $dS(t) = \mu S(t)dt + \sigma S(t)dW(t)$ has an expected return of 15% and a volatility of 40%. Find the distribution of the stock price in 2year. Find the expected price after 2 year if the current price is Rs.50. C

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(b) Solve the SDE $dX(t) = 2X(t)\,dW(t)$ with $X(0) = 2$. 5 CO4

3. (a) Evaluate $\int_0^T Sin(2W(t))dW(t)$ using Ito – Doeblin formula of version two. 5 CO4

(b) A stochastic process $\{S(t), t \geq 0\}$ is governed by $dS(t) = aS(t)dt + bS(t)dW(t)$, where a & b are constants. Find the SDE of $\sqrt{S(t)}$. 5 CO4

4. (a) Consider a portfolio of two assets a_1 & a_2 with the following statistical parameters $\mu_1 = 5\%$, $\mu_2 = 15\%$, $\sigma_1 = 15\%$, $\sigma_2 = 30\%$, $\rho_{12} = 0.5$. Obtain the equation of Markovitz curve, and using that find value of minimum risk, the expected return. 5 CO5

(b) Prove that if short sales are not allowed then the risk of the portfolio can not exceed the greater of the risks of the individual components of the portfolio. 5 CO5

5. (a) A portfolio with three securities a_1, a_2, a_3 with expected returns, $\mu_1 = 20\%$, $\mu_2 = 13\%$, $\mu_3 = 4\%$, standard deviations of returns, $\sigma_1 = 25\%$, $\sigma_2 = 28\%$, $\sigma_3 = 20\%$, and the correlation between returns, $\rho_{12} = 0.3$, $\rho_{13} = 0.15$ and $\rho_{23} = 0.4$. If risk free interest rate is 10% then compute the weight vector for market portfolio. 5 CO5

(b) Derive the expression of the line which converts into Capital Market line. 5 CO5

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

VI SEMESTER **B.Tech. (MCE)**

END TERM EXAMINATION *May-2024*

MC308 COMPUTER NETWORKS

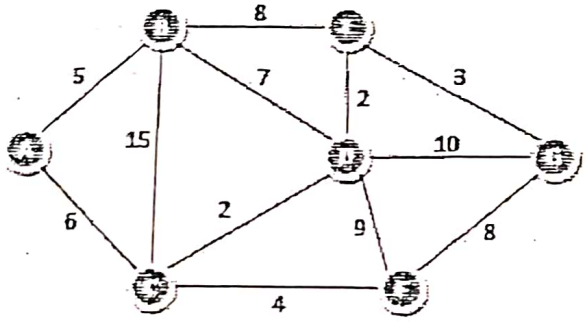
Time: 3:00 Hours *Max. Marks: 50*

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

Q.1 Explain the IPv4 packet header in detail. [5][CO5][L2]

Q.2 Demonstrate the parity check and checksum error detection techniques with the help of an example. [5][CO6][L3]

Q.3 Analyse the following weighted graph to find the shortest path from node A to node G by step-wise performing Dijkstra's algorithm. State the shortest path and the cost to traverse it. Also, illustrate the resultant graph. [5][CO5][L4]



Q.4 Determine various congestion control techniques in a datagram subnet. [5][CO3][L3]

Q.5 [a] Compare and differentiate between TCP and UDP. [2][CO3][L5]

[b] Determine how the transport layer ensures that the complete message arrives at the destination and in the proper order. [3][CO3][L3]

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Q.6 Answer ***any One*** of the following:

[a] Explain various control flags in the TCP segment header.

[5][CO3][L2]

[b] Explain various design issues in the Session layer.

[5][CO2][L2]

Q.7 An ISP is granted a block of 65,536 addresses starting with 190.100.0.0/16. The ISP needs to distribute these addresses to three groups of customers as follows:

a) The first group has 64 customers; each needs 256 addresses
b) The second group has 128 customers; each needs 128 addresses
c) The third group has 128 customers; each needs 64 addresses

Generate the subblocks and find out how many addresses are still available after these allocations. [5][CO5][L6]

Q.8 [a] Apply the LZ encoding technique step by step to compress the character sequence "AAABBBCCCABCBA". [5][CO4][L3]

[b] Determine the binary encoding of the message "HEADACHE" after performing Huffman coding for the following characters with the corresponding frequencies: [5][CO4][L3]

Character	A	B	C	D	E	F	G	H
Frequency	75	11	39	30	146	33	48	41

Q.9 Answer ***any One*** of the following:

[a] Illustrate and explain the working of the Domain Name System.

[5][CO1][L4]

[b] Discuss the message transfer protocols in the Application layer.

[5][CO3][L2]

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

Sixth Semester
B. Tech.

END-TERM EXAMINATION
May 2024

MC 310: Software Engineering

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

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

1. (a) Discuss how software engineers can contribute to tackling a myriad of pressing global issues such as climate change, education, healthcare, poverty, and public safety. [5][CO1]

   (b) Discuss reverse engineering and software re-engineering. [5][CO5]

2. (a) Describe spiral model of software development. Under what circumstances this model is suitable over other models? [5][CO1]

   (b) Explain data flow diagrams. Draw the Level-1 DFD of student result management system. [5][CO2]

3. (a) Write the characteristics of a good design. Describe different types of coupling and cohesion. [5][CO3]

   (b) In the context of system design, discuss the concepts of problem partitioning, top-down design, bottom-up design, functional oriented approach, and object oriented approach. [5][CO3]

4. (a) Explain all the levels of COCOMO Model. Mention its advantages and disadvantages. [5][CO4]

   (b) Describe the activities involved in software project management. [5][CO4]

5. (a) Explain the SEI Capability Maturity Model (CMM). Why is it suggested that CMM is a better choice than ISO-9001? [5][CO5]

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(b) Assume that a program will experience 200 failures in infinite time. It has now experienced 100. The initial failure intensity was 20 failures/CPU hour.

(i) Determine the current failure intensity.

(ii) Find the decrement of failure intensity per failure.

(iii) Calculate the failures experienced and failure intensity after 20 and 100 CPU hours of execution.

(iv) Compute addition failures and additional execution time required to reach the failure intensity objective of 5 failures/CPU hour.

Apply the basic execution time model for the above calculations. [5][CO5]

6. (a) In the context of software testing, discuss code inspection, levels of testing, alpha testing, beta testing, and debugging. [5][CO5]

(b) What is software reliability? Explain the Jelinski-Moranda model of reliability. [5][CO3]

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Total No. of Pages: 03

Roll No. _____

VI SEMESTER

B.Tech. (MCE)

END TERM EXAMINATION

May-2024

COURSE CODE: MC312

COURSE TITLE: Artificial Intelligence

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). What is BACKTRACKING in Prolog? Explain with a program in Prolog. [4 marks][CO5]

(b). Discuss, with an example, the concept of CUTS in Prolog. [4 marks] [CO5]

Q.2. (a) Given the following facts/axioms:

$$P \vee Q, \quad Q \rightarrow R, \quad P \rightarrow S, \quad \neg S.$$

Prove that "R" is true by resolution. [3 marks] [CO6]

(b). Given the SAT problem with 5 clauses:

$(\neg a \vee d) \wedge (c \vee b) \wedge (\neg c \vee d) \wedge (\neg b \vee \neg d) \wedge (a \vee \neg d)$.

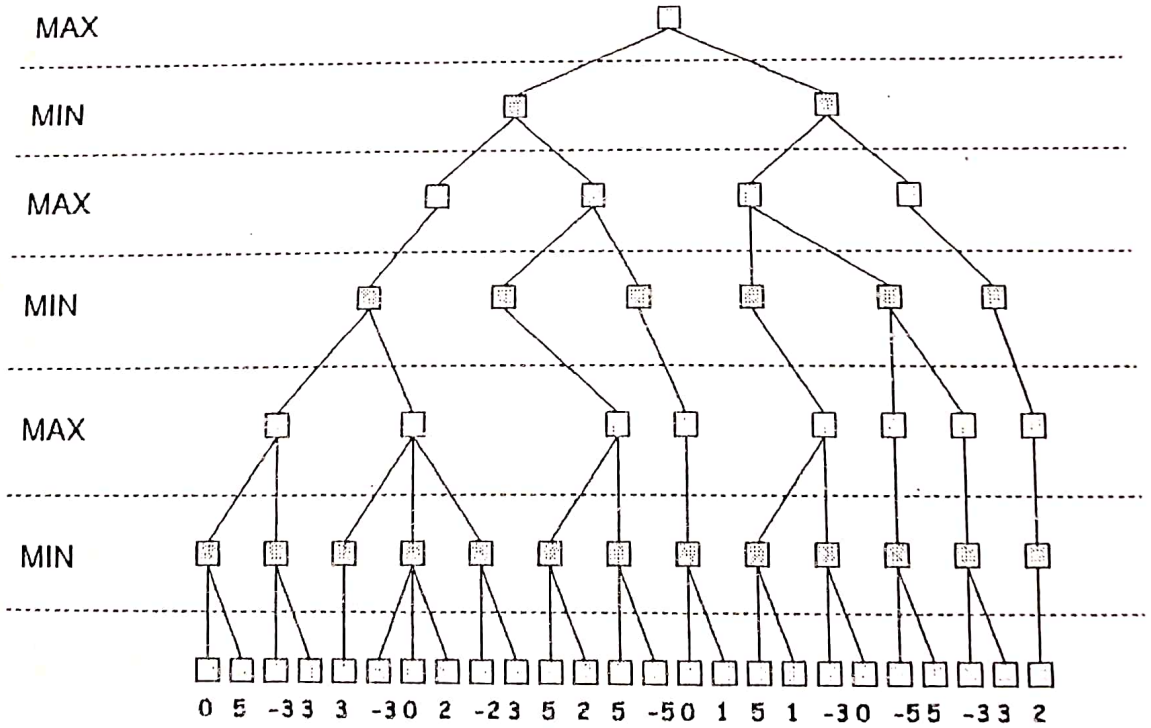
Assume that the heuristic function is number of clauses satisfied. Let the solution vector be in the order (a,b,c,d) and let the initial candidate is (0,0,0,0). Show three expansions of tabu search assuming tabu tenure is 2. Show the new candidate as well as the tabu moves at each of three stages. [5 marks][CO2]

Q.3. (a). Explain Sussman's Anomaly in Goal Stack Planning with the help of an example. [3 marks][CO2]

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(b). Given an initial state: {ON (B, A) ∧ ONTABLE (A) ∧ ONTABLE(C) ∧ ONTABLE(D) ∧ ARMEMPTY}, and the goal state as: {ON(C, A) ∧ ON(B,D) ∧ ONTABLE(A) ∧ ONTABLE(D)}. How can the goal state be achieved with Goal Stack Planning ? Explain all the steps involved. [5 marks] [CO3]

Q.4. (a) Consider a game tree given below that consists of alternate levels for MAX and MIN players. The evaluation function for each of the leaf nodes is written in the last level. The evaluation function values for the leaf nodes starting from the leftmost leaf to the rightmost leaf node is {0, 5, -3, 3, 3, -3, 0, 2, -2, 3, 5, 2, 5, -5, 0, 1, 5, 1, -3, 0, -5, 5, -3, 3, 2}. Evaluate the number of alpha cutoffs and beta cutoffs on the game tree if we apply the Alpha-Beta pruning technique on this given tree. Also, describe which leaf nodes will be evaluated and which leaf nodes will be pruned with Alpha-Beta pruning. [5 marks][CO3]



(b). How do you define the term "*Strategy*" in game playing algorithms with respect to MAX player ? Given a 4-ply game tree with MAX at the root, how many strategies exist for the MAX player ?

[3 marks][CO3]

Q.5. Consider the following sentences:

(i) John likes all kinds of food.

(ii) Apples are food.

(iii) Chicken is food.

(iv) Anything anyone eats and if he/she is not killed by is food.

(v) Bill eats peanuts and is still alive.

(vi) Sue eats everything Bill eats.

Translate the above sentences into formulas in Predicate Logic. Further, prove that the statement "John likes peanuts" is true using predicate logic. [8 marks][CO6]

Q.6. Compare the DFS and BFS algorithms in state space search on the basis of time complexity, space complexity, completeness and quality of solution by representing your analysis with suitable diagrams and mathematical analysis as applicable. [8 marks][CO4]

Q.7. (a). Differentiate between Forward State Space Planning and Backward State Space Planning with an example. [4 marks][CO1]

(b). Explain the difference Hill Climbing and Beam search techniques with an example. [4 marks] [CO1]

**********END**********

Total no. of Pages:01 *Roll no* 354

II SEMESTER B.Tech.

END TERM EXAMINATION *MAY-2024*

ME104 THERMAL ENGINEERING I

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

Note: Answer ANY FIVE Questions in all. Assume suitable data, if missing. Use of STEAM TABLE & MOLLIER CHART is permitted.

Q.1 a) Discuss the significance of Reversible and Irreversible Thermodynamic Process. What are the conditions under which a thermodynamic process could be termed as a reversible process, illustrate with suitable examples? [03][CO1]

b) Derive an expression for Work done in a closed system for Isothermal Process and also for Adiabatic process ? [05][CO1]

Q.2 a) A cylinder fitted with a piston has a initial volume $0.1m^3$ and contains nitrogen at 150 kpa & 25°C. The piston compresses the nitrogen until the pressure reaches 1MPa and temperature is 150°C. During the compression process heat is transferred from the nitrogen and work done on the nitrogen is 20kJ. Determine the amount of heat transfer ? [03][CO2]

b) At steady state, a refrigeration cycle operating between hot and cold reservoirs at 300 K and 275 K, respectively, removes energy by heat transfer from the cold reservoir at a rate of 600 kW. Determine:

(i) The power input required, in kW, If the cycle's coefficient of performance is 4.

(ii) The minimum theoretical power required, in kW, for any such cycle ? [05][CO2]

Q.3 a) A steam chest holds 100kg of steam at 10 bars. The steam quality is 90% dryness, Determine its (i) enthalpy and (ii) how much heat is required to make it saturated. Verify your results from the mollier chart. [03][CO3]

b) A Steam Power Plant working on Rankine Cycle has a range of operation from 40 bar dry saturated to 0.05 bar. Determine the cycle efficiency and specific steam consumption? [05][CO3]

Q.4 a) Disuss the classification of Boilers on the basis of flow of water and hot gases. Draw neat labelled diagram of any two boilers? [03][CO4]

b) Evaluate the importance of Boiler Mountings and Accessories in improving the performance of a steam boiler. Explain the working principal of any two mountings and any two accessories with suitable diagrams ? [05][CO4]

Q.5 a) In case of Nozzle , Prove that, $C_2 = 44.72 \sqrt{(h_1 - h_2)}$ (where, h = specific enthalpy and C_2 = Exit Fluid velocity) ? [03][CO5]

b) Estimate the Mass Flow rate of the steam flowing through a convergent – divergent nozzle with inlet pressure 10 bar and inlet temperature 220 °C, the back pressure is 0.5 bar, and throat diameter is 12 mm ? [05][CO5]

Q.6 a) What do you understand by Compounding of a steam Turbine. Explain different methods of Compunding? [03][CO6]

b) Steam enters an impulse wheel with a nozzle at an angle of 20° and velocity of 450m/s. the exit angle of the moving blade is 20° and the relative velocity of steam is assumed to remain constant over the moving blade. If the blade speed is 180 m/s. Calculate, using any method, the blade angle at inlet and the work done per Kg of steam ? [05][CO6]

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Total No. of Pages: 2

Roll No. _____

SECOND SEMRSTER

B. TECH.

END SEMESTER EXAMINATION MAY 2024

ME-104 BASIC MECHANICAL ENGINEERING

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

Note: Answer ALL questions. Answer Part-A and Part-B separately in same answer sheet
Assume suitable missing data, if any.

PART - A

[1] (a) Explain briefly the following:
(i) thermodynamic system (ii) property (iii) path function (iv) point function
[2] [CO1]

(b) A mass of gas is compressed to a quasi-static process from 80 KPa, 0.1 m^3 to 0.4 MPa, 0.03 m^3. Assuming that the pressure and volume are related by PV^n = constant, find the work done by the gas system. [3] [CO1]

[2] (a) Explain Kelvin-Planck statement of the second law of thermodynamics with a neat diagram. [2.5] [CO2]

(b) Show that COP of a heat pump is greater than the COP of refrigerator by unity.
[2.5] [CO2]

OR

(a) Derive an expression for thermal efficiency of Otto cycle in terms of compression ratio.
[2.5] [CO2]

(b) In air standard Diesel cycle, the compression ratio is 16, and at the beginning of isentropic compression, the temperature is 15 ^{0}C and the pressure is 0.1 MPa. Heat is added until the temperature at the end of constant pressure process is 1480 ^{0}C. Calculate the cycle efficiency. [2.5] [CO2]

[3] (a) Enumerate and explain briefly the five factors which should be considered while selecting the site for hydroelectric power plant. [2.5] [CO3]

(b) Explain the working of pressurized heavy water reactor power plant with a neat diagram.
[2.5] [CO3]

OR

Draw the layout of thermal power plant and explain its working principle. State merits demerits of thermal power plant and hydroelectric power plant. [5] [CO3]

[4] (a) Explain the liquid specific gravity, kinematic viscosity, steady and unsteady flow. [2] [CO4]

(b) State and prove Pascal's law. [3] [CO4]

[5] 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 the 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. [5] [CO5]

PART - B

[6] Differentiate briefly the following:
(i) up milling and down milling (ii) straight and reverse polarity
(iii) blanking and punching (iv) toughness and hardness
(v) sprue and runner [5] [CO1,2]

[7] What is composite material? Classify and mention the advantages, limitations, applications of composite materials. [5] [CO1]

OR

How plain carbon steel differs from cast iron. Discuss the composition, properties and applications of grey cast iron and white cast iron. [5] [CO1]

[8] (a) What are the desirable properties of moulding sand. [2.5] [CO3]

(b) Explain the working principle of resistance seam welding process with a neat sketch, also mention its applications. [2.5] [CO2]

OR

With neat sketches, discuss the following operations which can be performed on a lathe machine.
(i) facing (ii) taper turning (iii) knurling (iv) drilling (v) boring [5] [CO2]

[9] (a) Differentiate between Line standard and End standard. [2.5] [CO4]

(b) With a neat sketch discuss the working and applications of electrical comparator. [2.5] [CO5]

[10] Write short notes on Any Two of the following:
(i) Super alloys (ii) stainless steels (iii) types of oxy-acetylene gas flames with neat sketches. [5] [CO1,3]

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

IV SEMESTER B.Tech.

END TERM EXAMINATION May-2024

ME202 Thermal Engineering 2

Time: 03:00 Hours Max. Marks: 40

Note : All questions carry equal marks. Attempt any Two parts from each question. Assume suitable missing data, if any. For air assume Cv = 0.717 kJ/kg K, Cp= 1.005 kJ/kg K.

Q.1 (a) An engine operating on an air standard Otto cycle takes air at 100 kPa and 25 °C and compresses it isentropically to 2.2 MPa. The work output from the cycle is 200 kJ / kg of air. Find the efficiency of the cycle, and the maximum temperature reached in the cycle. [4][CO2]

(b) Derive an expression for efficiency of Diesel cycle in terms of compression ratio. [4][CO1]

(c) Explain the working principle of a centrifugal compressor with a neat sketch. [4][CO3, CO5]

Q.2 (a) An air standard Brayton cycle with a pressure ratio of 10 takes in air at 100 kPa and 300 K and a mass flow rate of 5 kg / s. The air leaves the combustor at 1260 K. Find the efficiency of the cycle and the net power output. [4][CO3]

(b) Discuss the effect of intercooling in the compressor stages in a Brayton cycle on compressor power, work output and efficiency. Also draw the T-s diagram showing intercooling. [4][CO4]

(c) Explain the phenomenon of surging and choking in a centrifugal compressor. [4][CO5]

Q.3 (a) Define dynamic and stagnation (i) temperature and (ii) pressure. How can static temperature be measured in a moving stream of a fluid? [4][CO1, CO2]

(b) Define sonic velocity 'a' and prove that $a = \sqrt{\gamma RT}$ where γ is ratio of specific heats, R is characteristic gas constant and T is absolute temperature. [4][CO2, CO3]

(c) Static air at 10 bar and 800°C flows through a duct. Calculate the temperature, velocity and Mach number at points where pressures are 5 bar and 1 bar respectively. Assume flow to be isentropic. [4][CO5]

Q.4 (a) Explain the working of a Ramjet Engine with a neat sketch. [4][CO3]

(b) Draw a neat sketch of Turboprop engine and briefly discuss principle of working. [4][CO3]

(c) Draw the diagram of a solid propellent rocket and briefly explain its working principle . [4][CO4]

Q.5 (a) A single-acting, single-cylinder reciprocating air compressor has a cylinder diameter of 200 mm and a stroke of 300 mm. Air enters the cylinder at 1 bar; 27°C. It is then compressed polytropically to 8 bar according to the law $pV^{1.3}$ = constant. If the speed of the compressor is 250 rpm, calculate the mass of air compressed per minute, and the power required in kW for driving the compressor. [4][CO4]

(b) Explain why multistage compression is required? [4][CO3]

(c) Derive an expression for the optimum pressure ratio in a two stage compression. [4][CO3]

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Total No. of Pages : 02 *Roll No. .....*

4th SEMESTER

B.Tech. (Mech.)

END SEMESTER EXAMINATION *May -2024*

ME204 FLUID MECHANICS

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

Note : Answer any 10 questions
All questions carry equal marks.
Assume suitable missing data, if any.

1. A liquid flows down a vertical wall in a steady, fully developed laminar film of thickness h. Simplify the continuity and Navier-Stokes equation to model this flow field. Obtain expression for the liquid velocity profile. [CO3]

2. Oil of relative density 0.9 and dynamic viscosity 2.5 poises is pumped through a 100 mm diameter pipe 500 m long at a rate of 2 L/s (i) Find the Reynolds number of the flow. (ii) Calculate the pressure required at the pump if the outlet end, which is free, is at 20 m above the pump level. (iii) What should be the power input if the overall efficiency of the pump set is 65%? [CO4]

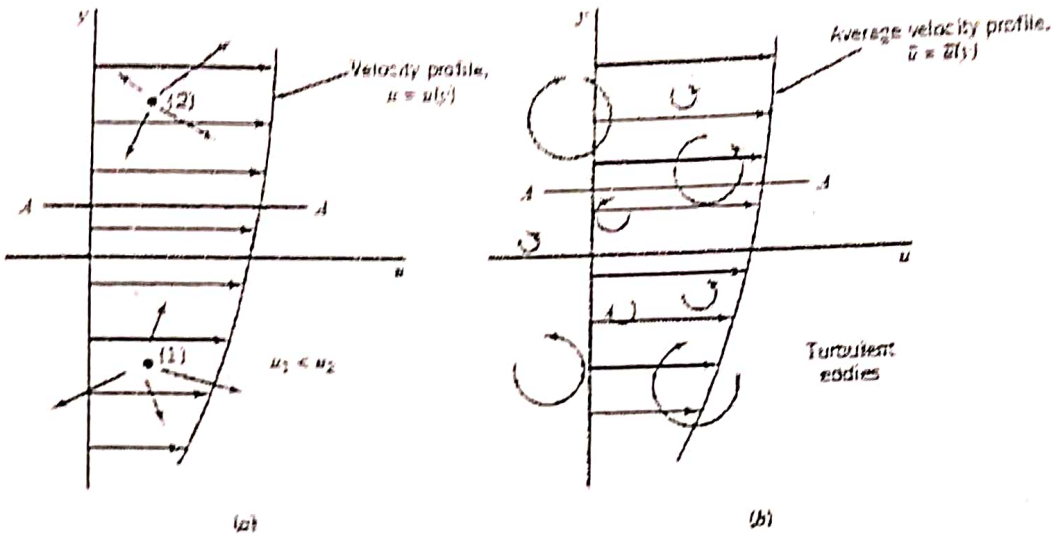
3. Explain and develop relation for Couette flow to quantify condition for flow separation. [CO4]

4. Develop relation of Kinetic energy coefficient or correction factor for laminar pipe flow. [CO4]

5. When a sudden contraction from 60 cm diameter to 30 cm diameter is introduced in a horizontal pipeline, the pressure drops from 100kPa on the downstream. Assuming a coefficient of contraction of 0.65, (i) estimate the flow rate in the pipe and (ii) the loss of head due to contraction. [CO5]

6. A small sphere of density ρ_s and diameter D settles at a terminal velocity V in a liquid of density ρ_f and dynamic viscosity μ. Gravity g is known to be a parameter. Express the functional relationships between these variables in a dimensionless form. [CO3]

7. Explain following figures and how to quantify viscosities for these cases? [CO6]
(a) Laminar flow. (b) Turbulent flow.



8. Oil of relative density 0.92 and dynamic viscosity 1.05 poise flows between two fixed parallel plates kept 1.2 cm apart. If the mean velocity is 1.40 m/s calculate (a) the maximum velocity, (b) the boundary shear stress, (c) velocity and shear stress at a distance of 0.2 cm from of the plates, and (d) head loss in a distance of 25 m. [CO4]

9. Write down important steps involved in the derivation of Von Karman's M.I. equation and simplify it for flow over plate with zero angle of incident. [CO5]

10. Explain REYNOL'S experiment to study flow through pipe and its conclusions. [CO6]

11. The velocity profile u of a boundary layer flow over a flat plate is given by

$$\frac{u}{U} = \left[\frac{3}{2}\left(\frac{y}{\delta}\right) - \frac{1}{2}\left(\frac{y}{\delta}\right)^3\right]$$

if the boundary layer thickness is given as $\delta = \sqrt{\frac{280\nu x}{13U}}$, develop the expression for the local drag coefficient C_f over the distance x = L from the leading edge of the plate. [CO5]

12. Explain Skin friction drag and form drag and draw pressure variation at different angles for uniform flow over cylinder in real and ideal fluid cases. [CO6]

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Roll No. .....

Total No. of Pages: 02

B. Tech. (ME)

FOURTH SEMESTER

May - 2024

MID TERM EXAMINATION

Kinematics of Machines

ME -106

Max. Marks: 40

Time: 3 Hours

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

Q.1 (a) What do understand by Inversion of mechanism? Explain inversions of a four bars chain in Detail? (4) CO- 1

(b) The crank of a slider crank mechanism rotates clock wise at a constant speed of 300 r. p. m. The crank AB is 150 mm and the connecting rod is 600 mm long. Determine: 1. Linear Velocity and acceleration of the midpoint of the connecting rod, and 2. Angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead center position. (4) CO-1

Q.2 (a) Classify the followers according to surface in contact, according to the motion of followers, according to the path of motion of the follower and classification of Cams. (4) CO-2

(b) Follower type is knife edged, in line, lift = 50 mm; base circle radius = 50 mm; out stroke with SHM, for 60° cam rotation; dwell for 45° period. Determine max. cam rotation; return stroke with SHM, for 90° cam rotation; dwell for the remaining velocity and acceleration during out stroke and return stroke if the cam rotates at 1000 rpm in clockwise direction. (4) CO-2

Q.3 An Epicyclic gear consists of three gears A, B, and C. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and carried on an arm EF which rotates about the center of A at 18 r.p.m. If the Gear A is fixed, determine the speed of gears B and C. (8) CO-3

Q.4 (a) What do you understand by interference how it can be avoided. (3) CO-4

(b) Derive the formula for minimum number of teeth so that interference between mating gear and pinion is avoided.(5) CO-4

Q.5 Define the Pivot and Coller bearing. Considering uniform contact bearing and uniform pressure, derive the friction torque when contact surface is uniform (8) CO-5

Q.6 (a) What do you understand by quick return mechanism? Explain it with a neat diagram of crank and slotted lever quick return motion mechanism. (4) CO-1

(b) What do you understand by synthesis of linkages. Use of software for interference analysis. (4) CO-6

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Total No. of Pages:02 Roll No.....

FOURTH SEMESTER

B.Tech. ME

END TERM EXAMINATION MAY-2024

ME208 MANUFACTURING TECHNOLOGY-I

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

Note: Question number 1 is compulsory and answer any three from the rest. Assume suitable missing data, if any.

1[a] In what circumstances would you suggest employing the following? Also provide appropriate justifications.

[i] Expendable pattern

[ii] Bottom gate

[iii] Power source with 60% duty cycle

[iv] Open die forging

[v] Cold working **5 [CO1,2,4,5]**

[b] Differentiate the following briefly

[i] AC Welding and DC welding

[ii] Hot chamber die casting and cold chamber die casting

[iii] Toughness and resilience

[iv] Direct extrusion and indirect extrusion

[v] Application of SAW and GTAW **5 [CO1,2,4,5]**

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

(i) Working principle and constructional features with a neat sketch ((ii) Types of joints (iii) Limitations and applications **5 [CO 3]**

[b] List all the possible defects that may arise during the welding process. Sketch and explain the following welding defects briefly with special emphasis on their causes and remedies.

(i)Weld spatter (ii) Slag inclusion (iii) Under cuts (iv) Hot cracks **5 [CO 3]**

3[a] With a neat sketch discuss the USW with a special emphasis on its fundamental working principle, components, advantages, limitations, and wide-ranging real-world applications. **5 [CO 3]**

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[b] With neat sketches discuss the Press forging and Drop forging processes. Also compare their relative merits and demerits and applications. 5 [CO 5]

4[a] With neat sketches, explain the various types of rolling stand arrangement used in a rolling mill along with their advantages and limitations. 5 [CO 5]

[b] How does powder metallurgy contribute to the development of advanced materials. Also explain the key steps involved in the powder metallurgy process, and how does each step contribute to the final product's properties? 5 [CO 6]

[5] Write short notes on the following *[Any Four]*

[i] Foundry automation

[ii] Electrode classification and their applications

[iv] Principle and mechanism of laser operation

[v] Sheet metal operations

[v] Wire drawing

10 [CO 1,2,3,5]

END

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Total No. of pages: 02 *Roll no. .....*

IV SEMESTER

B. Tech Electrical Engineering

COURSE CODE: ME 252

COURSE TITLE: Power Plant Engineering

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

- **Answer any five questions and all questions carry equal marks.**
- **Assume suitable missing data, if any.**
- **Use of Mollier-chart and steam-table is permitted.**
- **Draw neat diagram (properly labelled) wherever required.**
- **Answer to each question (or its part) must start on fresh page**

Q. 1 (a) What is meant by load curve? Construct a typical load curve and explain the terms [4] [CO-1,2]
i) Average load
ii) Base load
iii) Peak load

Q. 1 (b) A central power station has annual factors as follows: Load factor = 60%; Capacity factor = 40%; Use factor = 45%. Power station has a maximum demand of 15000 kW. Determine: [4] [CO-3]
i) Annual energy production
ii) Reserve capacity over and above peak load
iii) Hours per year not in service.

Q. 2 (a) With the help of a neat sketch, explain the construction and working of Babcock and Wilcox boiler. [4] [CO-2,3]

Q. 2 (b) Explain the function and working principle of the following: [4] [CO-2,3]
i) Economiser
ii) Cooling tower

Q. 3 (a) What are the different components of a hydro-electric power plant? Discuss the advantages and disadvantages of hydro-electric powerplant over coal-based thermal powerplant. [4] [CO-3]

Q. 3 (b) Discuss the factors which should be considered while selecting the site of a hydroelectric powerplant. [4] [CO-3,4]

Q. 4 (a) With the help of a schematic diagram explain different components of a diesel powerplant. Discuss various applications of diesel-electric powerplant. [4] [CO- 3]

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Total No. Pages 04 Roll no.....

VIth SEMESTER

[B.Tech.]

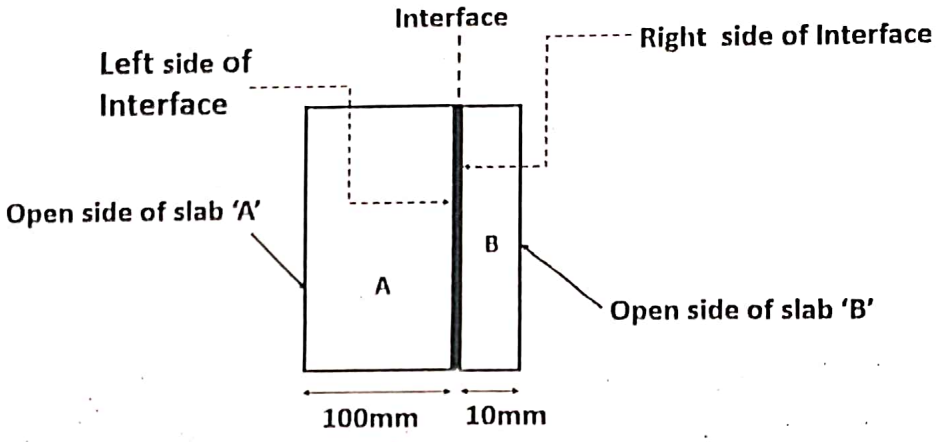
END TERM EXAMINATION ***May-2024***

ME302 Heat and Mass Transfer

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

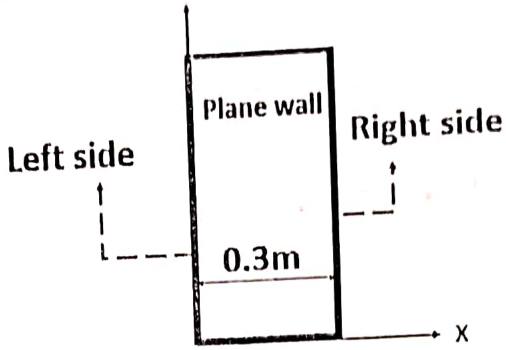
Note : Attempt any five questions. All questions carry equal marks.
Assume suitable missing data, if any.

Q.1**a)**A plane composite slab with cross-sectional area of 1.0 m^2 is made up of material '**A**'(thickness =100mm, thermal conductivity=60W/m-K) and material '**B**'(thickness = 10mm, thermal conductivity = 2W/m-K). Thermal contact resistance at interface is 0.003 m^2-K/W. The temperature at open side of slab 'A' is 300^{0}C and that of at open side of 'B' is 50^{0}C. Determine: i) heat transfer rate through slab, ii) temperature on both sides (left and right) of the interface. [4] [CO1]



Q.1 **b)** The outer surface of an electric wire (diameter = 2mm) is maintained at 120^{0}C. To increase the heat loss from the wire, it is covered with a 2.5mm thick layer of insulation (thermal conductivity= 0.5W/m-K). The surrounding temperature is 25^{0}C and convection heat transfer coefficient is 10 W/m^2-K. Determine: **i)** Rate of heat dissipation from the wire **without insulation** per unit length, **ii)** Rate of heat dissipation from the wire **with insulation** per unit length, **iii)** thickness of insulation for maximum heat dissipation, **iv)** maximum value of heat dissipation per unit length [4][CO1]

Q.2 a) The steady state temperature distribution in a 0.3m thick plane wall (as shown in fig) is given by, $T(x) = 600 + 2500x - 12000x^2$;



Where T(x) is in ^{0}C and 'x' is in meter measured from left surface of the wall. One dimensional steady-state heat conduction occurs in the wall along x-direction. The thermal conductivity of the wall material is 23.5 W/m-K. Determine: **i)** Left-side and right-side surface temperature of wall, **ii)** maximum temperature and its location, **iii)** heat flux at the left and right side of the wall, **iv)** volumetric heat generation in wall. [4][CO2]

Q.2 **b)** Describe the physical significance of Fin effectiveness and Fin efficiency. A very long 25mm diameter copper rod (thermal conductivity = 380 W/m-K) extends from a surface at 120^{0}C. The temperature of surrounding air is 25^{0}C and heat transfer coefficient over the rod is 10W/m^2-K. Determine the heat loss from the rod. [4][CO2]

Q3 a) Air at 27^{0}C and 1 atm. flows over a heated plate with a velocity of 2 m/s. The plate is at uniform temperature of 60^{0}C. What will be the heat transfer rate from: **i)** first 0.2m length of the plate , **ii)** first 0.4m length of the plate. The width of the plate is unity. Local Nusselt Number, $Nu_x = 0.332\, Re_x^{0.5}\, Pr^{1/3}$;

[At mean film temperature, properties of air: Kinematic viscosity = 17.36x10^{-6} m^2/s; Thermal conductivity = 0.02749 W/m-K; Prandtl number = 0.7;Specific heat =1.006 kJ/kg-K] [4][CO3]

Q3 b) A hot plate of 15 cm^2 area is maintained at 200^{0}C and exposed to air at 30^{0}C. When small side of the plate is held vertical, the convective heat transfer rate is 14% higher than that when bigger side of the plate is held vertical. Determine, the dimensions of the plate. **[Given:** At mean film temperature, density of air =0.91 kg/m^3; dynamic viscosity of air = 22.65x10^{-6} kg/m-s; Thermal conductivity of air= 0.0331 W/m-K; coefficient of volumetric expansion= 0.002577 K^{-1};Prandtl number=0.69; acceleration due to gravity = 9.81 m/s^2].

For vertical plate, $Nu_L = 0.59(Gr.Pr)^{0.25}$ [4][CO3]

Q.4 a) With the help of suitable curve, describe the various regimes of Pool Boiling. [4][CO3]

Q.4 b) Water at 10°C enters at the rate of 0.01 kg/s into a tube of 20 mm inner diameter. It is to be heated to 40°C. There is a uniform heat flux of 15 kW/m^2 over the surface. Determine: (i) length of pipe needed (ii) Tube temperature at outlet (Assume fully developed flow and neglect the entrance effect). [**Given:** Specific heat of water = 4180 J/kg-K, density of water = 997 kg/m^3; thermal conductivity of water = 0.608W/m-K, dynamic viscosity of water= 910x10^{-6} N-s/m^2]. [4][CO3]

Q5 a) Steam in condenser of a steam power plant is to be condensed at a temperature of 30°C with cooling water from a nearby lake. The cooling water enters at 14°C and leaves at 22°C. The surface area of the tube is 45m^2 and overall heat transfer coefficient is 2100W/m^2-K. Determine: i)Mass flow rate of cooling water, ii)Steam condensation rate in the condenser

[**Given:** Specific heat (water) = 4180 J/kg-K, latent heat vaporization of water at 30°C = 2430 kJ/kg]. [4] [CO4]

Q5 b) A chemical (specific heat=3.3 kJ/kg-K; flow rate= 20,000 kg/hr) enters a parallel flow heat exchanger at a temperature of 120°C. The cooling water (specific heat=4.186 kJ/kg-K; flow rate= 50,000 kg/hr) enters at a temperature of 20°C. The heat transfer area is 10m^2 and overall heat transfer coefficient is 1050W/m^2-K. Determine: i) effectiveness of heat exchanger; ii) outlet temperature of water and chemical. [4][CO4]

Q6 a) Define: Irradiation, absorptivity, transmissivity, reflectivity. [4][CO5]

Q6 b) A window glass of 0.3 cm thick has a monochromatic transmissivity as;

$$\tau = 0 \qquad (0 \le \lambda < 0.3\ \mu m);$$
$$\tau = 0.9 \qquad (0.3\mu m \le \lambda \le 2.5\ \mu m);$$
$$\tau = 0 \qquad (\lambda > 2.5\ \mu m)$$

Determine the transmissivity of the window for: i) Black Solar radiation at 5800K, ii) Black Room radiation at 300K.

[Given: At, $\lambda T = 90\ \mu m\text{-}K$, blackbody radiation function = 0.0;

At, $\lambda T = 750\ \mu m\text{-}K$, blackbody radiation function = 0.000005

At, $\lambda T = 1740\ \mu m\text{-}K$, blackbody radiation function = 0.03285;

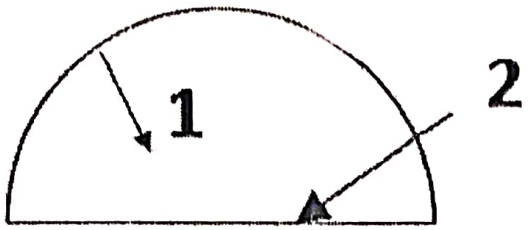
At, $\lambda T = 14500\ \mu m\text{-}K$, blackbody radiation function = 0.96597]

[4][CO5]

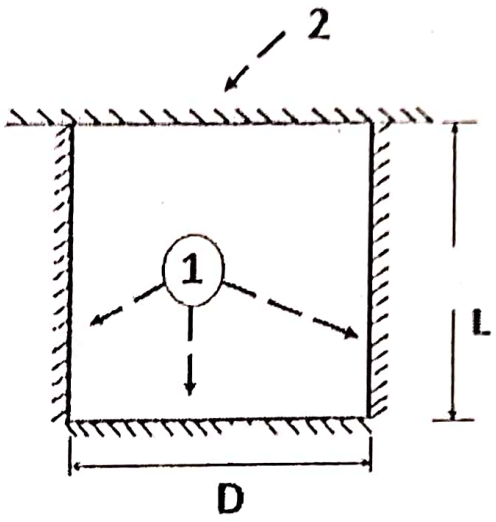
Q7 a) Determine all the view factor (F_{1-1}, F_{1-2}, F_{2-1}, F_{2-2}) of the following given geometry in figure:

i) A hemispherical cavity (1) and a plane surface (2);

ii) A cylindrical cavity (1) and a plane surface (2) [4][CO5]

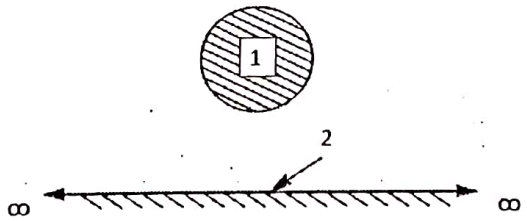


(i)



(ii)

Q7 b) A 5cm diameter sphere (1) at 600°C is placed near infinite wall (2) at 100°C. Both the surfaces are black. Calculate the radiant heat transfer between the two bodies. [4] [CO5]



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Roll No.:.....

SIXTH SEMESTER

B.Tech(Mechanical Engg)

END SEMESTER EXAMINATION May -2024

PAPER CODE ME304 & TITLE OF PAPER: Design of Machine Elements

Time: 3:00 Hours

Max. Marks : 40

Note : Answer any five questions. Use of Design Data HB is permitted but only one from any author. Photocopies of DDHB are not allowed.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1[a] How is the fatigue life of a spring enhanced? Discuss the stresses in a closed coil helical spring. CO-1

[b] How the localised stresses in machine component be avoided? Explain with diagrams. CO-1

[c]How is a power screw different from a fastening screw? How are the threads selected for power transmission? CO-1

[d]Show that the hollow shaft is stronger than the solid shaft having same weight, length and made of same material? CO-1

[2x4=8]

Q.2 Design only a screw and nut for a vertical screw jack to raise and lower a load of 30kN to a height of 250mm. Screw is made of AISI1030 alloy steel with allowable strength in tension and compression of 60MPa and 40MPa in shear, respectively. Assume that the nut is made of Phosphor Bronze with permissible stresses in tension, compression and shear of 42MPa, 38MPa and 35MPa respectively. Take a friction value of 0.15 and a bearing pressure 15MPa on the screw. Draw a well labelled sketch also. CO-2[8]

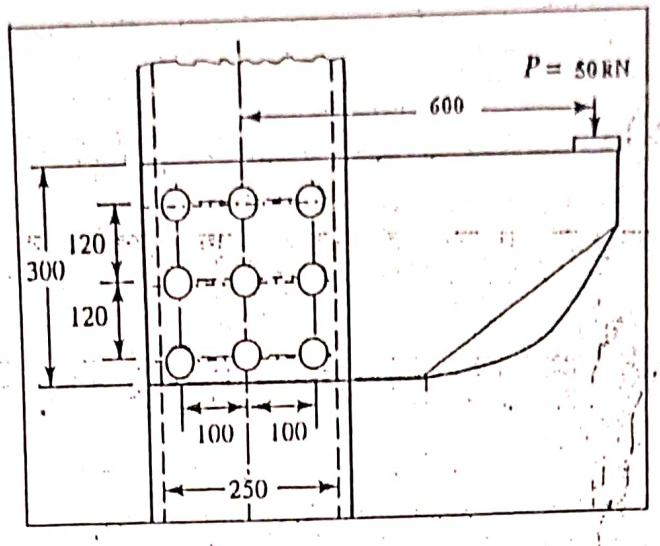
Q.3 A horizontal hollow shaft is simply supported on two bearings 850mm apart. A spur gear with 20° full depth profile and PCD of 250mm is keyed to the shaft at a distance of 200mm from the left hand bearing and transmits torque vertically down ward to a gear. A 600mm diameter pulley is mounted on the shaft at a distance of 250mm from the right hand bearing and receives 30kW at 280rpm from a belt drive located horizontally to the right of the shaft so that the tension in slack side is one third the tight side with angle of wrap of 180° and coefficient of friction for belt and pulley 0.24. Design the shaft as per ASME shafting code if the allowable bending and shearing stress in the shaft material is 80MPa and 45MPa respectively. Assume the shock factor for bending and torsion as 1.5 and the ratio of diameters be 0.5. CO-4[8]

Q.4. (a)What is nipping in leaf springs? Derive an expression to determine the equalized stress in a leaf spring. CO-3[4]

(b) An engine valve spring having a mean coil diameter of 36mm deflects by 12.5mm at a maximum load of 450N. The working stress in the wire is not to exceed 300MPa. Determine the size for the wire and number of coils to be used. CO-3[4]

Q.5 (a) Design a triple riveted butt and circumferential joint with rivets arranged in zig-zag fashion having five rivets in one pitch length and with double cover plates of equal widths for a boiler drum subjected to a pressure of 1.0MPa. The thickness of the main plate is 15mm. 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. CO-2[4]

(b) The bolts (as shown in Figure) are to be designed for a rigid bracket to carry a load of 50kN. Assume that maximum allowable shear stress in the bolt in shank area is 40MPa. All dimensions are in mm. CO-4[4]



Q.6 Design a rigid protected type flange coupling made of FG200 for transmission of 30kW from a motor to a centrifugal pump at 1448rpm. Each half of the flange is keyed to the shaft using two keys located at 90° apart from each other.
Diameter of motor shaft and pump shaft =38mm
No. of bolts=6 nos.
Allowable Shear stress for the bolts, keys and shaft made of SAE1030= 55MPa. Allowable shear stress for the Cast iron flanges=12MPa. Assume crushing stress twice the shearing stress in all the cases. CO-5 [8]

Q.7 A pair of spur gears is to transmit 25kW. The teeth are 20° full depth involute profile. The Cast steel pinion (σ_d=100MPa) is to drive a cast iron gear (σ_d=55MPa) at 150 r.p.m. and the velocity ratio is 1:6. If the pinion is surface hardened to 250BHN, determine the proper module, number of teeth and face width for these gears from the standpoint of strength, dynamic load and wear. Assume a first class commercial gear having an error of 0.07mm for which C=283kN/m. The wear factor K_w is 1.4 and endurance strength in bending is 1.5xBHN for the pinion material. CO-6 [8]

Total no. of Pages:2

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Roll no.....

VI SEMESTER

B.Tech.(Mechanical Engineering)

END TERM EXAMINATION *May-2024*

ME306a **Manufacturing Technology-II**

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

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

Q.1 Prove that shear angle in orthogonal cutting is given by $\tan\varphi = r_c\cos\alpha/(1- r_c\sin\alpha)$ and shear strain is equal to $\cos\alpha/(\sin\varphi\cos(\varphi-\alpha)$. where; φ = Shear angle, r_c= Chip thickness ratio, α = Rake angle.

[Marks 4][CO1]

Q.2 A 4 speed (2x2) gear box is required to be designed for transmitting 8 HP with speed ranging from 400 rpm with $\varphi = 1.2$. Select on optimum ray diagram and calculate the shaft sizes and sketch the gear box with the numbers of teeth on various gears. The gears made up of mild steel.

[Marks 4][CO2]

Q.3 Explain the role of materials selection of machine tool structures with respect to strength and deflection. Discuss the salient design features of spindles used in machine tool.

[Marks 4][CO3]

Q.4 Describe the working principle of ultrasonic machining with a neat sketch. Explain the process parameters and how they effect on metal removal rate in USM.

[Marks 4][CO4]

Q.5 Explain the working principle of LBM. What are the LBM process characteristics? Explain the mechanism of steady state hole penetration in LBM.

[Marks 4][CO4]

OR

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Q.5' Describe the working principle of ECM process and show the metal removal in ECM process depend on the quantity of electric current and chemical equivalent weight. [Marks 4][CO4]

Q6 Describe the working principle of the sine bar. Determine the elevation for 30° using 250mm sine bar. What are the sources of sine bar? [Marks 4][CO5]

Q.7 Define precision, accuracy and tolerance and classify different type of tolerances with neat sketches.

[Marks 4][CO5]

OR

Q7' Define interchangeability and classify different type of fits with neat sketches.

[Marks 4][CO5]

Q8 Tolerances for a hole and shaft assembly having a nominal size 40 mm are as follows:

Hole = $40^{+0.02}_{+0.00}$ mm and Shaft = $40^{+0.05}_{+0.03}$ mm

Determine the following:

(a) Maximum and minimum clearances

(b) Tolerances on Shaft and Hole

(c) Allowance

(d) Type of fit

[Marks 4][CO5]

Q.9 Discuss the key design considerations in fixture design? Explain the 3-2-1 principle of location in fixture design, emphasizing its significance in accurately positioning workpieces for machining operations. How many locators are required for locating cylindrical workpiece?

[Marks 4][CO6]

Q.10 With neat sketches, explain the different types of Clamping devices are used in jig and fixture.

[Marks 4][CO6]

---End---

Total no. of pages: 3

Roll No. _____

SIXTH SEMESTER

B.Tech.

END SEMESTER EXAMINATION

May- 2024

ME308 GAS DYNAMICS AND JET PROPULSION

Time: 3:00 Hours

Max. Marks: 50

Note: Answer all questions by selecting any two parts from each question. All questions carry equal marks. Use of isentropic flow table and normal shock table are allowed. Drawn neat diagram wherever necessary. Assume suitable missing data, if any.

1 [A] Drive three dimensional Navier-Stokes equations in partial differential form with help of neat diagram. [5] [CO1]

[B] Describe the behaviour of flow in a convergent-divergent nozzle when it is operated at (i) design pressure ratio, (ii) pressure ratio higher than the design value, and (iii) pressure ratio lower than the design value. [5] [CO2]

[C] A finite amplitude expansion wave with a pressure ratio of 1/1.35 across it transverses stagnant air at a pressure of 1.2 bar and temperature 300 K in a duct. Determine: (i) velocity of air in the duct, (ii) pressure and temperature of air, and (iii) velocity of the wave. [5] [CO2]

2 [A] Show Fanno line in adiabatic flow with friction on h-S diagram and explain the physical significance in detail. [5] [CO3]

[B] What is Rayleigh flow? Give two practical examples. Under what conditions the assumptions of Rayleigh flow is not valid in a heat exchanger? [5] [CO3]

[C] The Mach number at the exit of a combustion chamber is 0.9. The ratio of stagnation temperatures at exit and entry is 3.74. If the pressure and temperature of the gas at exit [5] [CO3]

are 2.5 bar and 1000 °C respectively, determine (i) Mach number, (ii) pressure and temperature of the gas at entry, (iii) the heat supplied per kg of the gas and (iv) the maximum heat that can be supplied.

3 [A] A circular duct passes 8.25 kg/s of air at an exit Mach nuber of 0.5. The entry pressure and temperature are 3.45 bar and 38 °C respectively and coefficient of friction 0.005. If the Mach number at entry is 0.15, determine (i) the diameter of duct, (ii) length of the duct, (iii) pressure an temperature at the exit, (iv) stagnation pressure loss, (v) verify exit Mach number through exit velocity and temperature. [5] [CO3]

[B] Explain the working of resistance thermometer for temperature measurement with neat diagram. [5] [CO4]

[C] Explain the working of constant current hot wire anemometer for velocity measurement with neat diagram. [5] [CO4]

4 [A] With help of schematic diagram explain the working of turbo-prop engine. Also write its four advantages and four disadvantages. [5] [CO5]

[B] A turbojet engine aircraft flies with a velocity of 260 m/s at an altitude where the air is at 35 kPa and –40 °C. The compressor has a pressure ratio of 10 and the temperature of the gases at the turbine inlet is 1095 °C. The air enters the compressor at a rate of 8.5 kg/s. Determine (i) temperature and the pressure of the gases at the turbine exit, (ii) velocity of the gases at the nozzle exit, and (iii) propulsive efficiency of the cycle. Assume the working substance is air as an ideal gas with Cp = 1.005 kJ/kg.K and $\gamma = 1.4$. [5] [CO5]

[C] A turbojet engine propels an aircraft at a Mach number of 0.8 in level flight at an altitude of 10 km. The data for the [5]

engine are given below: [CO5]

Stagnation temperature at the turbine inlet = 1200 K, calorific value of the fuel = 43 MJ/kg, compressor efficiency = 0.75, combustion chamber efficiency = 0.975, turbine efficiency = 0.81, mechanical efficiency of the power transmission between turbine and compressor = 0.98, exhaust nozzle efficiency = 0.97, specific impulse = 25 seconds. Assuming the same properties for air and combustion gases, calculate: (i) fuel-air ratio, (ii) compressor pressure ratio, (iii) turbine pressure ratio, (iv) exhaust nozzle pressure ratio, (v) Mach number of exhaust jet.

5 [A] With neat diagrams explaining the working of liquid propellant engine and solid propellant engine. [5] [CO6]

[B] Explain working of multistage rocket vehicle system with neat diagram. [5] [CO6]

[C] The following data refer to a rocket engine. Propellant flow rate is 200 kg/s. The thrust chamber pressure is 37 bar and its temperature is 3000 K. The nozzle exit diameter is 0.6 m, nozzle exit pressure is 1.1 bar, ambient pressure is 0.60 bar, and thrust produced is 380 kN. Calculate effective jet velocity, actual jet velocity, specific impulse and specific propellant consumption. [5] [CO6]

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Total no. of Pages 02 Roll No.....

SIX SEMESTER
B. TECH.

END TERM EXAMINATION May-2024
ME-310 AUTOMATION IN MANUFACTURING
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 applications of Hydraulics and Pneumatics in the production of goods and services? [5][CO1]

(b) What are different types of piston pumps? Explain the working of piston pump with a sketch. [5][CO2]

2 (a) Classify the direction control valves in terms of positions. When is a two-position valve preferred over three-position valve? [6][CO3]

(b) Explain the working of speed control valve with the help of diagram. [4][CO3]

3 (a) Explain the working of bleed-off control/circuits with the help of diagram. [5][CO3]

(b) Draw a circuit of press button operated (forward, automatic return) motion of a single cylinder for pneumatic. [5][CO4]

4 (a) What is poppet valve? Sketch the position 2/2, 3/2 and 4/2 of poppet valve. [5][CO3]

(b) Why electrical limit switches are used in pneumatic circuit? Explain the working of electrical switches in the operation motion (A+, A-) circuit. [5][CO3, CO4]

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5 (a) Draw an auto sequence operation motion (A+, B+, A-, B-) of a two-cylinder for pneumatic circuit. [6][CO4]

(b) Explain the need of air treatment in pneumatic system. Mention at least five applications in which compressed air is used [4][CO3]

6 (a) Explain the operation of AND, OR and NOT gates with graphical representation. [6][CO2]

(b) Prove the following theorem: [4][CO3]

(*i*) $\overline{XY} = \overline{X} + \overline{Y}$

(*ii*) $XY + YZ + \overline{X}Z = XY + \overline{X}Z$

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

6th SEMESTER B.Tech. [MECH]

END TERM EXAMINATION, May-2024

ME312-Quality Management and Six Sigma Applications

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

Note : Answer any FIVE questions
All questions carry equal marks.
Assume suitable missing data, if any.
Use of statistical Table is allowed

Q.1 (a) Differentiate physical goods and services. Write Garvin's eight dimensions of quality.

(b) Why measuring of service quality in more difficult in comparison to physical goods. Discuss the five dimensions of service quality. [5+5][CO1]

Q.2 (a) Discuss the major philosophy of Total Quality Management.

(b) Discuss typical reasons for each of the following barriers to total Quality implementation (i) Poor planning, (ii) Lack of top management commitment, and (iii) Workforce resistance. [5+5][CO2]

Q.3 A soft drink bottling company is interested in controlling its filling operation. Random samples of size 4 are selected and the fill weight is recorded. Table 1 shows the data for 24 samples. The specifications on fill weight are 350±5 grams (g). Daily production rate is 20,000 bottles. (a) Find the trial control limits for the X- and R-charts. (b) Assuming special causes for out-of-control points, find the revised control limits. (c) Assuming the distribution of fill weights to be normal, how many bottles are nonconforming daily?

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TABLE 1

Sample	Observations (g)				Sample	Observations (g)			
1	352	348	350	351	13	352	350	351	348
2	351	352	351	350	14	356	351	349	352
3	351	346	342	350	15	353	348	351	350
4	349	353	352	352	16	353	354	350	352
5	351	350	351	351	17	351	348	347	348
6	353	351	346	346	18	353	352	346	352
7	348	344	350	347	19	346	348	347	349
8	350	349	351	346	20	351	348	347	346
9	344	345	346	349	21	348	352	351	352
10	349	350	352	352	22	356	351	350	350
11	353	352	354	356	23	352	348	347	349
12	348	353	346	351	24	348	353	351	352

[10][CO3]

Q.4 Find a single sampling plan for lot size 2500 where it is desired to reject batches that are 1.2% nonconforming no more than 5% of the time, while batches that are 7.5% nonconforming are accepted about 10% of the time. The producer's stipulation must be satisfied exactly.

[10][CO4]

Q.5 (a) Discuss the steps for ISO 9000 certification of an organization.

(b) Discus the DMAIC method to implement the six sigma program.

[5+5][CO5&6]

Q.6 Write Short Notes on

(a) Malcolm Baldrige National Quality Award

(b) Cost of Quality

(c) Operating Characteristic Curve

(d) ASN and ATI

[2.5×4][CO5&6]

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Total No. Pages 02 *Roll no.....*

VIth SEMESTER

[B.Tech.]

END TERM EXAMINATION *May-2024*

COURSE CODE: ME-314; COURSE TITLE: MECHANICAL VIBRATIONS

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) Define Mathematical modeling. Describe the various steps involved in the mathematical modeling of vibrations. [5] [CO1]

Q.1(b) Describe the Discrete and Continuous systems with respect to the Vibrations. [5] [CO1]

Q.2(a) Derive Lagrange's equation of motion of a vibrating system in terms of generalized coordinates. [5] [CO2]

Q.2(b) The displacement in centimetres of the slider in the slider crank mechanism is given by $x = 24 \cos(8\pi t) + \frac{3}{2} \cos(16\pi t)$. Plot a displacement versus time diagram. What is the acceleration of the piston at $t = \frac{1}{8}$ second? [5] [CO2]

Q.3(a) What is the magnification factor (MF)? Draw and explain the characteristics curve between the Magnification factor (MF) and the frequency ratio. [5] [CO3]

Q.3(b) A mass of 100 kg is suspended on a spring having a scale of 19600 N/m and is acted upon by a harmonic force of 39.2 N at the undamped natural frequency. The damping may be considered to be viscous with a coefficient of 98N-sec/m. Determined, (i) the undamped natural frequency, (ii) the amplitude of the vibration of the mass, and (iii) the phase difference between the force and the displacement. [2 + 2 + 1 = 5] [CO3]

Q.4(a) A trailer being pulled at a high speed, hits 'h' centimetres curb. Considering the trailer to be a single degree of the freedom spring-mass system. Analyze the system for its response. [5] [CO4]

Q.4(b) What do you understand by the transient vibrations? Describe the steady-state vibrations in detail. [5] [CO4]

Q.5(a) Write down the differential equation of motion for the system shown in Figure (1). The quantities X_1 and X_2 are absolute displacements. Find the two natural frequencies when $k_1 = 98000$ N/m, $k_2 = 19600$ N/m, $m_1 = 196$ kg, and $m_2 = 49$ kg. [5] [CO5]

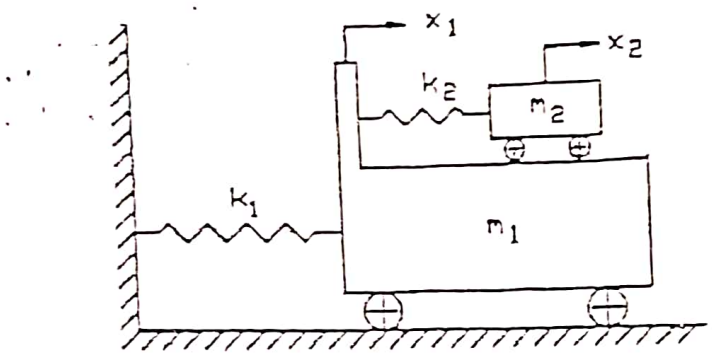


Figure (1)

Q.5(b) Write the short notes on the following: [1.5 + 1.5 + 2 = 5] [CO5]

(a) Only static coupling – no dynamic coupling
(b) Only dynamic coupling – no static coupling
(c) Static and Dynamic Coupling

Q.6(a) What do you understand by Vibration Measuring Instruments? Explain various types of Vibration Measuring Instruments. What is the stiffness coefficient? [5] [CO6]

Q.6(b) What is 'Vibration testing equipment'? What is the meaning of 'Vibration signature'? Describe the balancing of rotors. [5] [CO6]

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

VI SEMESTER (Mechanical)

B.Tech.

END SEMESTER EXAMINATION ***May-2024***

ME-316 Power Plant Engineering

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

Note: 1. Attempt any FIVE questions
2. All questions carry equal marks
3. Assume suitable missing data, if any.

1	a. Why water is not superheated in the boiler drum? Discuss	[5]	[CO2]
	b. With the help of a simple diagram, explain the essential features of either Steam or hydro power plant.	[5]	[CO1,2]
2	a. Describe the working and essential features requirements of any one of the advanced power cycles used in power plant	[5]	[CO2,3]
	b. Discuss the necessary aspects which direct the choice of particular type of power plant at a specified place. Substantiate your arguments with valid reasoning.	[5]	[CO3]
3	a. Why Nuclear power reactor uses Control rods and nuclear reactor needs a moderator material? Explain	[5]	[CO3]
	b. Explain the need of control system in power plants. Justify your answer with at-least one suitable practical example	[5]	[CO3,4]
4	a. How load curve can help power plant engineer to design the power plant? Specify your answer based upon base load/peak load/average load	[5]	[CO4,5]
	b. Discuss, how would you reduce the pollution from the power plants.	[5]	[CO3,4]
5	a. Define the term waste heat recovery and explain how it is achieved in power plants.	[5]	[CO4,5]

b. Air enters in the compressor of gas turbine plant at 1 bar and 27 °C. Air is then compressed to a pressure of 12 bar and combustion takes place in the combustion chamber where the fuel (Calorific value of 46 MJ/kg). The Turbine Inlet Temperature rises to 1300 K, where it is expanded in the turbine (coupled with the compressor on the same shaft). Determine the Air fuel ratio and efficiency of the Plant [5] [CO3,4]

6 a. How Energy conservation can help in reducing the cost as well as requirement of resources? Explain [5] [CO4,5]

b. What is meant by Energy audit and how it is carried out? Explain [5] [CO4,5]

7 a. Discuss the various pollutants from power plant and explain in brief. [5] [CO4,5]

b. Discuss, how would you reduce the pollution from the power plants. [5] [CO3,4]

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Total No. of Pages: 2 Roll No.-.....

B.Tech -ME318
VI SEMESTER
END SEMESTER EXAMINATION
COMPUTER AIDED MANUFACTURING

Time: 3:00 Hrs Max. Marks: 50

Note: Attempt ANY FIVE Questions.
All questions carry equal marks.

Q1 a) Define with examples NC,CAM, CNC DNC,NCMT,CIDM,CIM.
b) Discuss the parameters to be considered by the Production engineering department to adopt CAM technology for the first time in the industry.
c) Discuss advantages and limitations of using CNC and CIDM technology in the industries. 10[CO1]

Q2. Elaborate following in detail with suitable examples/diagrams and their applications in CAM:
(a) Artificial intelligence.
(b) IOT.
(c) Fuzzy AHP
(d) INDUSTRY 4.0
(e) 4G,5G.
(f) Deep learning
(g) Machine Learning
(h) Data Analytics
(i) Clouding
(j) SOFT COMPUTING. 10(CO2)

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Q3. a) Describe various types of programming with examples used for CNC machine tools.

b) What are G codes and M codes? Give ten example of each.

c) Write APT program to turn a cylindrical component of total length of 600mm and diameters as 20,30,40mm at an equidistance of 200mm. Turning is to be done in two passes and material of component of mild steel. 10[CO3]

Q4. a) Discuss in detail FMC and FMS with all the basic elements involved.

b) Elaborate typical control cycle used in FMS along with neat sketch.

c) Discuss various types of flexibilities.

d) Discuss various advantages and limitations of FMS used in Indian industries 10 [CO4]

Q5 a) Discuss various types of sensors used in industrial robots.

b) Explain the various configurations of industrial robots.

c) Elaborate the applications of industrial robots.

d) Discuss computer aided design and the benefits of its integration with computer aided manufacturing 10[CO5]

Q6 Write short notes on the following :(any five)

a) Computer aided Process planning and its types.

b) Parallel programming and its advantages.

c) Group technology and its benefits.

d)Advantages and disadvantages of point to point and continuous path control systems.

e) Reverse engineering and its applications.

f) Open loop and closed loop systems. 10[CO2 & CO4]

Total No. of Pages : 02 Roll No. 387

VI SEMESTER B.Tech (ME)

END SEMESTER EXAMINATION May-2024

ME328 COMPOSITE MATERIALS TECHNOLOGY

Time: 3:00 Hours Max. Marks : 50

Note : Answer all questions by selecting any two parts from each questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 [a] Why are materials in fibre form better than the bulk material they are derived from? Classify the composite materials on basis of (i) Type of matrix (ii) Size-and-shape of reinforcement. [2+3] [CO1]

[b] Explain the graphite fiber structure. Explain pyrolysis process for graphite fibers and types of precursor used for graphite fibers. [5] [CO1]

[c] Write the compliance and stiffness matrices for a lamina for plane stress condition along material axis in terms of elastic constants. Take material axis are 1-2 and elastic constants are E_1, E_2, G_{12}, υ_{12} and υ_{21}. [5][CO2]

Q.2[a]Determine the stiffness and compliance matrices along material axis for a unidirectionalAS4/3501-6 graphite epoxy lamina that has following engineering constants: E_1=145GPa, E_2=12.5GPa, G_{12}=5.25GPa, υ_{12}=0.27 [5][CO2]

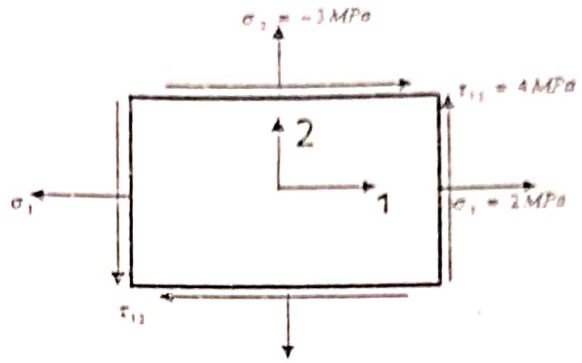
[b]Calculate the longitudinal modulus and tensile strength of a unidirectional composite containing 60 percent by volume of carbon fibres (E_{1f}=294GPa and $\sigma 1_{fu}$=5.6GPa) in a toughened epoxy matrix(E_m =3.6GPa and σ_{mu}=105MPa).What fraction of load carried by fibres in the composite? [2+2+1] [CO3]

[c] Derive the expression for Transverse Young's Modulus for composite materials, when applied loads are perpendicular to the fibre direction in terms of (E_f, E_m, V_f & V_m) [5] [CO3]

Q.3 [a] Explain different failure theories for composite material with mathematical expression. [5] [CO4]

[b] Determine the compliance matrices for a unidirectional graphite epoxy lamina that has following engineering constants: E_1=181GPa, E_2=10.3GPa, G_{12}=7.17GPa, υ_{12}=0.28 . Also find strains in 1-2 coordinates if the applied stresses are shown in the figure (1).

[5] [CO2]



Figure(1)

[c] Explain the vacuum bag moulding for manufacturing of composite materials. Write its advantages and limitations. [3+2] [CO5]

Q.4 [a] With neat sketch explain the hand lay up process in composite manufacturing. Write its advantages and limitations. [3+2] [CO5]

[b] An angle –ply lamina made of S-glass/epoxy has the following properties in the principal fibre direction.

F_{1T}=1280MPa, F_{1C}=622MPa, F_{2T}=49MPa, F_{2C}=245MPa, &F_6= 69MPa (Note :F denotes stress at ultimate point) E_1=35GPa, E_2=7GPa, E_6=3GPa and $\upsilon_{12} = 0.3$. A tensile load of σ_x =2MPais applied at angle 60^0 to the principal fibre direction. Check the safety of Laminate as per failure theories. [5] [CO4]

[c] With neat sketch explain the filament winding in composite manufacturing. [5] [CO5]

Q.5 [a] Explain the function of matrix materials in composite. Classify the matrix materials and explains it's briefly. [5] [CO6]

[b]Explain the failure mechanism of fibres matrix and composite with help of stress strain diagram. Also derive expression V_{min} (minimum fibre volume fraction),

$$V_{min} = \frac{\sigma_{mu} - (\sigma_m)_{\varepsilon_f^*}}{\sigma_{fu} + \sigma_{mu} - (\sigma_m)_{\varepsilon_f^*}}$$

where σ_{mu} and σ_{fu} indicate the tensile strength of matix and fibres. $(\sigma_m)_{\varepsilon_f^*}$ indicates matrix stress at the fibers fracture strain ε_f^* [5] [CO4]

[c] Write short notes on

(i)Pultrusion (ii) Injection moulding [5] [CO5]

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Total no. of Pages: 2 Roll no.....

VIII SEMESTER B.Tech. (Mechanical Engineering]

END TERM EXAMINATION May 2024

COURSE CODE: ME404

COURSE TITLE: Industrial Engineering

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) Differentiate between production and productivity. Justify with a suitable example, "Increase in production may or may not increase Productivity". [5][CO-2]

(ii) The following information regarding the output produced and inputs consumed for a particular period for a particular company is given below:

a) Output = Rs.10,000.

b) Human input = Rs.3,000.

c) Material input = Rs.200.

d) Capital input = Rs.300.

e) Energy input = Rs.100.

f) Other misc. input = Rs.50.

The values are in terms of base year rupee value. Compute various productivity indices. [5][CO-4]

Q.2: (i)Explain the predetermined motion time system with a suitable example. [5][CO-2]

(ii) In a time study for a job by a worker whose rating is 90, data obtained as follows: observed time 15 minutes, personal need allowances = 4% of basic time, fatigue allowance = 2.5% of basic time, contingency work allowances = 2% of basic time, contingency delay allowances= 1% of basic time.

Find: a) Basic time, b) work content, c) standard time. [5][CO-4]

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6 Write short notes on any FOUR of the following: [10][CO1]

(a) Purpose of Color coding of ABC items
(b) JIT
(c) MIMS
(d) FIFA and LIFA
(e) Cost consideration in making

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Total no. of pages: 2 Roll. No. ----------

B.Tech. (2nd SEMESTER)
PE-104 ENGINEERING MATERIALS AND METALLURGY

END TERM EXAMINATION May 2024
Time: 03:00 Hours Max. Marks: 40

Note: Answer all the questions.
Assume missing data.

Q.1 For a BCC iron, determine (i) Inter-planar spacing (ii) Diffraction angle for the (220) set of planes. The lattice parameter for Fe is 0.2866 nm. Assume that monochromatic radiation have a wavelength of 0.1790 nm with order of reflection as one. **[10 Marks] CO-1**

OR

Discuss various point imperfections in a crystal in detail. Calculate the number of vacancies in copper at room temperature of 20°C. Assume Boltzmann Constant k = 0.0000862 eV/atom-k and free energy required to form the defect (E_d = 0.9 eV/atom) at room temperature, the density of copper ρ = 8.94 g/cc at 20°C, atomic weight of copper A_{Cu} = 63.55 g/mole. **[10 Marks] CO-1**

Q.2 Write the composition and applications of following alloys:
(a) Al-bronze, Babbit metals
(b) Brasses and Muntz metal
(c) Inconel **[10 Marks] CO-2**

OR

What do you mean by galvanic corrosion? Discuss the mechanism, causes, and preventive measures for galvanic corrosion with the help of diagrams in detail. **[10 Marks] CO-2**

Q.3 Classify the heat treatment processes commonly employed in engineering practice. Describe Carburising, Cyaniding, and Nitriding processes with the help of diagrams. **[04 Marks] CO-3**

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Q.4 Classify phase diagrams on the basis of components present in the system. Draw iron-carbon phase diagram and describe the invariant reactions involved in detail. [04 Marks] CO-3

Q.5 Define the terms creep and creep strength. Draw and discuss the creep curve for metals. [04 Marks] CO-4

Q.6 Classify composite materials on the basis of type of matrix material present and describe the metal matrix composites. [04 Marks] CO-5

Q.7 Write short notes on the following:

(a) Powder Metallurgy [02 Marks] CO-6

(b) Applications on the polymer matrix composites in industry. [02 Marks] CO-5

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IV SEMESTER

B.Tech. (PE)

END TERM EXAMINATION

May-2024

COURSE CODE: PE 202

Branch: Production

COURSE TITLE : Thermal Engineering - II

Time: 03:00 Hours

Max. Marks: 40

Note : Attempt any FIVE questions in full. Assume suitable missing data, if any. For air assume C_v = 0.718 kJ/kg K, C_p= 1.005 kJ/kg K.

Q.1 (a) Derive an expression for the optimum pressure ratio in a two stage compression. [4][CO1]

(b) A single-acting, single-cylinder reciprocating air compressor has a cylinder diameter of 200 mm and a stroke of 300 mm. Air enters the cylinder at 1 bar; 27°C. It is then compressed polytropically to 8 bar according to the law $pV^{1.3}$ = constant. If the speed of the compressor is 250 rpm, calculate the mass of air compressed per minute, and the power required in kW for driving the compressor. [4][CO1]

Q.2 (a) Explain the working principle of a centrifugal compressor with a neat sketch. [4][CO2]

(b) Explain the phenomenon of surging in a centrifugal compressor with the help of a diagram. [4][CO2]

Q.3 (a) Derive an expression for efficiency of Diesel cycle in terms of compression ratio. [4][CO3]

(b) An engine operating on an air standard Otto cycle takes air at 100 kPa and 25 °C and compresses it isentropically to 2.2 MPa. The work output from the cycle is 200 kJ / kg of air. Find the efficiency of the cycle, and the maximum temperature reached in the cycle. [4][CO3]

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Q.4 (a) Discuss the effect of intercooling in the compressor stages in a Brayton cycle on compressor power, work output and efficiency. Also draw the T-s diagram showing intercooling. [4][CO4]

(b) An air standard Brayton cycle with a pressure ratio of 10 takes in air at 100 kPa and 300 K and a mass flow rate of 5 kg / s. The air leaves the combustor at 1260 K. Find the efficiency of the cycle and the net power output. [4][CO4]

Q.5 (a) With the help of a sketch, derive the expression for rate of heat transfer and overall heat transfer coefficient for three layered composites walls. [4][CO5]

(b) A conductor with 8 mm diameter carrying an electric current pass through an ambient at 30 ^{0}C with a convection coefficient of 120 W/m^2 K. The temperature of the conductor is to be maintained at 130^0 C. Find the rate of heat loss per metre length of the conductor when (a) the conductor is bare and (b) conductor is covered with insulation [k = 1.2 W/(m-K)] with radius corresponding to the critical radius of insulation. [4][CO5]

Q.6 (a) Define the following: (i) Reynolds number (ii) Nusselt number (iii) Prandtl number (iv) Grashof number [4][CO5]

(b) Explain the various laws of radiation heat transfer. [4][CO6]

Total No. of Pages: 03

Roll no.....

4th Semester

B.Tech

END SEMESTER EXAMINATION May -2024

PE 204 Industrial Engineering and Operations Research

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

Note: 1. Attempt any FIVE questions; assume missing data if any

1a	What do you understand by Flexible Automation? Discuss its applications (examples) in manufacturing and service systems.	CO1	4
1b	What type of technology is most suitable for Mass production, Batch production and job shop production systems?		4
2a	What is economic order quantity (EOQ)? Draw the Time Vs Cost and Quantity Vs Cost diagrams to explain the Q- Model of Inventory control. Develop the expression for EOQ.		4
2b	The annual demand of an item is 8000 units and the production rate is 12000 units per annum. Calculate the economic batch size if the cost of carrying inventory is Rs 20 per unit per year and cost of each changeover is Rs 500. Also calculate the number of batches to be produced per year.		4
3a	Convert the following Primal into Dual by following all the steps: Max Z = 200 X1 + 150 X2 + 100 X3 Subject to 50X1+30X2 +25X3<=1200 10X1+18X2 +15X3=900 25X1+15X3 >=1500 X1, X2, X3 >=0,	(CO4)	4
3b	Solve the following problem using Simplex Method Max $Z = 8x_1 + 7x_2$ s.t. $2x_1 + 3x_2 \leq 60$ $4x_1 + 3x_2 \leq 96$ $x_1, x_2 \geq 0$	(CO3)	4
4b	What is Hungarian Method of finding optimal solution of the Assignment Model? Discuss in detail the steps of this method. What is the condition for multiple optimal solutions of an assignment problem?	(CO1) (CO2)	4

4b A Service shop has four independent teams capable of handling any job. However, their efficiency in terms of number of hours required to complete the job differs. Four jobs are received in the centre for servicing. The time taken (in hours) by a team to complete the job is given in the table below. Find the optimal assignment which minimize the total number of hours, when each team has to be assigned one job and we cannot split the job between the teams. (CO3) 4

Jobs

Service Teams	1	2	3	4
A	5	2	7	10
B	6	5	10	7
C	8	4	7	9
D	9	14	12	15

5a Solve the following transportation problem to minimize the cost of transportation. Use North West Corner rule to find the initial feasible solution and u-v method for optimization (CO3) 4

Destinations

Sources	D	E	F	Supply
A	4	2	1	200
B	2	5	4	300
C	5	7	3	500
Demand	250	370	380	

5b Find the initial feasible solution of the following Transportation problem using Vogel's Approximation Method (CO3) 4

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Destinations

Sources	D	E	F	G	Supply
A	6	2	3	5	180
B	4	5	4	6	140
C	7	4	7	4	180
Demand	100	120	100	150	

6a What is Demand forecasting? How forecasting is different from prediction? Explain the use of calculating Mean Absolute Deviation and Cumulative Forecast Error of a forecasting model. CO2 4

6b Monthly demand of an electronic product at a store is given below. Compare 3Period moving average model and exponential smoothing method of forecast for the electronic product. Also forecast the demand for 9th month by the two methods. CO4 4

Month	Demand	Month	Demand
1	37	5	28
2	42	6	36
3	25	7	39
4	32	8	29

7 Write brief notes [CO1] 8

(a) QFD
(b) Internet of Things
(c) Break Even Analysis
(d) Gravity method of facility location

Total No. of Pages : 02 Roll No. .....

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4th SEMESTER

B.Tech. (PIE)

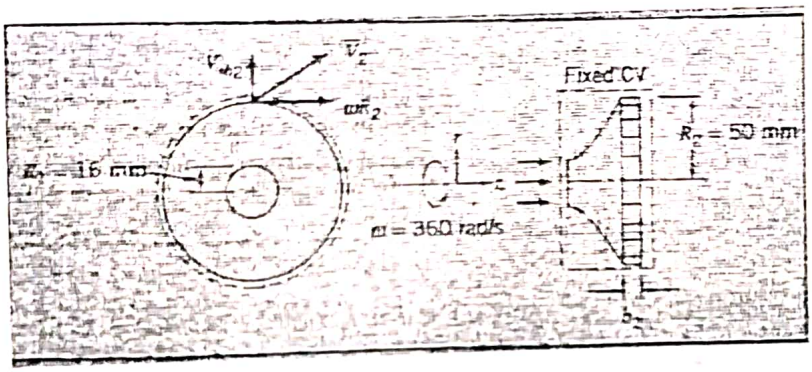
END SEMESTER EXAMINATION May -2024

PE206 FLUID MECHANICS & MACHINERY

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

Note : Answer any 10 questions
All questions carry equal marks.
Assume suitable missing data, if any.

1. A centrifugal pump is used to pump 0.008m^3/s of water. The water enters the impeller axially through a 32mm diameter inlet. The inlet velocity is axial and uniform. The impeller outlet diameter is 100mm. Flow leaves the impeller at 3.1 m/s relative to the blades, which are radial at the exit. The impeller speed is 380 rad/s. Determine the impeller exit width, b_2, the torque input, and the power predicted by the Euler turbine equation. [CO6]



2. Derive and explain EulerTurbomachine equation with its limitations. [CO6]

3. A Pelton wheel is a form of impulse turbine well adapted to situations of high head and low flow rate. Consider the Pelton wheel and single-jet arrangement, in which the jet stream strikes the bucket tangentially and is turned through angle θ. Obtain an expression for the torque exerted by the water stream on the wheel and the corresponding power output. Show that the power is a maximum when the bucket speed, U, is half the jet speed, V. [CO6]

4. Draw the Schematic of typical reaction turbine installation and show definitions of head terminology. [CO6]

5.Explain the need for CFD and its strategy. [CO5]

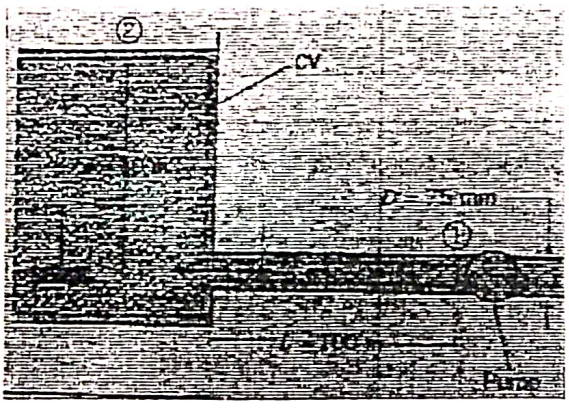
6. Draw the diagram of hydraulic Accumulator and Intensifier and briefly explain their working. [CO3]

7. Following the steps to convert the differential equation into a difference equation, solve $\frac{du}{dx} + u = 0$ $0 \leq x \leq 1$ $u(0) = 2$ for N = 4 and compare the exact solution. [CO5]

8. Develop equations of velocity and pressure drop for Fully Developed Laminar Flow in a Pipe. [CO4]

9. A simple and accurate viscometer can be made from a length of capillary tubing. If the flow rate and pressure drop are measured, and the tube geometry is known, the viscosity of a Newtonian liquid can be computed. A test of a certain liquid in a capillary viscometer gave the following data: Flow rate: 890 mm^3/s Tube length: 1 m Tube diameter: 0.55 mm Pressure drop: 1.0 MPa Determine the viscosity of the liquid. [CO4]

10. A 100-m length of smooth horizontal pipe is attached to a large reservoir. A pump is attached to the end of the pipe to pump water into the reservoir at a volume flow rate of 0.01 m3 /s. What pressure (gage) must the pump produce in the pipe to generate this flow rate? The inside diameter of the smooth pipe is 75 mm. f = 0.0162 for this case. [CO4]



11. Explain REYNOL'S experiment to study flow through pipe and its conclusions. [CO4]

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Total No. of Page 02 *Roll No. .....*

FOURTH SEMESTER B.Tech. (PE)

END SEMESTER EXAMINATION *May-2024*

PE208 Metal Cutting & Tool Design

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

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

1a In machining tests it was found that for a particular material, the following relation applied [5][CO#2]
$2\phi+\beta-\gamma= \pi/2$
Also, when the rake angle was 20°, the coefficient of friction was 1.2.
(i) What would be the chip thickness if in a turning operation, the feed was 0.15 mm and the major cutting edge angle was 60° ?
(ii) If the cutting force is limited to 3KN and the specfic cutting energy of the work material is $2GJ/m^3$, what maximum depth of cut can be taken?

b What is a chip breaker? Describe its various forms. [3][CO#1]

2a Which cutting fluid would you recommend for the machining of the following materials? [4][CO#3]
(i) Aluminium alloys
(ii) Stainless steels

b Evaluate the average shear plane temperature for machining mild steel at a cutting speed of 2m/sec with a 10° rake angle tool, the width of the cut being 2 mm and the undeformed chip thickness 0.25mm. The apparent shear strength of the material is $400x10^6 N/mm^2$. Given ρ =7200Kg/m^3, C = 502J/Kg°C, μ = 0.5 and fraction of heat going into the chip = 0.85. [4][CO#3]

3a What is Tool life criteria? Show diagrammatically the variation of flank wear of cutting tool with time and explain its importance from the tool-life point of view. [5][CO#4]

b What is the role of cutting fluid in grinding? What types of cutting fluids would you recommend in case of grinding? [3][CO#5]

4a A 600 mm long job of 150 mm diameter of AISI 4140 Steel is to be turned with a depth of cut of 1.5 mm and a feed rate of 0.25 mm/rev. [5][CO#4]

Assume that:

Labour cost per hour = Rs. 12.00
Machine overhead per hour = Rs. 40.00
Grinding cost per hour = Rs. 15.00
Grinding machine overhead per hour = Rs. 50.00
Idle time = 5 minutes
The Taylor's tool life equation is given by = $VT^{0.22} = 475$
The operation can be carried out using tungsten carbide tools as brazed tool.
For brazed tools:
Initial cost = Rs. 60.00
Grinding time = 5 minutes/edge
Tool change time = 2 minutes
9 grinds per tool before salvage
Calculate:

(i) Optimum cutting speed for minimum cost
(ii) Corresponding tool life

b Discuss the important machinability criteria. [3][CO#4]

5a What do you understand by self-sharpening characteristic of a grinding wheel? Define the equivalent diameter of a grinding wheel. [5][CO#5]

b Explain the various forms of thermal damage that may occur in grinding? [3][CO#5]

6a What parameters should be considered for designing a single point cutting tool? [5][CO#6]

b What are the main types of milling cutters? [3][CO#6]

7a How will you design the gullet space for pull type broach? [5][CO#6]

b What are the points that have to be considered for designing a clamp for a jig or a fixture? [3][CO#6]

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

FOURTH SEMESTER B. Tech (ME)

END SEM. EXAMINATION MAY 2024

PE252 MANUFACTURING MACHINES

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

Note: Question no. *ONE* is compulsory and answer *any three* questions from the rest. Assume suitable missing data, if any.

1 Briefly distinguish between the following.

(i) Taper turning and eccentric turning

(ii) Cemented carbide and coated carbide

(iii) Shaper and Planer

(iv) Up milling and down milling

(v) Wheel dressing and truing 10 [CO1,2,4,5,6]

2(a) With a neat sketch explain the construction and working of a crank and slotted link mechanism of a standard shaper. Describe how stroke length, cutting speed, and stroke position are adjusted on this shaper.

5 [CO 5]

(b) Sketch various views of a RH twist drill and explain its various elements and angles.

5 [CO 3]

3(a) With a neat sketch explain the construction and working of a column and knee type horizontal milling machine. Explain the methods used to mount different types of cutters on this milling machine.

5 [CO 4]

(b) Explain the step-by-step procedure for machining T-slots on a milling machine accompanied by neat sketches.

5 [CO 5]

PTO

Q5" Discuss the scheme of finish turning operation in precision machining. Show that the theoretical calculation of surface roughness depends upon approach angle and feed.

(4 Marks)(CO4)

Q6. Explain spindles used in precision machining with a neat sketch. Differentiate between AC servo and DC servo motors used in precision machine and highlighting their respective characteristics and applications.

(4 Marks)(CO4)

Q7. Explain the working principle of Focused Ion Beam machining with a neat diagram. Discuss key process parameters of FIB milling in nanofabrication with an example.

(4 Marks)(CO5)

OR

Q7" Explain micro cutting mechanics with a neat diagram and discuss the size effect arising from micro turning.

(4 Marks)(CO5)

Q8. Describe the working principle and steps of the photolithography process employed in the microfabrication system for masking on silicon wafers.

(4 Marks)(CO5)

Q9. Explain micro-sensor and micro-actuator. Discuss the functional relationship between micor-sensor, micro-actuator and micro system.

(4 Marks)(CO6)

Q10. Define micro casting process. Explain with neat sketches, the steps of micro casting based on the investment casting process.

(4 Marks)(CO6)

---End---

Total No. of Pages ____

B Tech [Prod & Industrial Engg.] Sixth Semester

End Sem Exam (May - 2024)

PE – 306 : (Metrology and Quality Assurance)

Time: : 03 *Hrs* Max Marks. 40

Note: Question No. 1 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. 01 Differentiate between. (02x4=08) [CO 01, 02 & 03]

(i) – Active and Passive type of Measuring instruments

(ii) – Indicating and Integrating Instruments

(iii) – Snap Gauge and Progressive Gauge

(iv) – Angle gauge and Sin bar.

Q No. 02 (a) What are various types of Standards in Metrology? Explain by making a comparison between them. (04) [CO 04]

Q No. 02 (b) What do you understand by Systematic errors? Discuss its various types in brief. (04) [CO 03]

Q No. 03 (a) Differentiate between Response time and Settling time, in brief. (04) [CO 01]

Q No. 03 (b) What are the advantages and applications of Limit Gauges? Also mention limitations of Limit gauges in brief. (04) [CO 02]

Q No. 04 (a) What are various standard grades/classes of Slip gauges? Also mention applications of slip gauges in brief. (04) [CO 01]

Q No. 04 (b) Find out the blocks that would be selected from the Set M 112 of Slip Gauge for creating a dimension of 58.975 mm. (04) [CO 03]

Slip Gauge Set M 112			
	Range	Steps	No. of Pieces
1-	1.001 – 1.009 mm	0.001	9
2-	1.01 – 1.49 mm	0.01	49
3-	0.5 – 24.5 mm	0.5	49
4-	25, 50, 75 and 100	25	4
5-	1.0005 mm	–	1

Q No. 05 (a) What are various elements of Screw threads measurement? Also mention the instruments used to measure it. (04) [CO 04]

Q No. 05 (b) Discuss various ways of expressing Surface Roughness values in brief? (04) [CO 05]

Q No. 06 (a) What are various instruments used in Metrology, which are based on principle of Optics? (04) [CO 05]

Q No. 06 (b) What are various elements of Gear measurement? Also mention the instruments used to measure it. (04) [CO 02]

Y10

Q No. 07 (a) What are various Geometrical aspects of Dimensioning and Tolerancing? Discuss in brief (0
[CO

Q No. 07 (b) For a Hole Shaft system having basic size as 70.00 mm, the following data is given. (0
[CO

Maximum Metal limit on Shaft = 70.009 mm
Maximum Metal limit on Hole = 70.02 mm
Maximum Size of Hole = 70.006 mm
Minimum Size of Shaft = 69.97 mm
Find out. (i) – What type of Fit it is?
(ii) – What is the Allowance?

Q No. 08 Write short notes on any two of the following. (2x04
[CO (
&
(i) – Hole basis and Shaft basis system.
(ii) – Electrical and Electronic comparators
(iii) – Machine Tool Alignment in brief
(iv) – Johansson's Mikrokator

VI SEMESTER

B.Tech (Prod./Other Branches)

END TERM EXAMINATION *MAY-2024*

PE-308 **Green Energy Technology**

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 in one place
Assume suitably missing data, if any.

Q.1	(a) Discuss in detail about reserves and production of petroleum and natural gas in India. Also discuss the history of oil exploration in India.	10 marks (5+5)	CO-1
	(b) Explain the necessity of renewable energy in Indian scenario. Analyze the different targets set by Government of India for enhancing the penetration of renewable energy in India energy mix and the achievements made so far?		
Q.2	(a) Examine the mechanism of greenhouse effect and global warming.	10 marks (5+5)	CO-2
	(b) Describe your recent visit to any industrial plant (may be hypothetical) and interpret the impact of pollutants on environment. Also, explain necessary measures would you suggest to control the pollution levels?		
Q.3	(a) Predict that green energy and sustainable development are the key for long term sustenance of living organism on mother earth?	10 marks (5+5)	CO-3
	(b) Outline the role of an individual in the society in prevention of pollution and adaptation of green energy in developing countries.		

Please Turn Over for remaining five questions

Q.4	(a) Illustrate the criteria in detail for site selection of green building	10 marks (5+5)	CO-4
	(b) Analyse the various impacts of Green building on Delhi's environment.		
Q.5	(a) Differentiate between carbon capture & storage and carbon sequestration.	10 marks (5+5)	CO-5
	(b) Explain Green Hydrogen and how it is different from fossil origin hydrogen? Describe the green hydrogen mission of government of India.		
Q.6	(a) Write a comprehensive note on Fuel cells along with its importance for storage of energy in a developing country like India	10 marks (5+5)	CO-6
	(b) Illustrate the construction and working of Nickel metal hydride battery with the help of neat sketch		
Q.7	(a) Write a comprehensive note on biomass resources in India and the potential of energy generation from such resources.	10 marks (5+5)	CO-7
	(b) Describe the production mechanism of biogas. Also describe construction and working of any one type of biogas plant commonly found in India..		
Q.8	Write short notes on any two of the following: a) COP28 b) Sustainable Development c) Energy Storage	10 marks (5+5)	CO-2 CO-3 CO-6

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Total No. of Pages: 02 *Roll No.....*

06 SEMESTER B.Tech. [PE]

END TERM EXAMINATION *May 2024*

PAPER CODE: PE 312 TITLE OF PAPER: AUTOMOBILE ENGG.

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] Derive the relation for the Torque (T) transmitted by multidisc plate clutch considering (i) uniform pressure on the friction surface of the clutch plate (ii) Uniform wear of the clutch plate [CO – 1] [5]

[b] Explain the following terms as applied to I. C. Engine: Bore, B.D.C., Swept volume, Compression ratio and piston speed. [CO – 1] [5]

Q.2 [a] Give a neat sketch of battery ignition system for a four-cylinder engine, and describe its working? [CO – 2] [5]

[b] List the various types of clutches. With neat sketch describe the construction and working of multi plate clutch. [CO – 2] [5]

Q.3 [a] Why are the brakes necessary in automobiles? Give a classification of brakes. Briefly describe the construction and working of hydraulic brakes. [CO – 3] [5]

[b] Briefly describe the following: (a) Self energizing brakes and (b) Disc Brakes. [CO – 3] [5]

Q.4 [a] Describe construction and working of telescopic type hydraulic type shock absorbers. [CO – 4] [5]

[b] What do mean by suspension system? Explain in detail the working of independent suspension system. [CO – 4] [5]

Q.5 [a] What do you understand by Principle of steering? Explain in detail the center point steering system. [CO – 5] [5]

[b] What do you understand by steering geometry? Explain in detail Ackerman principle of correct steering. [CO – 5] [5]

Q.6 [a] What do understand by maintenance; servicing and tuning up on Engine? [CO – 6] [5]

[b] What are the common faults? How will you find faults and recommend their remedies. [CO – 6] [5]

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Total No. of Pages 02 *Roll No. .....*

SECOND SEMESTER **B.Tech. (SE)**

END SEMESTER EXAMINATION ***MAY-2024***

SE102 FUNDAMENTALS OF COMPUTERS

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 is a Computer? Describe the various types of computers. [4] [CO1]

[b] Write a C program to find the eligibility for voting. Draw the flowchart for the same. [3][CO1]

[c] Classify the following into input and output Devices. [3] [CO1]

2[a] Draw the block diagram of the central processing unit. Explain the different processor registers. [4] [CO2]

[b] Draw a neat block diagram of memory hierarchy in computer system. Discuss the variation of size, speed and cost per bit in the hierarchy. [3] [CO2]

[c] What is direct memory access, when it is used? Explain it with block diagram. [3] [CO2]

3 [a] List out the basic rules (laws) that are used in Boolean algebra expressions with example. [3] [CO3]

[b] Convert the following:-

(i) $(329.54)_{10} = (\ )_{16}$ (ii) $(BD02.1A)_{16} = (\ )_{10}$

(iii) $(1101)_{Gray} = (\ )_{2}$ (iv) $(967.345)_{10} = (\ )_{8}$ [4] [CO3]

[c] What is latch? What is the difference between latch and flip flop? [3] [CO3]

4[a] List and explain the services provided by OS for the uses & efficient operation of system. [4] [CO4]

[b] Define process. Explain different states of a process with neat diagram. [3] [CO4]

[c] Calculate the average waiting time and average turn-around time by drawing Gantt. Chart using FCFS, SJF, RR (Quantum = 2 ms) and priority scheduling algorithm.

Process	Arrival Time	Burst time
P1	0	9
P2	1	4
P3	2	9
P4	3	5

[3] [CO

5 [a] Explain three Schema Architecture and reason for need of mapping among Schema level. [4] [CO5]

[b] Draw an E-R diagram for an AIRLINES database Schema with at least fi entities. Also specify primary key and structural constraints. [3] [CO5]

[c] Explain characteristics of the database approach. [3] [CO5]

6 Write short notes: -

[a] Ethical Hacking. [4] [CO4]

[b] Intrusion Detection. [3] [CO4]

[c]Security Management. [3] [CO5]

Total no. of Pages: 2

Roll no.....

SECOND SEMESTER

B.Tech

END TERM EXAMINATION May-2024

SE104 Fundamentals of Software Engineering

Time: 03:00 Hours Max. Marks: 40

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

Q.1 a) Answer the following questions briefly:

i.Discuss any two requirements elicitation techniques with suitable examples.

ii.Differentiate between Verification and Validation.

[2*2][CO2, CO4]

b) Discuss the advantages and disadvantages of the prototyping model over the evolutionary model for software development. [4][CO1]

Q.2 a) As you move along the process flow path of the spiral model, what can you say of the software being developed or maintained? What are the two characteristics of the spiral model, which distinguish it from other process model? Give an example of a software process where:

i. Spiral model is suitable
ii. Spiral model is not suitable

Justify your answer for the above cases. [5] [CO1]

b) Briefly explain testing phase of Software Development Life Cycle (SDLC). [3][CO3]

Q.3 a) What is software design? Describe the difference between conceptual design and technical design. [4][CO3]

b) Discuss the objectives of software design. How do we transform an informal design to a detailed design? [4][CO3]

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Q.4 a) List five desirable characteristics of a good SRS document. Discuss the relative advantage of a formal requirement specification. List the important issues, which an SRS must address. [4] [CO2,CO3]

b) Draw the use case of the diagram for the banking system. What are the different dependencies in the banking system? [4] [CO4]

Q.5 a) What are the guidelines to draw DFD? What constraints must be observed while creating levelled DFD? Make a 0-level DFD of university system. [6] [CO4]

b) What is the degree of a relationship? Give an example of each of the relationship degree. [2] [CO2]

Q.6 a) Write Short notes on:

i. Data dictionary

ii. ER diagram [2.5*2] [CO3,CO4]

b) Which type of coupling and cohesion is best suited why? [3][CO4]

Total no. of Pages: 4 Roll no.....

FOURTH SEMESTER

B.Tech.

END TERM EXAMINATION **May-2024**

COURSE CODE: SE202/SE202a COURSE TITLE: OBJECT ORIENTED SOFTWARE ENGINEERING

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

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

Q.1 (a) Describe various types of messages in sequence diagram with their notations.

(b) Write short notes on lifeline and focus of control in sequence diagram.

(c) Explain the fountain model with the help of a diagram. List the advantages and disadvantages of this model. [8][CO2, CO5]

Q.2 One of the key challenges faced nowadays by public transportation authorities is to offer personalized services to citizens. This requires the new Information and Communication Technologies (ICT) to be massively exploited. The goal of this project is to develop **Transport4You**: an intelligent public transportation **manager** that can help a Metropolitan Transportation Authority improve the services offered to citizens. At its core, the system should offer the following basic functionalities:

- allow a citizen to register into the system and pre-pay for a certain number of trips;
- recognize when a registered citizen gets on a bus and determine the journey he/she performs, calculating the fare he/she has to pay, and detracting it from his/her credit;
- when the citizen's credit is finished, allow him/her to pay the bus fare through the cell phone;
- provide registered citizens with information about changes in the lines they use most frequently. Possibly, the system should be able to

from 8.00 to 9.00, someone who usually takes it at 10.00 should not be informed of the stop.

The following scenarios illustrate some possible interactions between users and system concerning the core functionalities described above.

Scenario 1: user registration Jane Doe uses a web interface to activate an account with the Transport4You system. For this, she chooses a username and password, then she provides her personal data (name, address, etc.), and the data of her cell phone: phone number, bluetooth address (if any), WiFi mac address (if any). After having activated the account, she logs onto the system and adds 20€ to her account (which she pays by credit card through an online transaction system).

Scenario 2a: the system detects a registered passenger entering the bus The system detects that Jane Doe has boarded bus 35 at stop "Central Station" by sensing the bluetooth or WiFi device of her cell phone. It looks for the address of the device among those that are registered with the system and stores the information about the bus stop, the line she boarded, and the time of the boarding for future purposes.

Scenario 2b: the passenger leaves the bus Jane Doe decides to get out of the bus number 35 at stop "Main Square". After that stop, the system detects that Jane's phone is no more on board and therefore infers that she has left the bus. It also updates the data concerning the trip with the information about the stop where she has left.

Scenario 3: payment of the bus fare When Jane Doe enters the bus at stop "Central Station", the system recognizes her (see Scenario 2a) and then checks the status of her account. As she has more than T_COST Euros on it, the system updates the account by subtracting the bus fare. The system sends Jane Doe an SMS informing her of the purchase; the SMS notification includes the information about the bus stop at which the system determined Jane boarded the bus, the line she boarded, and the time of the boarding.

Scenario 4: citizens are informed about changes in the lines A major accident has occurred on the path of line 35. The police decide to block all streets entering "Central Station" for one hour. Therefore, MTA is forced to redirect bus number 35 on an alternative path passing close by "Central Station". The operator John Brown enters the new path into the Transport4You system. The system collects the information about all passengers that are likely to be affected by the problem and sends an SMS to them with the new path and schedule of the bus.

Draw the following using standard notations. If necessary, you can make suitable assumptions regarding the details of various features

of Transport4You, but you must clearly write down the assumptions you make.

(i) Identify use cases and actors.
(ii) Draw use case diagram for Transport4You.
(iii) Write use case description of "Manage Passenger Details" use case. [8][CO5]

Q.3 (a) Identify entity class, interface class and control along with their relationships for the Transport4You given above. [8][CO5]

Q.4 Draw sequence diagram of "Manage Passenger Details" (basic flow and at least 2 alternative flows) use case of Transport4You. [8][CO5]

Q.5 Consider the process of Manage Passenger Details in Transport4You. Construct the scenario diagram, scenario matrix, test case matrix and test case matrix with actual values. [8][CO5]

Q.6 (a) What is an activity diagram? What are the basic symbols used in the construction of such a diagram?

(b) Consider an operation to calculate Fibonacci series of n numbers. Draw its activity diagram. [8][CO5]

Q.7 Consider an example of stack where two operations (push and pop) are allowed. There are four events, namely, new, push, pop and destroy with the following purposes:

- New: To create an empty stack.
- Push: To push an element in the stack, if space is available.
- Pop: To pop out an element from the stack, if it is available.
- Destroy: To destroy the stack after the completion of its requirement, i.e. instance of the stack class is destroyed.

Identify the states and draw their statechart diagram. [8][CO5]

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

FOURTH SEMESTER

B.Tech

END TERM EXAMINATION *May 2024*

SE204a Machine Learning

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

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

Q.1 a) Explain three stages of model building in machine learning.

b) What are various performance measures used for regression problem?

c) Differentiate between Adaboost and Bagging with mathematical derivation.

d) Explain bias variance trade off. [4*2][CO1]

Q2. a) Consider the data given below in a table, reduce the 2-dimension data to 1-dimension data using principal component analysis algorithm. [5][CO2]

F	A	B	C	D
X	4	8	13	7
Y	11	4	5	14

b) Differentiate between feature selection and feature extraction with example. [3][CO1]

Q3. a) Why KNN algorithm is referred as lazy learner? How to choose the optimal value of K in KNN algorithm? Can KNN algorithm be used for regression problem. Explain with example. [4][CO2]

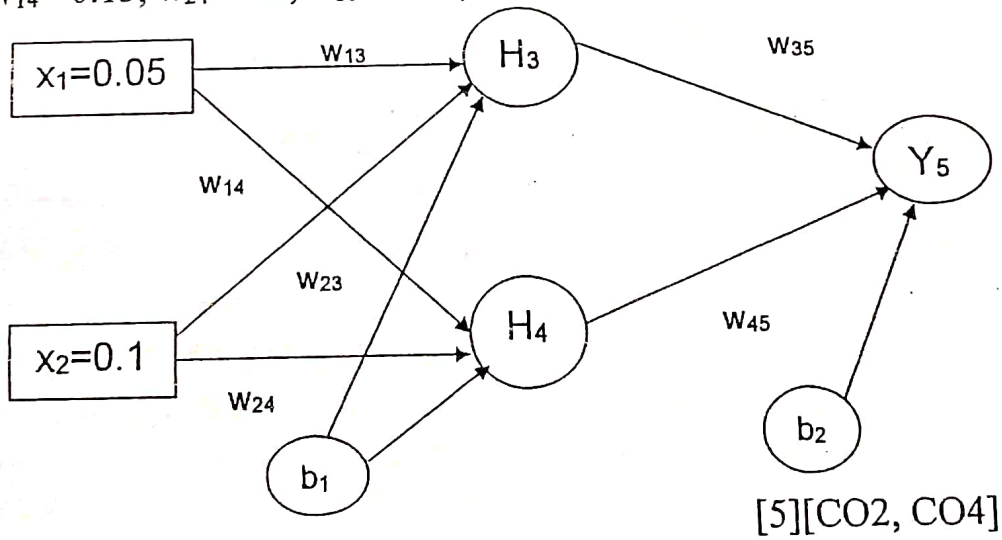
b) Consider the dataset given below with four training instances each having two attributes (A1 and A2). Compute the class label for

test instance t1 = (3, 7) using three-nearest neighbors (k=3) with weighted vote according to using Manhattan distance.

Training Instance	A1	A2	Output
I1	7	8	0
I2	6	4	0
I3	3	4	1
I4	2	4	1
I5	1	7	1

[4][CO4]

Q4. a) For the given feed forward network, perform forward and backward sweep using back-propagation algorithm and find the updated weights (perform computations for first iteration only with updated weights). Activation function used is sigmoid function. Initial weights, bias and target output t_5 corresponding to Y_5 are provided in table. Assume $\eta = 0.6$. $b_1 = 0.4$, $b_2 = 0.6$, $w_{13} = 0.12$, $w_{23} = 0.2$, $w_{14} = 0.15$, $w_{24} = 0.3$, $w_{35} = 0.45$, $w_{45} = 0.5$, $t_5 = 1$.



[5][CO2, CO4]

b) Explain the principle of the gradient descent algorithm. Accompany your explanation with a diagram. Explain the use of all the terms and constants that you introduce and comment on the range of values that they can take. [3][CO2]

Q5. a) Consider the dataset given below. Estimate the conditional probabilities of P(A|+), P(B|+), P(C|+), P(A|-), P(B|-), and P(C|-). Use the conditional probability estimates and predict the class label for the test sample P(A=0, B=1, C=0).

Record No.	A	B	C	Class
1	0	0	0	+
2	0	0	1	-
3	0	1	1	-
4	0	1	1	-
5	0	0	1	+
6	1	0	1	+
7	1	0	1	-
8	1	0	1	-
9	1	1	1	+
10	1	0	1	+

[5][CO3]

b) Explain DBSCAN algorithm in detail. [3][CO1]

Q6. a) What do you understand by Hinge Loss? What is the difference between Classification and Regression when using SVM? What is structured SVM?

b) Explain following kernel function in detail:

i. Polynomial Kernel

ii. Gaussian Radial Basis Kernel

[4*2][CO1, CO5]

Total no. of Pages: 04 *Roll no.....*

4th SEMESTER B.Tech. (Eve)

END TERM EXAMINATION ***May-2024***

SE206 Database Management System

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

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

Q.1 a) What do you mean by BCNF used in the process of normalization? Why 3NF is more preferable than BCNF in certain cases? **[2+3+3=9M] (CO2)**

b) Consider the relation R, which has attributes that hold schedules of courses and sections at a university:

R = (Course no., Sec no., Offering dept, Credit hours, Course level, Instructor ssn, Semester, Year, Days hours, Room no., No. of students).

Suppose that the following functional dependencies hold on R:

{Course no.} → {Offering dept, Credit hours, Course level}

{Course no., Sec no., Semester, Year} → {Days hours, Room no., No of students, Instructor ssn}

{Room no, Days hours, Semester, Year} → {Instructor ssn, Course no., Sec no.}

Determine which sets of attributes form keys of R. How would you normalize this relation?

c) Suppose that we decompose the schema R = (A, B, C, D, E) into R_1 = (A, B, C) and R_2 = (A, D, E)
Show that this decomposition is lossless join decomposition if the following set F of FDs holds:
A → BC, CD → E, B → D and E → A

Q.2 In the context of transaction concurrency control in database management system, answer the following questions: [2*5=10M] (CO4-5)

a) Describe the properties of transactions?

b) What is the phantom problem? Can it occur in a database where the set of database objects is fixed and only the values of objects can be changed?

c) Consider the following two transactions and schedule (time goes from top to bottom). Is this schedule conflict-serializable? Explain why or why not.

Transaction T_0	Transaction T_1
$r_0[A]$	
$w_0[A]$	
	$r_1[A]$
	$r_1[B]$
	c_1
$r_0[B]$	
$w_0[B]$	
c_0	

d) Show how 2PL can ensure a conflict-serializable schedule for the same transactions above. Use the notation Li [A] to indicate that transaction i acquires the lock on element A and Ui [A] to indicate that transaction i releases its lock on A.

e) Show how the use of locks without 2PL can lead to a schedule that is NOT conflict serializable.

Q.3 Consider the following relations containing airline flight information: [2+2+2+3 = 9M] (CO1)

Flights *(flno: integer, from: string, to: string, distance: integer, departs: time, arrives: time)*

Aircraft *(aid: integer, aname: string, cruisingrange: integer)*

Certified *(eid: integer, aid: integer)*

Employees *(eid: integer, ename: string, salary: integer)*

Note: Employees relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft (otherwise, he/she would not qualify as a pilot), and only pilots are certified to fly.

Write the following queries in relational algebra as well as in SQL:

i. Find the names of pilots who can operate planes with a range greater than 3,000 miles but are not certified on any Boeing aircraft.
ii. Find the eids of employees who make the highest salary.
iii. Find the eids of employees who are certified for the largest number of aircraft.
iv. Find the eids of employees who are certified for exactly three aircraft.

OR

a) Consider the following two transactions: **[2+2+2+3=9 M] (CO 2-3-4)**

T1: read(A);
read(B);
if A = 0 then B := B + 1;
write(B).
T2: read(B);
read(A);
if B = 0 then A := A + 1;
write(A).

Let the consistency requirement be A = 0 ∨ B = 0, with A = B = 0 the initial values.

i. Show that every serial execution involving these two transactions preserves the consistency of the database.
ii. Show a concurrent execution of T1 and T2 that produces a non-serializable schedule.
iii. Is there a concurrent execution of T1 and T2 that produces a serializable schedule? Justify the answer.

b) What is a recoverable schedule? Why is recoverability of schedules desirable? Are there any circumstances under which it would be desirable to allow non-recoverable schedules? Explain.

Q.4 Differentiate between the following: **[3+3=6 M]**
a) Exclusive lock and Shared lock **(CO 1-4)**
b) Data Abstraction and Data Independence

Q.5 Write short notes on each of the following terms with suitable examples: **[2+2+2=6 M] (CO 1-2)**
a) Key Domain Constraints
b) Specialization and Generalization
c) Cardinality and Optionality

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Total No. of Pages 02

FOURTH SEMESTER

B.Tech. (SE)

MAY-2024

END SEMESTER EXAMINATION

SE208 ALGORITHM ANALYSIS AND DESIGN

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 complexity of the following code. [5][CO1]

```
for(i=1;i<=n ;i ++) {
    for(j=1;j<=i ; j=j*2) {
        Some code of complexity O(1)}}
```

[b] Explain master theorem and Solve below recurrence using Master Theorem. [5] [CO1]

i) $T(n) = 3T(n/9) + n$

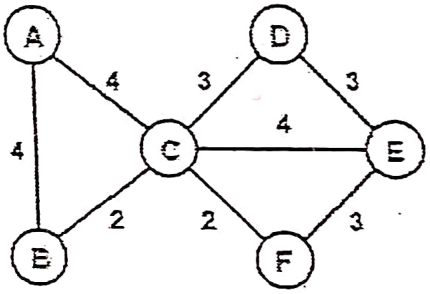
ii) $T(n) = 3T(n/2) + n^2$

2. Discuss the complexity of insertion and deletion in Heap sort algorithm and apply the heap sort to sort the following element using Max heap. [10][CO2]

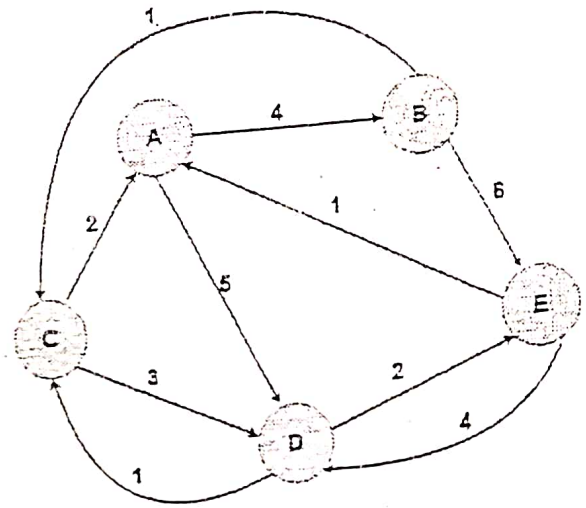
10,6,12,8,15,17,21

3. [a] What is the difference between greedy method and dynamic programming? [5][CO3,CO4]

[b] What is Prim's algorithm for finding the MST? What type of graphs is it used for and why? Find the MST for the following graph. [5][CO3]



4. Find the shortest path distance between every pair of vertices for below graph using floyd warshall algorithm. [10][CO4]



5. Use Branch and Bound to solve the Kanpsack 0/1 problem for M = 15, n = 4, (P1, P2, P3, P4) = (10, 10, 12, 18) and (w1, w2, w3, w4) = (2, 4, 6, 9). [CO5][10]

6. [a] Explain P, NP, NPC and NP hard classes with relationship between them? [5][CO6]

[b] Find length of the longest common subsequence for the strings *S1* = *"AGGTAB" and S2* = *"GXTXAYB"* using LCS algorithm ? [5][CO4]

Roll no.....

Total no. of Pages: 3

SIXTH SEMESTER

B.Tech.

END TERM EXAMINATION May-2024

SE302a Empirical Software Engineering

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

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

Q.1 a) Consider the data given below, the contingency table for classes that are coupled or not coupled in a software with respect to the faulty or non-faulty binary outcomes.:-

	Faulty	Non- Faulty	Total
Coupled	1	5	6
Not coupled	2	7	9
Total	3	12	15

i. Calculate relative risk (RR).
ii. Calculate odds ratio (OR)
iii. Calculate Risk difference. [3][CO1]

b) Write down pseudocode (mathematical analysis) of a procedure for conducting systematic review. [5][CO2]

Q.2 a) What is the role and significance of Weyuker's properties in software metrics. [4][CO3]

b) Identify appropriate statistical test for the scenario given below:

i. To test whether there is any association between Gender and uptake of Flu vaccination.
ii. To compare two groups with skewed unpaired continuous data.
iii. To compare the relationship between two continuous variables which had skewed distributions.
iv. To compare a single sample of non-parametric values with a published value. [2][CO4]

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	.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

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SIXTH SEMESTER

B.Tech. (SE)

END SEMESTER EXAMINATION *MAY-2024*

SE304a **COMPUTER NETWORKS**

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

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

1[a] What are the advantages and disadvantages of utilizing a hybrid topology comprising bus, and ring topology in terms of fault tolerance and network reliability? [4] [CO1]

[b] What are the different transmission impairments? [4][CO1]

2[a] Explain how Hamming code is used to correct single-bit errors using check bits. [4] [CO2]

[b] A hamming codeword consists of 8 bit data and 4 check bits as

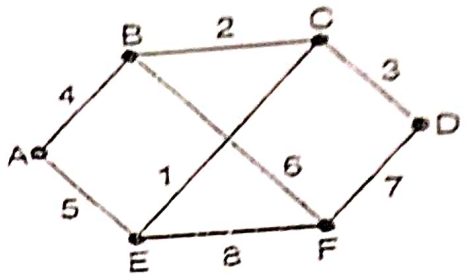
Data bits							
d_8	d_7	d_6	d_5	d_4	d_3	d_2	d_1
1	1	0	x	0	1	0	1

Check bits			
c_8	c_4	c_2	c_1
y	0	1	0

Explain with working how the data bits and check bits are arranged and how they are related. What are the values for x and y? [4] [CO2]

3 [a] Explain the distance vector routing algorithm. Distance vector routing is used, and the following vectors have just come into router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and from E: (7, 6, 3, 9, 0, 4). The new measured delays to B, D, and E, are 6, 3, and 5,

respectively. What is C's new routing table? Give both the outgoing line to use and the expected delay. [4][CO3]



[b] How does Network layer resolve congestion control? [4][CO3]

4[a] How does TCP determine the timer for acknowledgment? [4] [CO4]

[b] What is the Significance of TCP and UDP protocol? [4][CO4]

5[b] What is symmetric encryption? What is the difference between transposition and substitution cipher explain with an example. [4][CO5]

[b] In RSA algorithm if p = 7, q = 11 and e = 13 then what will be the value of d? [4] [CO5]

6 [a] Define E-Mail. Explain the basics of POP3 and IMAP mail access protocols. [4][CO6]

[b] Explain what is DNS and how it is used to resolve the IP address of a server [4][CO6]

7 Answer the following:- **[4 X 2 = 8 Marks]**

[a] Differentiate reliable and unrealiable communication. [CO1]

[b] What is a socket and which layer uses it? [CO4]

[c] Describe the functions of session and application layers. [CO6]

[d] If the bit rate = 3000 and each signal element carries 6 bits. Find the baud rate. [CO2]

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Total no. of Pages 02 *Roll no.....*

Sixth Semester **B.Tech.**

End Semester Examination **May-2024**

SE306 COMPILER DESIGN

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) Draw a DFA for the language accepting strings ending with 'abba' over input alphabets $\sum = \{a, b\}$ **[5][CO1]**

b) Consider the following C code snippet: Calculate the total number of tokens and lexemes. **[5][CO2]**

```
#include <stdio.h>
int main() {
int num1 = 10;
int num2 = 20;
int sum = num1 + num2;
printf("The sum is: %d\n", sum);
return 0;
}
```

2 a) Construct pushdown automata for the following language. **[5][CO1]**

$$\{a^i b^j c^k \mid i, j, k \in \mathbb{N}, i + k = j\}$$

b) What are various Code Optimization techniques? Explain with example. **[5][CO6]**

3 a) Enlist types of parameter passing techniques. If the programming language uses dynamic scoping and call by name parameter passing mechanism, the values printed by the below program are : **[5][CO4]**

```
global int i = 100, j = 5;
void P(x)
{
int i = 10;
print(x + 10);
i = 200;
j = 20;
print(x);
}
main()
{
P(i + j);
}
```

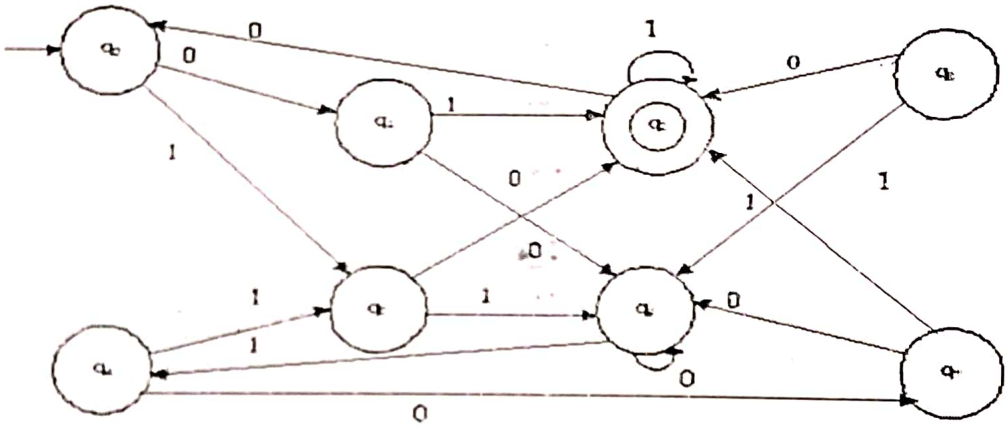
b) What is left factoring , how to remove it ? Remove Left factoring from the following grammar **[5][CO5]**

S→ abA / abB
A→ a
B→ b

4. Write steps of CLR parsing. Construct a CLR parsing table and DFA for the given context-free grammar. **[10] [CO2]**

S-->AA
A-->aA|b

5. Construct a minimum state automata and transition table equivalent to the finite automata given. Write all the steps involve in it. **[10][CO1]**



6. What is SDT? Consider the following grammar and their syntax Directed Translation (SDT) rules. Draw the SDT tree with steps and find the value of the expression 4∗6+3∗7 . **[10] [CO3]**

$S \rightarrow S * A$ {S.val = S.val × A.val} $S \rightarrow A$ {S.val = A.val}

$A \rightarrow A + B$ {A.val = A.val - B.val} $B \rightarrow (S)$ {B.val = 2}

$A \rightarrow B$ {A.val = B.val} $B \rightarrow id$ {B.val = id.val}

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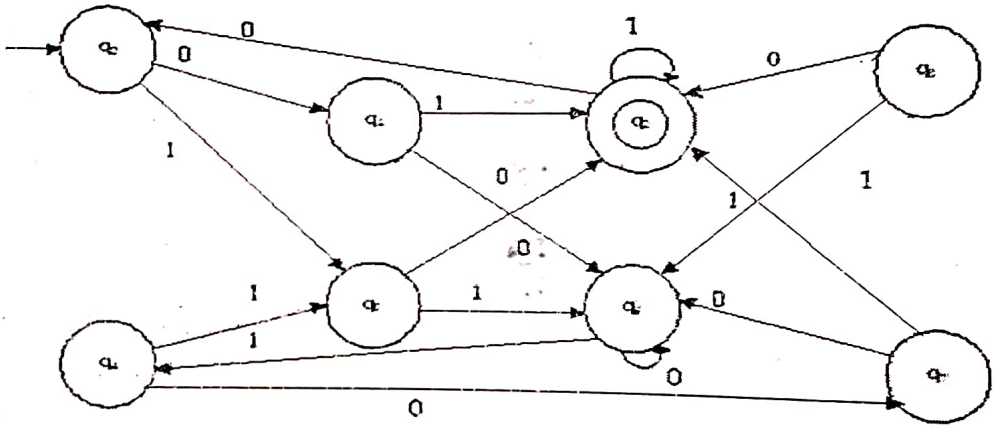
b) What is left factoring , how to remove it ? Remove Left factoring from the following grammar **[5][CO5]**

S→ abA / abB
A→ a
B→ b

4. Write steps of CLR parsing. Construct a CLR parsing table and DFA for the given context-free grammar. **[10] [CO2]**

S-->AA
A-->aA|b

5. Construct a minimum state automata and transition table equivalent to the finite automata given. Write all the steps involve in it. **[10][CO1]**



6. What is SDT? Consider the following grammar and their syntax Directed Translation (SDT) rules. Draw the SDT tree with steps and find the value of the expression 4*6+3*7 . **[10] [CO3]**

$S \rightarrow S * A$ {S.val = S.val × A.val} $S \rightarrow A$ {S.val = A.val}

$A \rightarrow A + B$ {A.val = A.val - B.val} $B \rightarrow (S)$ {B.val = 2}

$A \rightarrow B$ {A.val = B.val} $B \rightarrow id$ {B.val = id.val}

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Total no. of Pages: 2 Roll no.....

6TH & 8TH SEMESTER

B.Tech.

END TERM EXAMINATION ***May-2024***

COURSE CODE: SE308

COURSE TITLE: SOFTWARE RELIABILITY

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

Note: All questions are mandatory unless explicitly stated.
Assume suitable missing data, if any.

Q.1 Write short notes on the following (*any five*) [10][CO2]

i. Predictive Validity
ii. Availability
iii. Types of software reliability engineering test
iv. Regression test
v. Poisson probability distribution
vi. Reliability block diagram

Q.2 i. What do the shape and scale parameters signify within the failure intensity function of the Generalized NHPP Model? [5][CO3]

ii. What is learning phenomenon of the testing team and how it influences the software reliability? Specify the reason for delayed S-shape curve for SRGM. [5][CO3]

Q.3 i. Assume the initial failure intensity is 5 failures/CPU hours. The failure intensity decay parameter is 0.02/failure. Consider that 150 failures have already been experienced. Calculate the current failure intensity using LPET model. [5][CO1]

ii. Describe Goel-Okumoto Imperfect Debugging Model. Specify equation for hazard function for Goel-Okumoto Debugging Model.

OR [5][CO3]

Differentiate between Markovian, NHPP, and Bayesian Models.

Q.4 i. Outline the detailed procedure for preparing for test. [5][CO5]

ii. Explain any two goodness of fit test in detail. [5][CO1]

Q.5 i. Provide a detailed explanation of the steps involved in creating an operational profile with the help of an example. [5][CO5]

ii. Provide any two basis for characterizing system modes while developing an Operational Profile. [5][CO5]

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Roll No. .....

SIXTH SEMESTER

B.Tech. (SE)

END SEMESTER EXAMINATION

May-2024

SE316—NATURAL LANGUAGE PROCESSING

Time: 3:00 Hours

Max. Marks: 40

Note: Attempt any four questions.
Attempt all parts of a question together.
All questions carry equal marks.
Assume suitable missing data, if any.

Q1 [a] Differentiate between Hypernymy, Hyponymy, Antonymy & Synonymy with examples?

[b] Explain three different architectures of NLG?

[2x5=10]

Q2 [a] Write the top down parse table and draw parse tree (Depth first search based) for the sentence "cover the book" using the following grammer:-

S→ NP VP NP→ Det Nominal VP→ Verb NP

S→ VP NP→ Noun VP→ Verb

Nominal→Noun Det→ this / the / a Noun→ book /notebook

Nominal→Noun Nominal Verb→open / close/ cover

[b]Differentiate between indefinite, definite, pronominal & demonstrative references with examples?

[2x5=10]

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Q3 Draw DFA over the alphabet {a,b} for recognizing:

[a]All strings having odd number of a's

[b]All strings that does not contain three consecutive b's

[c] All strings that contains the pattern 'abac'

[d]All strings starting with 'a' and ending with 'b'

[4x2.5=10]

Q4 [a] Explain corpus-based word sense disambiguation along with difficulties and possible approaches to corpus based WSD?

[b] Explain five different applications of NLP?

[2x5=10]

Q5 Write short note on

[a] Problems in machine translation

[b] SHAKTI & MaTra system

[2x5=10]

Total no. of Pages: 2 Roll no. 440

SIXTH and EIGHTH SEMESTER

B.Tech

END TERM EXAMINATION *May 2024*

SE326 Machine Learning

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

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

Q.1 a) Calculate the probability that if somebody is "tall" (meaning taller than 6 ft or whatever), that person must be male. Assume that the probability of being male is p(M) = 0.5 and so likewise for being female p(F) = 0.5. Suppose that 20% of males are T (i.e. tall): p(T|M) = 0.2; and that 6% of females are tall: p(T|F) = 0.06. Calculate p(M|T). If you know that somebody is male, how much information do you gain (in bits) by learning that he is also tall? How much do you gain by learning that a female is tall? Finally, how much information do you gain from learning that a tall person is female? [5][CO4]

b) Explain Bias Variance trade-offs. [3][CO5]

Q2. Consider the two dimensional patterns (2, 1), (3, 5), (4, 3), (5, 6), (6, 7), (7, 8). Compute the principal component using PCA Algorithm. [8][CO2]

Q3. Consider the data collected through a questionnaires survey (to ask people opinion) and objective testing with two attributes (acid durability and strength) to classify whether a special paper tissue is good or not. The data given below with four training samples:

X1= Acid Durability (seconds)	X2=Strength (Kg/square meter)	Y=Classification
7	7	Bad
7	4	Bad
3	4	Good
1	4	Good

Now the factory produces a new paper tissue that passes the laboratory test with X1 = 3 and X2 = 7. Without another expensive survey, can you predict what the classification of this new tissue is? (Use KNN Algorithm) [8][CO1]

Q4. 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 centers 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 centers after the second iteration. [8][CO2]

Q5. a) Explain the concept of a Perceptron and perceptron convergence theorem with a neat diagram.
[5][CO3]
b) Explain Value Iteration and Policy Iteration. [3][CO5]

Q6. a) Derive the Backpropagation rule considering the training rule for Output Unit weights and Training Rule for Hidden Unit weights.
[5][CO3]
b) Differentiate between filter and wrapper method. [3][CO1]

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

8th SEMESTER

B.Tech. (Eve)

END TERM EXAMINATION May-2024

SE406 : Advances in Software Engineering

Time: 03:00 Hours Max. Marks: 40

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

Q.1 In the context of re-engineering in software engineering, answer the following questions: [4+2+2 M] [CO 4]

a) What is reverse engineering? Discuss levels of reverse engineering? What are the appropriate reverse engineering tools? Discuss any two tools in details.

b) Under what circumstances do you think that software should scrapped and rewritten rather than re-engineered?

c) Differentiate between reverse engineering and re-engineering?

Q.2 With reference to CBSE (Component-based Software Engineering) an approach that reuses the software component to develop software. Answer the following questions: [4+4 M] [CO 3]

a) Discuss the problems with CBSE.

b) Explain why the savings in cost form reusing existing software is not simple proportional to the size of the components that are reused.

Q.3 a) Consider that the ATM machine for cash withdrawal or cash deposit in your campus for the staff and students. Develop a set of use cases with use case diagram that could be used to derives the requirements for an ATM system. Also, write down the issues that may be raised with respect to the design process. Also mention the various criteria for security in ATM systems. [6+4 M] [CO 2,3]

b) What is web-engineering? Consider the above project (as in part (a)), design a checklist for verification of this web-based software ATM software. Also, list out the WebE activities that are part of a generic framework.

OR

This question is on formal methods and software verification.

a) Explain why a formal specification of a program is more effective if it is considerably shorter than the program that implements the specification. [4 M] [CO 1]

b) Given the following program [1+1+2+2 M] [CO 1]

```
x = 0;
while (m != 9)
{ m = m - 1 ;
  x = x + 100;
}
```

where **m** and **x** are integer variables

i. Identify the program input variable or variables.
ii. Identify the program output variable or variables.
iii. Give the pre-condition on the input that ensures that the program terminates.
iv. Give the pre-condition on the input that ensures the program post-condition **x < 1002**.

Q.4 a) Why is the two-tier architecture not a practical client-server architecture? How does the three-tier architecture overcome the problems of the two-tier. [4+4 M] [CO 4]

b) What are the functions of a middleware in a three-tier architecture? Mention two popular middleware standards.

OR

a) What do you understand by software testing and how can you decide that the testing can be stopped. [4+4 M] [CO 2]

b) It is always advisable to identify and fix the bug during execution phase"-Justify this statement with suitable justification.

Q.5 Write a short note on: [2+2+2 M] [CO 2,3]

a) Incremental development under statistical control;
b) Black-box specification and State-box specification;
c) Statistical testing and software certification.

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VIII SEMESTER

B.Tech

END TERM EXAMINATION *May 2024*

SE 416 Big Data Analytics

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

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

Q.1 Differentiate the following
I. SQL vs. MapReduce
II. HBase vs. HDFS [8] [CO3]

Q.2 What are the main challenges faced by conventional data systems when dealing with big data, and how do big data platforms address these challenges? [8] [CO1, CO2]

Q.3 What are the statistical concepts relevant to big data analytics, such as sampling distributions, re-sampling, and statistical inference? How are these concepts applied in predictive model? [8] [CO2]

OR

Write a MapReduce program to calculate employee salary of each department in the university. [8] [CO4]
I/P:
001,it,10000
002, cse,20000
003, it,30000

Q.4 Compare and contrast the functionalities of Pig and Hive in the context of big data processing. How do Pig and Hive facilitate data processing and querying in Hadoop environments? [8] [CO5]

Q.5 Write a short note (any two) [8] [CO4]
I. Modules of Apache Hadoop framework
II. Hadoop Modes of Installations
III. XML File configurations in Hadoop

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Roll no.....

II SEMESTER

B.Tech. (ME)

END TERM EXAMINATION May-2024

COURSE CODE ME/AE/PE102

COURSE TITLE : Electronics and Communication for Mechanical Engineers

Time: 3:00 Hours Max. Marks : 40

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

Q1. (i) Considering the small signal model (hybrid Pi model) of common emitter configuration, derive the expressions for current gain, voltage gain, input resistance and output resistance. [4][CO2]

(ii) Determine the region of operation of the node currents and voltages for the circuit shown in Fig.1

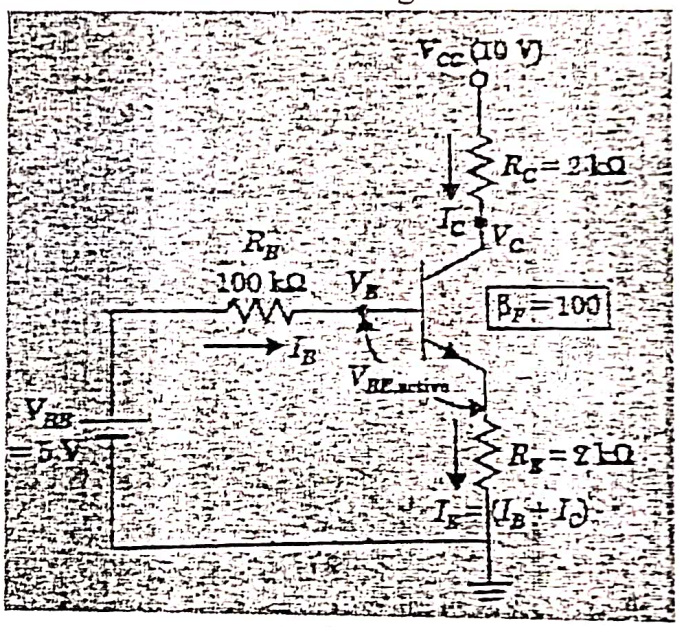


Fig.1 [4][CO2]

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Q. 2. (i) What do you mean by sequential circuits? Draw the truth table of SR, JK, D and T flip flop. [4][CO4]

(ii) Implement the given function using 4:1 multiplexer

$F(A,B,C) = \sum (1,3,5,6)$ [4][CO4]

Q. 3. (i) Simplify the following expression and implement the logic circuit: $F = A\bar{B} + ABD + AB\bar{D} + \bar{A}\bar{C}\bar{D} + \bar{A}B\bar{C}$

(ii) Use Karnaugh map method to simplify the Boolean function

$F(A, B, C, D) = \sum m(2,4,6,10,12) + d(0,8,9,13)$.

Implement the Boolean function, F using not more than two NOR gates. [4+4=8][CO4]

Q. 4. (i) Using Op-AMP derive the voltage gain expression for inverting and non-inverting amplifier

(ii) Derive the expression for the output voltage in terms of input voltage of Differentiator and Integrator circuit. [4+4=8][CO3]

Q.5 (i) Explain the working principle of digital optical encoder

(ii) Describe briefly about electrical actuator system [4+4=8][CO5]

Q.6 Write short notes on the following [4*2=8]

(i) Proximity sensor [CO5]

(ii) Decoder and Demultiplexer [CO4]

(iii) Voltage Regulator [CO1]

(iv) LVDT [CO5]

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Total no. of Pages: 02

2nd SEMESTER

B.Tech. [Evening](Civil Engg.)

May-2024

END TERM EXAMINATION

CCE102 Engineering Mechanics

Time: 3:00 Hours

Max. Marks: 40

Note: * Attempt any five questions.

- Marks of the questions are mentioned opposite to them.
- Assume suitable missing data, if any.

1. Four forces of magnitudes 20 N, 30 N, 40 N, and 50 N are acting respectively along the four sides of a square taken in order. Determine the magnitude, direction and position of the resultant force. (2+3+3)[CO1]

2. Four coplanar forces are acting at a point as shown in Fig. 1. Determine the resultant in magnitude and direction. (4+4) [CO2]

3. Using method of section, determine the forces in members CD, ED and EF of the truss shown in Fig. 2. (8/3+8/3+8/3) [CO3]

4. The following are specifications of a single purchase crab:
   Diameter of load drum = 20 cm,
   Length of lever = 120 cm,
   No. of teeth on pinion = 10,
   No. of teeth on spur wheel = 100.
   Find the velocity ratio of the machine. On this machine, efforts of 100 N and 160 N are required to lift loads of 3 kN and 9 kN respectively. Find the law of machine and efficiencies at the above loads. (2+2+2+2) [CO4]

5. The cross section of a machine part is as shown in Fig. 3. Determine its moment of inertia and radius of gyration about the horizontal line passes through it's centroid. (6+2) [CO5]

6. 80 N and 150 N bodies are approaching each other with a velocity of 20 m/sec and 6 m/sec respectively. What will be the velocity of each body after impact? How much is loss of kinetic energy? Take, coefficient of restitution = 0.6. Assume 80 N block is moving from left to right. (8/3+8/3+8/3) [CO6]

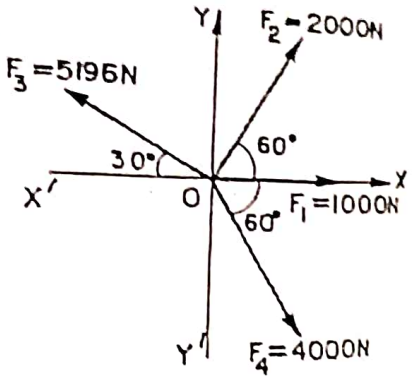


Fig. 1

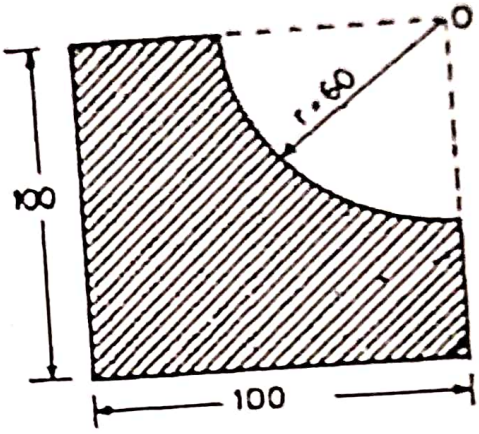


Fig. 3

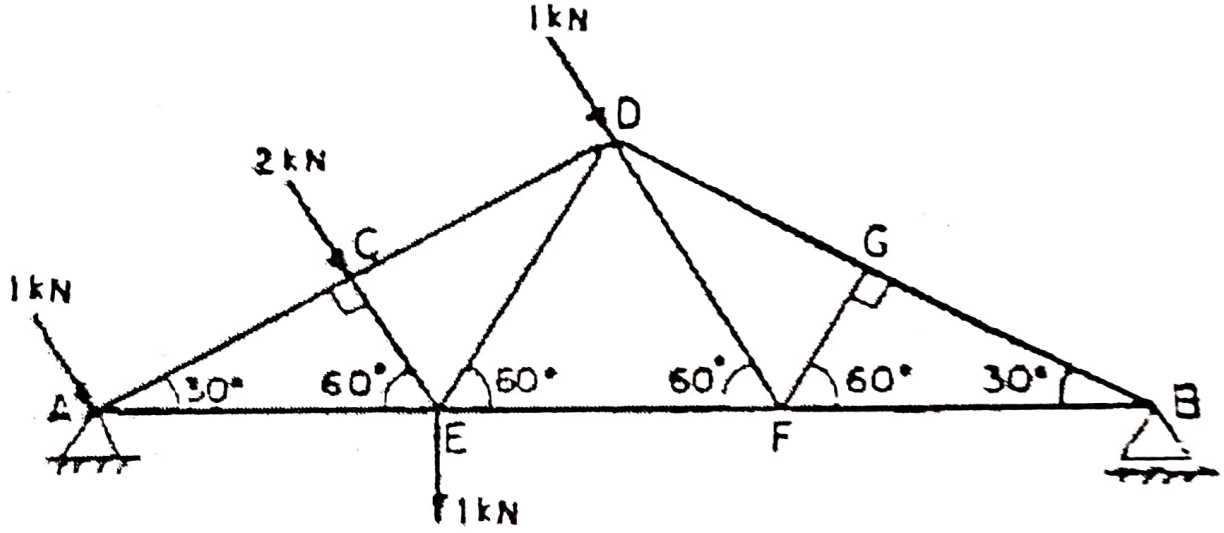


Fig. 2

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

END SEMESTER EXAMINATION **May-2024**

CCE-104 Fluid Mechanics

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

Note :Answer five questions
Part A is compulsory and Answer any four from Part B
Assume suitable missing data, if any.

Part A

10x0.8= Marks

1) The condition of 'no slip' at rigid boundaries is applicable to (CO 1)

(a) flow of Newtonian fluids only
(b) flow of ideal fluids only
(c) flow of all real fluids
(d) flow of non-Newtonian fluids only

2) A U-tube manometer measures (CO 1)

(a) absolute pressure at a point
(b) local atmospheric pressure
(c) difference in total energy between two points
(d) difference in pressure between two points

3)The centre of buoyancy of a submerged body (CO 2)

(a) coincides with the centre of gravity of the body
(b) coincides with the centroid of the displaced volume of the fluid
(c) is always below the centre of gravity of the body
(d) is always above the centroid of the displaced volume of liquid

4) The flow field represented by the velocity vector $V=axi+by^2j+czt^2k$ where a, b and c are constants, is

(CO 2)

a) three-dimensional and unsteady
(b) two-dimensional and steady
(c) three-dimensional and steady
(d) two-dimensional and unsteady

5) If a stream function Ψ exists it implies that (CO 2)

(a) the function Ψ represents a possible flow field
(b) the flow is irrotational
(c) the flow is steady, incompressible
(d) the potential function also exists

6) The difference between the total head line and the hydraulic grade line represents (CO 3)

(a) the velocity head
(b) the piezometric head
(c) the pressure head
(d) the elevation head

7) In a steady flow of an oil in a pipe in laminar regime the shear stress is (CO 4)

(a) constant across the pipe
(b) maximum at the centre and decreases parabolically towards the sides
(c) zero at the boundary and increases linearly towards the centre
(d) zero at the centre and increases linearly towards the boundary

8) Two identical pipes of length L, diameter D and friction factor f, are connected in series between two reservoirs. The size of a pipe of length L and of the same friction factor f, equivalent to the above pipeline, is (CO 5)

(a) 0.5 D
(b) 0.87 D
(c) 1.15 D
(d) 1.40 D

9) Three pipes are connected in series. Then (CO 5)

(a) the head loss in each pipe is the same
(b) the total discharge is the sum of the discharge in the individual pipes
(c) the discharge through each pipe is the same
(d) the Reynolds number for each pipe is the same

10) In a pipe network (CO 5)

(a) the algebraic sum of discharges around each elementary circuit must be zero
(b) the head at each node must be the same
(c) the algebraic sum of the piezometric head drops around each elementary circuit is zero
(d) the piezometric head loss in each line of a circuit is the same

Part B

1a) What is the pressure corresponding to 25 cm column of Kerosene of relative density 0.80? What is the equivalent head of mercury corresponding to this pressure? (CO 1) 2 Marks

1b) If the surface tension at the soap-air interface is 0.088 N/m, calculate the internal pressure in a soap bubble of 3 cm diameter. (CO 1) 2 Marks

1c) A 6 m deep tank contains 4 m of water and 2 m of oil of relative density 0.88. Determine the pressure at bottom of the tank (CO 2) 4 Marks

2a) A vertical isosceles triangular gate with its vertex up has a base width of 2 m and a height of 1.5 m. If the vertex of the gate is 1 m below the free water surface, find the total pressure force and the position of the centre of pressure on one side of the plate. (CO 2) 4 Marks

2b) Check whether the stream function $\Psi = 5xy$ is irrotational and if so, determine the corresponding potential function Φ. (CO 2) 4 Marks

3a) Water flows up a tapered pipe as shown in Fig. 1 Find the magnitude and direction of flow and the deflection h of the differential mercury manometer corresponding to a discharge of 120 L/s. The friction in the pipe can be completely neglected. (CO 3) 4 Marks

3b) A viscous liquid was flowing in laminar regime in a 6 cm diameter circular pipe. A pitot tube at a radial distance of 2 cm from the axis indicated a velocity of 0.6 m/s. Calculate (a) the maximum velocity (b) the mean velocity and (c) the discharge in the pipe. (CO 4) 4 Marks

4)A pipe 6 cm in diameter, 1000 m long and with f = 0.018 is connected in parallel between two points M and N with another pipe 8 cm diameter, 800 m long and having f = 0.02 A total discharge of 20 L/s enters the parallel pipes through division at M to rejoin at N (Fig. 2). Estimate the division of discharge in the two pipes. (CO 4) 8 marks

5) A compound piping system consists of 1800 m of 50 cm, 1200 m of 40 cm and 600 m of 30 cm diameter pipes of the same material connected in series. (CO 5) 8 Marks

(1) What is the equivalent length of a 40 cm pipe of the same material?
(ii) What is the equivalent size of a pipe 3600 m long?
(iii) If the three pipes are in parallel, what is the equivalent length of a 50 cm pipe?

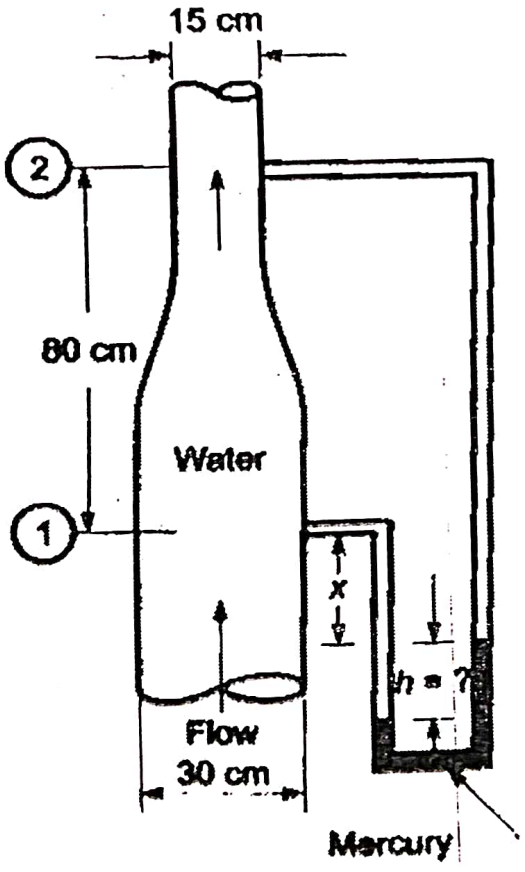


Fig 1

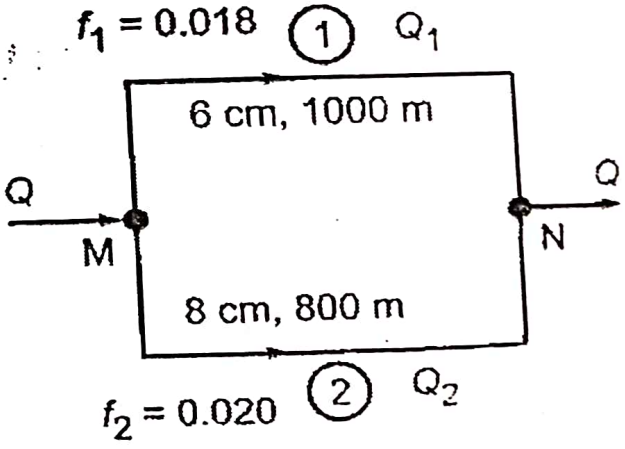


Fig 2

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IV SEMESTER

B.Tech. (Eve)

END TERM EXAMINATION May-2024

CCE-202 HYDRAULICS AND HYDRAULICS MACHINES

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 (a) Derive an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet. [CO5]

(b) A jet of water having a velocity of 40 m/s strikes a curved vane, which is moving with a velocity of 20 m/s. The jet makes an angle of 30° with the direction of motion of vane at inlet and leaves at an angle of 90° to the direction of motion of vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so that the water enters and leaves the vane without shock. [CO5]

Q.2(a) Show that efficiency of propulsion when the inlet orifices face the direction of motion of the ship is given by, $\eta = \frac{2u}{V+2u}$ where V is absolute velocity of issuing jet and u is the velocity of the ship. [CO4]

(b) A 75 mm diameter water jet having a velocity of 12 m/s impinges on a plane, smooth plate at an angle of 60° to the normal to the plate. What will be the impact when

(i) the plate is stationary, and (ii) the plate is moving in the direction of the jet at 6 m/s? Estimate the work done per unit time by the jet on the plate in each case. Take the density of water as 998 kg/m^3. [C04]

Q.3 (a) What is 'cavitation'? What are the effects of cavitation? Give the necessary precautions against cavitation. [CO6]

(b) A centrifugal pump running at 750 r.p.m. discharges water at 0.1 m3/s against a head of 10 m at its best efficiency. A second pump of the same homologous series, when working at 500 r.p.m., is to deliver water at 0.05 m3/s at its best efficiency. What will be the design head of the second pump and what is the scale ratio between the first and the second? [CO6]

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Q.4(a) Derive an expression for hydraulic efficiency of A Pelton wheel. [CO5]

(b) A Francis turbine works under a head of 25 m and produces 11800 kW while running at 120 r.p.m. The turbine has been installed at a station where atmospheric pressure is 10 m of water and vapour pressure is 0·2 m of water. Calculate the maximum height of the straight draft tube for the turbine. [CO5]

Q.5(a) The velocity distribution in a rectangular channel of 2 m depth is given by:

$$v = \left(\frac{y}{y_0}\right)^{\frac{1}{2}}$$

[CO2]

(b) In a wide rectangular channel if normal depth is increased by 20%, find the increase in discharge. [CO1]

Q.6(a)A sewer pipe is proposed to be laid on a slope of 1/2500 to carry 1.5 m^3/s. What size of circular channel be used if the pipe has to flow half full. Take n = 0.015. [CO1]

(b)A rectangular channel 3.0-m wide carries a discharge of 10.0 m^3/s and has its specific energy of 2.0 m of water. Calculate alternate depths and corresponding Froude numbers. [CO2]

Q.7(a) Supercritical flow occurs at Froude number ($F_r = 2$) at a depth y = 0.63 m in a rectangular channel. Find the critical depth y_c. [CO3]

(b)A rectangular channel of 5 m wide carries water at depth 1.5 m , $S_b = 10^{-4}$, n = 0.016 and ends in a canal drop. The depth upstream at some upstream point is 1.4 m. Find the type of profile. [CO3]

Total No. of Pages:03

Roll No.....

IVSEMESTER

B.Tech. (Eve.)

END SEMESTER EXAMINATION

April/May 2024

CCE-204: Analysis of Determinate Structures

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) A cantilever of length 2m carries a point load of 20kN at the free end and another load of 20 kN at its centre. If $E=10^5 N/mm^2$ and $I=10^8$ mm^4 for the cantilever then determine by moment area method, the slope and deflection of the cantilever at the free end. [CO2] [4]

(b) Find the deflection at the free end of a cantilever which carries a uniformly distributed load and a point load at the free end. Use Castigliano's first theorem. [CO1] [4]

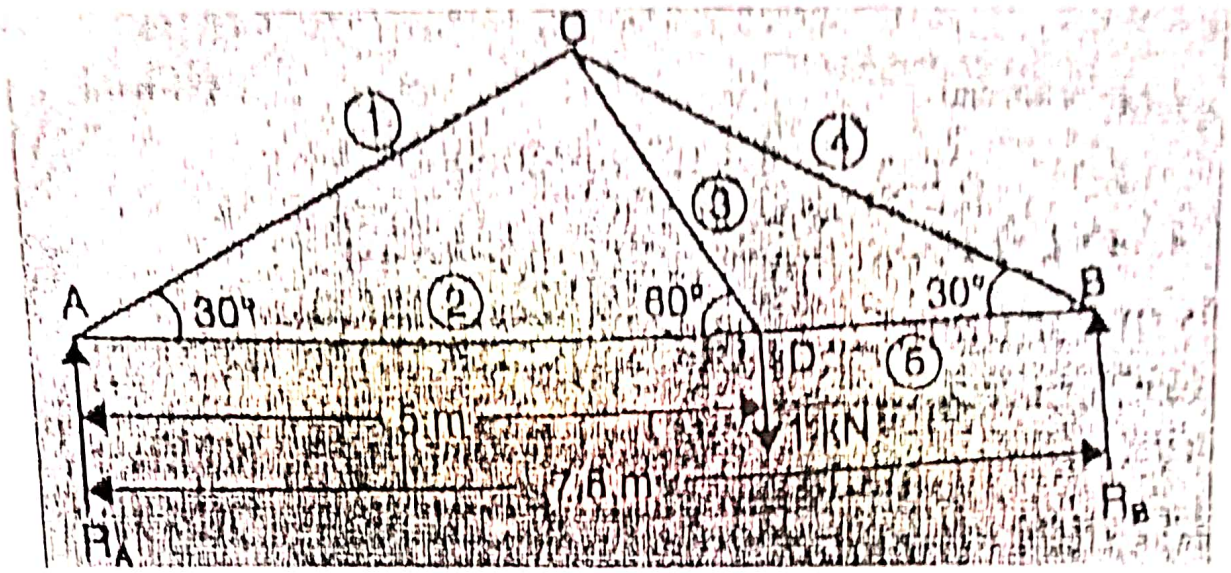
Q.2 (a) What is moment area method? What are the two theorems of moment-area method? [CO3] [3]

(b) A beam 6m long simply supported at its ends, is carrying a point load of 50 kN at its centre. The moment of inertia of the beam (i.e., I) is given as equal to $78x\ 10^6$ mm^4. If E for the material of the beam $=2.1x10^5$ N/mm^2, calculate: (i) deflection at the centre of the beam and (ii) slope at the supports. [CO2][5]

Q.3(a) What is difference between determinate and indeterminate structure? [CO1][2]

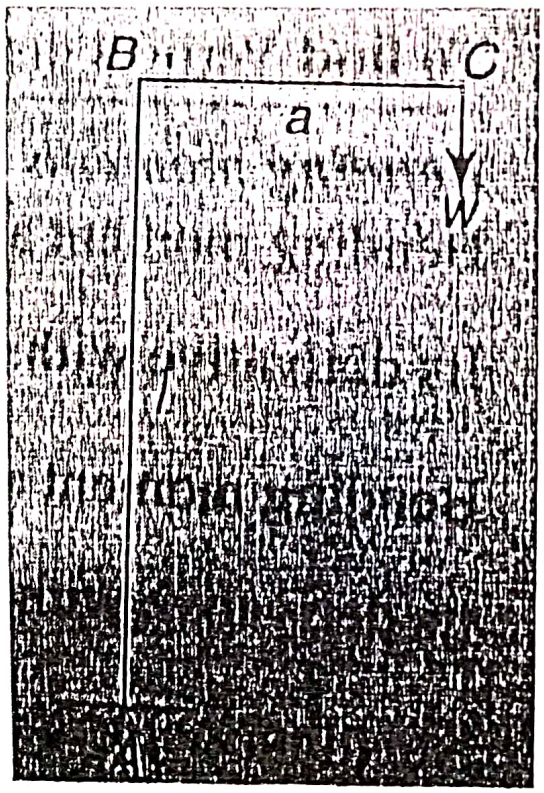
(b) A truss of span 7.5 m carries a point load of 1 kN at joint D as shown in Figure. Find the reactions and forces in the members of the trusses. [CO3][6]

4.5.3



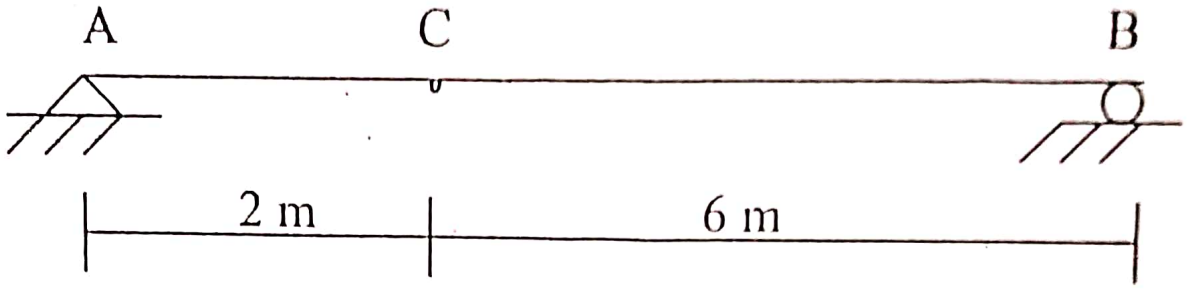
Q. 4 (a) Differentiate between two hinged and three hinged arches. [CO5][3]

(b) A rigid cantilever frame shown in Fig. carries a load W at the free end. Assuming a constant value of EI, determine the vertical and horizontal displacement at the free end C. [CO4][5]



Q.5 (a) What is an influence line diagram? [CO2][2]

(b) Construct the influence lines for RA, RB, VC and MC for the shown below: [CO2][6]



[CO5][5]

Q.6 Write short notes on (Any two) [2x4=8]

(i) Conjugate Beam Method [CO4]

(ii) Maxwell reciprocal deflection theorem [CO1]

(iii) Castigliano's First Theorem [CO1]

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

B. Tech (Civil Engineering) 4TH SEMESTER

END SEMESTER EXAMINATION May 2024

CCE206 DESIGN OF RCC STRUCTURES

TIME: 3:00 Hours Max. Marks: 40

Note: Answer **any five** Questions. Assume suitably missing data, if any.

1 (a) Draw a neat sketch of stress-strain curve of mild steel. Describe its characteristics in various portions. 4

(b) Explain importance of water quality in RC construction. 4

2 Determine the depth of neutral axis of a beam 250 mm x 400 mm (effective), reinforced with 3 bars of 20 mm diameter. Check the type of section for the beam. Use of M20 concrete and Fe 415 steel is to be considered. Determine it's bending capacity also. Draw a neat sketch of the cross section of the beam. 8

3 (a) Discuss all cases of the design of a T-beam with diagrams and expressions. 4

(b) What are various constituents of concrete? Explain in detail how they affect quality of concrete. 4

4 Determine moment of resistance of a beam of 300 mm width x 550 mm effective depth. The beam is reinforced with 1963 sq.mm of steel in tension side. Use M20 concrete and Fe 415 steel for the beam. 8

5 Write short notes on **any two** of the following topics:

(a) Shear and torsion design for beams

(b) Exposure conditions for RCC structures

(c) Design of one way slabs with diagrams and various aspects. 8

6 Explain various aspects of design of columns and footings of RCC. Draw neat sketches of critical sections for design. 8

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

6th SEMESTER

B.Tech. (Eve.)

END TERM EXAMINATION ***May-2024***

CCE302 Transportation 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) What is the impact of infrastructure on development? [4][CO1]

b) What are different roles of transportation? List the different modes of transportation. [4][CO2]

Q.2 a) What are the various factors to be considered in pavement design? Discuss the significance of each? [4][CO3]

b) Differentiate between flexible pavement and rigid pavement? [4][CO3]

Q.3 a) Compare and differentiate the types of rails with neat sketches? [4][CO4]

b) What is permanent way? Describe in details with neat sketches? [4][CO4]

Q.4 a) What are the different systems of controlling the movement of trains? Explain. [4][CO5]

b) What do you mean by zoning laws in transportation and it's common aspects? [4][CO5]

Q.5 a) Differentiate between Runway and Taxiway. [4][CO6]

b) What is tunnel? List the type of the tunnel? Discuss advantages and disadvantages of Tunnels? [4][CO6]

Q.6 Write short note (any two): [4x2][CO2-CO6]

a) Major faults occurring in flexible pavements
b) Rail gauge
c) Fish plates
d) Clear zone and approach zone

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

SIXTH SEMESTER

B.Tech (EVENING)

END TERM EXAMINATION MAY 2024

COURSE CODE- CCE310 COURSE TITLE- APPLICATIONS OF GEO-INFORMATICS, REMOTE SENSING AND GIS IN ENGINEERING.

Time: 3:00 Hours Max. Marks: 50

Note : . Attempt any five Questions.

Assume suitable missing data, if any.

Q.1 (a) What is GIS? Describe it in detail. [04][CO1]

(b) Differentiate between Active Microwave remote sensing and Passive Microwave remote sensing. [06][CO1]

Q.2 (a) What is RADAR? Write down its various applications. [04][CO2]

(b) Write down various other areas in which GIS applications can be used. Numerate these GIS applications in those areas. [06][CO1]

Q.3(a)What are various components of Remote sensing?

(b)Explain the various image resolution with details? [10][CO3]

Q.4 (a) What is Orbit and how does Orbit selection vary? [10][CO2]

(b) Name Various type of orbits.

Q.5 Write down short note on the following: -

i)- Optical radiation models

ii)- Synthetic Aperture Radar (SAR)

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iii)- Geodetical Surveying

iv)-Image enhancement

V)- Digital Data Bank [10][CO1]

Q.6 What is image processing in GIS? Explain image processing methods. [10][CO3]

Total no. of Pages: 03

Roll no.....

6TH SEMESTER

B.TECH(EVENING) CIVIL ENGINEERING

END SEMESTER EXAMINATION MAY-2024

CCE- 314 GEOTECHNICAL PROCESSES

TIME:3.0 Hr **MAX MARKS: 50**

NOTE: ATTEMPT ALL QUESTIONS. ASSUME THE DATA SUITABLY IF ANY.

1. Check the validity of following statements with reasons-

a. The clay minerals absorb more water than the quartz mineral. CO-5(2)

b. The stone columns are not applicable to deposits of highly organic clays. CO-3(2)

c. If the degree of consolidation in vertical and radial directions are 50% and 70% respectively, the overall degree of consolidation will be 85%. CO-1(2)

d. The use of geogrid is more suitable for toe filter in dam. CO-4(2)

e. The coefficient of permeability of the aquifer is 0.01 m/sec. If the drawdown in the well is 2 m, the radius of influence will be 200 m. CO-2 (2)

2. Attempt any **Two** parts.

a. How does a sheep's foot roller compact the earth.

In order to compact the clay layer on an embankment, determine the quantity of material compacted by a sheep's foot roller when the roller travels for 50 min at a speed of 4.5 km/h. The length of drum is 2.8 m, number of drum is one, fraction of overlap is 1/8, layer thickness is 0.5 m and number of passes given is 8. CO-1 (5)

b. Discuss the design steps of sand drain. What are its limitations. CO-2 (5)

c. Three aggregates A, B and C are available at the site. The grading of each one is given in the following table. Design a mechanical stablisation mix with desired grading given as D, by Ruth Futch's technique. CO-2 (5)

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Sieve size (mm)	Desired grading D	% finer than for A	% finer than for B	% finer than for C
20	100	100	100	100
10	80-100	96	100	100
4.75	50-75	0	98	100
2.36	35-60	0	85	100
0.600	15-35	0	2	92
0.075	5-15	0	0	10
0.002	2-7	0	0	2

3. Attempt any **Two** parts-

a. Explain the mechanism of cement stablisation. What are the factors affecting cement stablisation? CO-2 (5)

b. Write a note on grouting with respect to followings-

- Depth and size of grout holes
- Spacing of grout holes
- Pattern of grout holes

CO-2 (5)

c. A clay deposit of depth 10 m is followed by a very stiff stratum. A stone column system of diameter 450 mm and length 8m with centre to centre spacing of 1.2 m is installed in the clay. The water table is at a depth of 1.5m from the ground level. The undrained cohesion is 20kN/m^2. The saturated unit weight of soil is 19kN/m^3. Assume m_v=0.0005 m^2/kN, Φ_c =40° and k_o =0.6. Determine

i) The safe bearing pressure of the soil.

ii) The load carrying capacity of the stone column its tributary soil.

iii) The number of stone column required for a column carrying a load of 650 kN. CO-3 (5)

4. Attempt any **Two** parts-

a. What is the principle of electro-osmosis process? Discuss the factors affecting. CO-3 (5)

b. With the neat sketches explains the functions of geosynthetics as-

- Reinforcement
- Erosion control
- Separation

- Confinement CO-4 (5)

c. How a reinforced retaining wall is checked for stability against

- Sliding
- Overturning
- Bearing failure CO-4 (5)

5. Attempt any **Two** parts-

a. How the collapsible soils are identified? What are the preventive measures adopted during the construction on such soils? CO-5 (5)

b. Explain the mechanism of expansive soils. Define swelling potential and swelling pressure. CO-5 (5)

c. (i) The 10 c.c. dry soil passing through 425 micron sieve is poured into a graduated cylinder of 100 ml filled with distilled water. After 24 hr, the volume of settled soil is measures as 150 c.c. Determine the free swell index. Comment on its swelling potential. CO-5 (2.5)

(ii) A soil has liquid, plastic and shrinkage limits 60%, 27% and15% respectively. Find its swelling potential as per Seed et al. Also comment on its degree of plasticity/ compressibility. CO-5 (2.5)

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

B.TECH.[Eve](CIVIL) **VI SEMESTER**

END TERM EXAMINATION **MAY-2024**

CCE326: TRAFFIC AND TRANSPORTATION PLANNING

Duration: 3 Hours ***Max. Marks: 50***

Note: Attempt any FIVE questions. Assume missing data, if any.

Q.1 Explain purpose of traffic surveys mentioning their various methods. [CO1][10]

Q.2 (a) Specify the method(s) of traffic study that is used to determine time mean speed and space mean speed. Also mention application of time mean speed and space mean speed. [CO2][5]

(b) From the following observations of speed collected from a study, determine time mean speed and space mean speed.
50, 47, 40, 41, 60, 62, 54, 43, 45, 55, 31, 40, 72, 49, 58, 52, 56, 43, 46, 43, 65, 33, 34, 42, 44, 47, 51, 59, 63, and 69 km/h. [CO3][5]

Q.3 The work trips per day and their journey time between zones of a study area consisting four residential zones A, B, C, D and two industrial zones X and Y are given in following table:

Zone	Number of work trips	Journey time in minutes	
		X	Y
A	1000	15	20
B	2250	15	10
C	1750	10	10
D	3200	15	20
X	3700	-	-
Y	4500	-	-

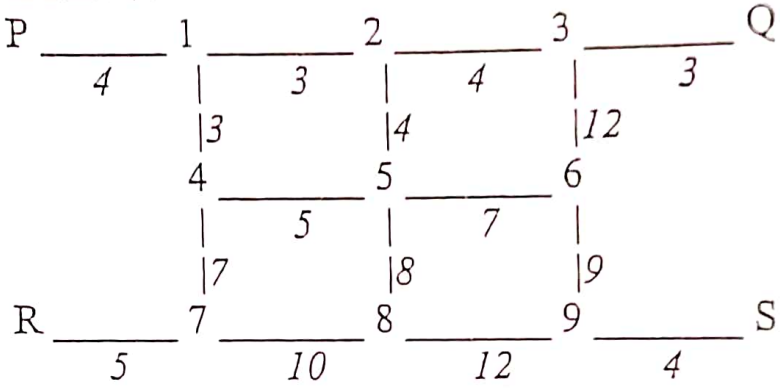
P.T.O.

Distribute the work trips between residential zones and industrial zones using gravity model. It is given that trip distribution is inversely proportional to the square of journey time. [CO4][10]

Q.4 (a) Discuss various factors affecting mode choice.[CO1][5]

(b) What are the relative advantages of different stage of the modal split in transportation planning? [CO2][5]

Q.5 The network connecting the zones P, Q, R and S is as shown below.



Figures on network links indicate cost of travel.

FROM \ TO →	P	Q	R	S
P		200	600	100
Q	900		800	200
R	400	700		500
S	700	300	400	

Assign the trips given in the above table between four zones using all or nothing technique. [CO4][10]

Q.6 Describe merits and demerits of *ANY TWO* of the following: [CO2][5×2=10]

(a) Road side interview method for O-D survey
(b) Fratar method for trip distribution
(c) Moore's method for trip assignment

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Total no. of Pages:2

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8th SEMESTER

B.Tech. (Eve)

END TERM EXAMINATION *May-2024*

COURSE CODE: CCE402 **COURSE TITLE: CT&M**

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

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

Q.1 Give, in a tabular form, the difference between standard equipment and special equipment for earth excavation. [5] [CO1]

Q.2 What are the four common types of compaction equipment's? [5] [CO2]

Q.3 What is the difference between PERT and CPM? [5] [CO3]

Q.4 What is Quality Control (QC) in construction? And explain different types of Quality Control in construction project management. [5] [CO5]

Q.5 The cost of equipment's is Rs 3lakhs and scrap value is Rs.20,000, life of equipment 20 years, and age of equipment 8 year. Calculate depreciated value of equipment. [5] [CO4]

Q.6 Explain the following term's -

a) Depreciation cost. b) Maintenance and Repair Cost.

c) Investment Cost. [5] [CO4]

Q.7 Determine the probable cost per hour for owing and operating a power shovel (Crawler Tractor Mounted) for the following: Engine,160HP diesel, Crank Capacity=30 lit. Time between oil changes=100Hr. Operating factor=0.6 Useful Life=5 Year, Hours used per Year=2000 Hr. Total initial Cost=800000Rs. Estimated Salvage Value=90000 Rs. [10] [CO4]

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Q.8 The following table shows the jobs of a network along with their time estimates.

Activity	Estimated Duration (Weeks)		
	Optimistic	Most Likely	Pessimistic
1 - 2	1	7	13
1 - 6	2	5	14
2 - 3	2	14	26
2 - 4	2	5	8
3 - 5	7	10	19
4 - 5	5	5	17
6 - 7	5	8	29
5 - 8	3	3	9
7 - 8	8	17	32

Calculate the

a) Draw the Project Network.

b) Find the expected duration and Variance of each Activities. [5+5] [CO5]

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Total No.of pages:02

Eight semester
B.Tech [Evening]

END SEMESTER EXAMINATION **May-2024**

CCE – 414 Geo-Environmental and Geo-Hazard Engineering

Time:3.0 Hours **Max. Marks:50**

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

1. Compare the impact of solid waste disposal and liquid waste disposal of subsurface contamination and also explain different control and and remediation of surface contamination.

2. What is land fill and what are the points for consideration of site selection of land fill and also explain different types of land fills.

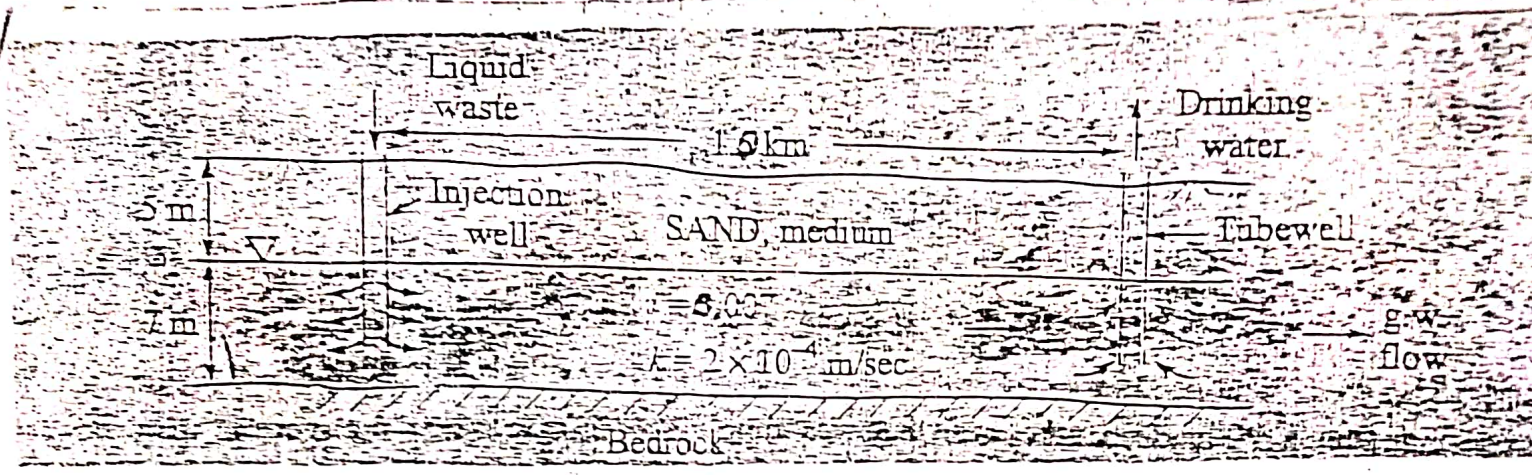
3. Liquid waste is [b] eing discharged into a shallow injection well. The subsoil consists of medium sand with coefficient of permeability of $2x10^{-4}$m/sec and a porosity of 35%. The ground water table is located 5 m below the ground surface and hydraulic gradient causing ground water flow is 0.007. A drinking water tube well is located 1.0 km away from the injection well on the downstream side as shown in Fig. Once the liquid waste percolates vertically down to the ground water table, how much time will it take for the liquid waste to reach the drinking water tube well? Consider only advective flow and assume one dimensional horizontal flow condition.

4. List the two main problems caused by the following types of wastes (a) mining overburden (b) fly ask (c) construction and demolition wastes (d) ETP sludge from industrial area (e) cynide bearing gold tailings.

5. Determine the expression for effective permeability of the soil-bentonite mix and bentonite slurry system of the soil-bentonite slurry trench wall. For the soil-bentonite backfill, the permeability is k_s and its thickness t_s. the bentonite film formed on the sides of the trench has permeability k_b and thickness t_b.

6. What causes earth quakes? Explain its engineering significance in seismic resistant design of geotechnical structures. What is magnitude and intensity of an earthquake?

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Liquid waste
1.5 km
Drinking water
5 m
Injection well
SAND, medium
Tubewell
5 m
g.w. flow
Bedrock

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Total No. of Pages -01

Roll No._____

End Term Exam May 2024 8th Semester B Tech. (Evening)

CCE-410 Topics : Construction and Design aspects in transportation Engineering

Time: 3 Hrs Max Mark: 40

Note All Question are compulsory all question carry equal marks Assume Suitable Missing data if any.

Q-1. Write short Notes on

i) Design of turn over terminal facilities

ii) Design of turn over inter model transfer facilities (CO4) 8 Marks

Q- 2. What do you understand by Area Traffic Control Systems? Discuss (CO2) 8 Marks

Q-3. Define the following terms? (CO3) 8 Marks

i) Pedestrian food over bridge

ii) Rotary intersection

Q-3. What is Intersection sight distance? (CO1) 8 Marks

Explain Merits and Demerits

Q-5. Enumerate the case studies of bus and Rail Terminal? Discuss Advantages and Disadvantages

- (CO5) 8 Marks

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

SECOND SEMESTER

B.TECH. (EVENING) ELECTRICAL ENGINEERING

END SEMESTER EXAMINATION May, 2024

CEE-102: ELECTROMECHANICAL ENERGY CONVERSION AND TRANSFORMERS

Time: 3.00Hours Max. *Marks: 40*

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

1. (a) Explain the constructional features and the principle of operation of a D.C. generator. Also derive the Equation for the EMF developed. CO1 4

   (b) Explain following with the help of neat sketches (i) Yoke (ii) armature core (iii) Front Pitch and Back Pitch, for lap and wave winding. CO1 4

2. (a) How is the voltage Built-up in a DC shunt generator? What is the role of field resistance hence define critical field resistance. What do you understand by residual magnetism in a self excited DC generator? CO2 4

   (b) A 10 kW, 250 V, 6 pole DC shunt generator runs at 1000 rpm when delivering full load. The armature has 534 lap connected conductors. Full load cu-loss is 0.64kW. The total brush drop is 1 volt. Determine the flux per pole. Neglect the shunt current. CO2 4

3. (a) What are the losses occurring in a D.C. machine. Derive the condition for maximum efficiency. CO3 4

   (b) A shunt generator delivers 195A at a terminal voltage of 250 Volt. The armature and shunt field resistance are 0.02 ohm and 50 ohm respectively. Iron and friction losses equal 950 W. Find generated EMF (b) Cu-loss (c) B.H.P. of prime mover (d) commercial, mechanical and Electrical efficiency. CO3 4

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4. What do you mean by the Back EMF in DC motors? Develop the condition for maximum power and derive an expression for the armature torque developed. CO4 4

5. (a) Develop the characteristics of DC series, DC Shunt, and compound motors CO4 4

(b) Give the general applications of DC shunt, DC series, and DC compound motors. CO4 4

6. (a) Explain how do we perform Open circuit test and short circuit on a single phase transformer. Which parameters of the equivalent circuit of the transformer are determined from these tests? CO5 4

(b) Develop a vector diagram for a transformer when the secondary is loaded by a lagging power factor load. CO5 4

7. Write short notes on any two of the following: CO5 2x 4

(a) Starters in DC motors
(b) Armature reaction
(c) Losses in a Transformer

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Total No. Pages: 02 *Roll No. .....*

II Semester

B.Tech. EE (Continuing Education)

END TERM EXAMINATION **MAY- 2024**

CEE-104 Electromagnetic Field Theory

Time: 3 Hours **M.M. 50**

Note: Attempt Any Five Questions, each question carry equal marks
Assume suitable missing data, if any

[1] If $A = 10a_x - 4a_y + 6a_z$ and $B = 2a_x + a_y$, find (i) Component of A along a_y (ii) magnitude of (3A-B) and its direction (iii) unit vector along (A+2B) **[CO1]**

[2] Given point P (-2, 6, 3) and vector $A = ya_x + (x+z)a_y$, express P and A in cylindrical and spherical co-ordinates. Evaluate A and P in Cartesian, cylindrical and spherical systems. **[CO2]**

[3] Given $F = x^2 a_x - xza_y - y^2 a_z$, calculate the circulation of F around the path shown in Fig. 1 . **[CO2]**

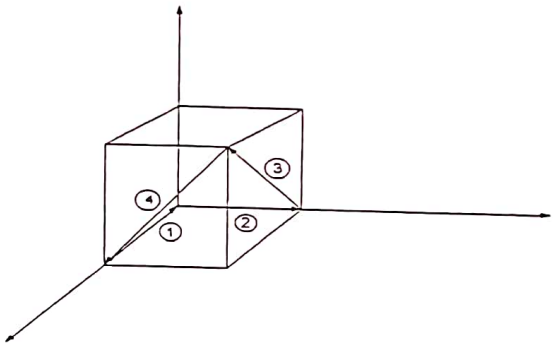


Fig. 1

[4] Point charges 5 nC and -2 nC are located at (2, 0, 4) and (-3, 0, 5) respectively (a) Determine the force on a 1 nC point charge located at (1, -3, 7) (b) find electric field at (1, -3, 7). **[CO3]**

[5] The line sheet $0 \le x \le 1$, $0 \le y \le 1$, on $z = 0$ plane has charge density $\rho_s = xy(x^2 + y^2 + 25)^{3/2} nC/m^2$, Find (i) Total charge on the sheet, (ii) electric field at (0, 0, 5) (iii) the force experienced by a -1 mC charge located at (0, 0, 5) **[CO3]**

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[6] A charge distribution with spherical symmetry has density as follows. Determine E everywhere. **[CO4]**

$$\rho_v = \begin{cases} \dfrac{\rho_0 r}{R}, & 0 \le r \le R \\ 0, & r \ge R \end{cases}$$

[7] A point charge of 5 nC is located at (-3, 4, 0) while line y = 0, z = 0, carries uniform charge 2 nC / m, (i) if V = 0, at O (0, 0, 0) Find V at A (5, 0, 1), (ii) if V = 100V, at B (1, 2, 1) find V at C (-2, 5, 3), (iii) if V = -5V at O, find V_{BC}. **[CO5]**

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

IVth SEMESTER B.Tech.[EE(Eve)]

END TERM EXAMINATION MAY-2024

CEE 202 POWER TRANSMISSION AND DISTRIBUTION

Time: 3.00 Hour *Max. Marks : 40*

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

Q.1 What is the percentage saving in feeder copper if the line voltage in a two wire dc system be raised from 250 V to 400V for the same power transmitted?

Q.2 The d-axis reactance of 10kV, 75MVA, salient pole alternator is 0.4 pu based on the alternators name plate rating.

a. Find the actual value of the d-axis reactance.

b. If the base for calculation is changed to 11kV, 100MVA, find the new pu value of the alternator.

Q.3 Define string efficiency of a string of overhead line insulators. Explain the methods to improve it.

Q.4 Explain the factors which determine the formation of corona on overhead lines. What are the disadvantages of corona? How can corona be minimized?

Q.5 A long transmission line is open circuited at the receiving end. Will there be any current in the line at the sending end ? If yes, what will be nature of the current. Justify your answer.

Q.6. Deduce an expression for voltage regulation of a short transmission line, using phasor diagram.

Q.7 A 765 kV, 60 Hz, three phase transmission line is 300 km long. The series impedance is $z = 0.0165 + j0.3306\ \Omega$ per phase/km and the shunt admittance is $y = j4.674 \times 10\text{-}6$ S per phase/km. Find the characteristic impedance and propagation constant of the line.

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Q.8 A 345 kV, 60 Hz, three phase transmission line is 130 km long. The resistance per phase is 0.036 Ω per km and the inductance per km is 0.8 mH/km. The shunt capacitance is 0.0112 μF per km. Find the ABCD parameters of the line. Assume π model of the transmission line.

Q.9 Calculate the capacitance and charging current of a single core cable used on a 3-phase, 66 kV system. The cable is 1 km long having a core diameter of 10 cm and an impregnated paper insulation of thickness 7 cm. The relative permittivity of the insulation may be taken as 4 and the supply at 50 Hz.

Q.10 Write short notes on: (any two)

a. Bundled Conductors

b. Pin Type Insulators

c. Different types of distribution System for supply of electrical power

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

IV Semester

B.Tech (Part-time)

End Term Examination **May 2024**

CEE-204, Instrumentation & Measurement

Time: 3:00 Hours **Max. Marks – 40**

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

Q.1 (a) 0.0035 μH/degree is the rate of change of inductance in a 25 A electrodynamic meter. What should be the full scale angle of deflection, if spring constant is 10^(-6) Nm/degree? [5][CO1]

(b) (i) A (0-1)mA ammeter is used to measure (0-100)mA deflection through shunt arrangement. What should be the value of shunt resistance if internal resistance of ammeter is 200 ohms? [2.5][CO1]

(ii) A 20A moving iron ammeter is having full scale torque of 6*10^(-5) Nm. At full scale, the rate of change of self-inductance with respect to the pointer deflection would be_____? [2.5][CO1]

Q.2 (a) Draw neat and clean diagram of EMMC Instrument. Explain how EMMC can be used to measure power. [2+3][CO2]

(b) Draw neat and clean diagram of a PMMC Instrument. Derive the equation for deflection angle and deflection torque. Explain its working, show if the scale is linear or non-linear? [1+2+2][CO2]

Q.3 (a) Measured current of a circuit is 235*10^(-6)A with a measurement accuracy of 0.5%. This circuit represents a resistance of 35k +/- 0.2% ohms. What should be the value of error (in volts) while calculating the voltage across this circuit? [5][CO4]

(b) What are the seven different basic characteristics of an instrument? [5][CO4]
Explain each and every one of them in detail.

Q.4 Write Short notes on any two of the following: [5+5]

(i) 3 ½ digital voltmeter [CO4]
(ii) Kelvin's Double Bridge [CO3]
(iii) Repulsion type MI Instrument [CO2]
(iv) 5 Point Bridge [CO3]

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Total No. of Pages: 02 Roll No. .....

FOURTH SEMESTER B.Tech.[EE](Even.)

END TERM EXAMINATION (May-2024)

CEE-206 Microprocessor and Microcontroller Applications

Time: 03 Hour *Max. Marks:40*

Q1. a) Mention the addressing modes in 8085 **10**

b) Differentiate between instruction cycle and machine cycle.

c) Name all 16-bit registers in 8085.

d) Name the hardware interrupts in 8085.

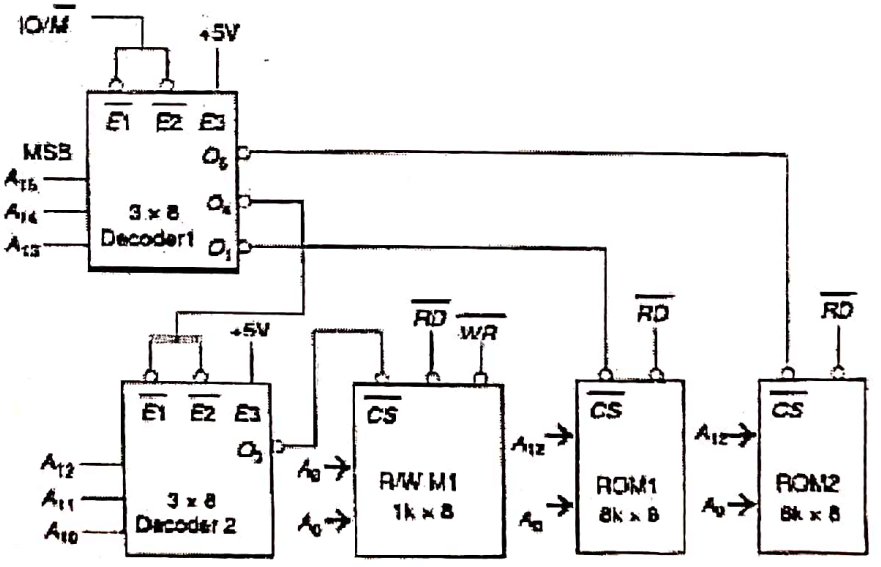
e) Differentiate between CALL and POP instruction.

Q2. Write a program to blink LED connected to port C of 8255 PPI to 8085. **05**

Q3. Write a program for checking the key debouncing. also write a program to detect pressed key in a matrix keyboard interface. **05**

Q4. Explain the steps with timing diagram for data flow when instruction OUT 08H with opcode 5B executed. **10**

Q5. Identify the addres range of ROM 1, ROM 2, and R/W M1. **10**



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Total No. of Pages: 02 Roll No. .....

B. Tech. (EE) Continuing Education SIXTH SEMESTER

END SEMESTER EXAMINATION (MAY-2024)

CEE 302 RENEWABLE ENERGY SYSTEMS

Time: 3.00 Hours *Max. Marks: 40*

Note: Answer four questions in total. Question 1 is compulsory. Each question carry equal marks. Assume the missing data suitably (if any).

1. Answer the following questions in brief. [5x2=10]

(a) Write down the limitations of exploitation of renewable energy resources in India? [CO-1]

(b) Why the efficiency of solar thermal power generation is lesser than other systems? [CO-2]

(c) Mention the factors which determine the power in wind. Also discuss the significance of Betz's limit. [CO-3]

(d) What are the various forms of biomass? Mention their applications? [CO-4]

(e) Why hydrogen is considered as a secondary energy source? [CO-5]

2. (a) Describe the various renewable energy resources available and their potential to supplement the conventional energy sources. Discuss the projected demand of India by 2030 and how renewable energy resources would be utilized to fulfil the demand. [5] [CO-1]

(b) Design a stand-alone PV system to fulfil the requirements of 10 kW load which is operated for 5 hours in a day. The following are the data to be used in designing of the PV systems. PV Module rating: 580 W_p, Battery Voltage: 12 V, Sunshine hours: 7, η_{cc} = 90%, η_{inv} = 90%, DoD: 80%, Operating factor: 0.75. [5] [CO-2]

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3. (a) Discuss the various considerations taken into account for site selection of a wind energy system. With the help of block diagram, briefly explain the various components of wind energy conversion system (WECS). [5] [CO-3]

(b) What are the different types of wind turbines. With the help of suitable example discuss the applications of HAWT and VAWT. [5] [CO-3]

4. (a) Explain briefly the components of a biogas plant. With the help of neat sketch, explain the working of floating/fixed drum type biogas plant. [5] [CO-4]

(b) What are the various factors considered in designing a micro hydro power plant? With neat layout explain the working of hydroelectric power plant. [5] [CO-4]

5. Answer *any two* of the following: [2x5 = 10]

(a) Principle of operation of open cycle OTEC system [CO-5]

(b) Working of tidal power plant with neat layout [CO-5]

(c) Working principle of a geothermal power plant with the help of a neat sketch [CO-5]

(d) Solar water pumping system with suitable example [CO-2]

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Total No of pages:02 *Roll No:* 479

SIXTH SEMESTER **B.TECH(CEEE)**

END SEMESTER EXAMINATION **MAY-2024**

CEE-304 Power System Operation & Control

TIME:3hr **MAX. MARKS:40**

NOTE: *Attempt ANY FIVE questions.*

1. (a) Explain the following voltage control methods: - [4][CO1]
   (i) Tap changing Transformer & (ii) Booster transformer.
   (b) Show that the maximum power transfer between two nodes is maximum when $X = \sqrt{3}\,R$, where X is the reactance and R is the resistance of the system. [4][CO3]

2. Explain the Point-by-Point method of solving the swing equation and compare this method with 'Equal Area Criterion' method of power system stability. [8][CO2]

3. (a) A 4-pole, 50 Hz, 25 kV turbo-alternator has a rating of 90 MVA, p.f. 0.85 lag. The moment of inertia of rotor is 7000 kgm^2. Determine M and H. [4][CO3]
   (b) Discuss the effect of neutral grounding on stability of power system. [4][CO1]

4. (a) Two power stations A and B are located close together. Station A has four identical generator sets each rated 100 KVA and each having an inertia constant of 9 MJ/MVA whereas station B has three sets each rated 200MVA, 4 MJ/MVA. Calculate the inertia constant of the equivalent machines of both the stations on 150 MVA base. [4][CO4]
   (b) Station A transmits 50 MW of power to station B through a tie line. The maximum steady state capacity of the line is 100MW. Determine the allowable sudden load that can be switched on without loss of stability. [4][CO5]

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5. Differentiate between steady state stability and transient stability of a power system. Discuss the factors that affect: (i) steady state stability, and (ii) transient state stability of the system. [8][CO2]

6. Determine the kinetic energy stored by a 50 MVA, 50 Hz, two pole alternator with an inertia constant (H) of 5 kW-sec/kVA. If the machine is running steadily at synchronous speed with a shaft input (minus rotational losses) of 65000 HP when the electrical power developed suddenly changes from its normal value to a value of 40 MW, determine the acceleration or deceleration of the rotor. If the acceleration computed for the generator is constant for a period of 10 cycles, determine the change in the torque angle in that period and the rpm at the end of the 10 cycles. [8][CO4]

7. (a) Prove that the law of combination of inertia constants of the equivalent machine corresponding to a group of machines that swing together is different from the one where the machines do not swing together. [4][CO2]

   (b) Explain a speed governing system which controls the real power flow in the power system. [4][CO1]

Total No. Pages: 03 *Roll No. .....*

Semester: VI

B. Tech. EE (Continuing Education)

END TERM EXAMINATION **MAY-2024**

CEE-306 POWER SYSTEM OPTIMIZATION

Time: 3 Hours ***M.M. 50***

Note: (i) Attempt Any Five Questions
(ii) All questions carry equal marks
(ii) Assume Suitable Missing Data, If Any

[1] Describe overview of different methods of optimization applied in power system optimization. **[CO1]**

[2] Describe unit commitment and load forecasting commonly applied in power system optimization. **[CO1]**

[3] Determine nodal admittance matrix for the power system represented by single line diagram as shown in Fig. 1. **[CO2]**

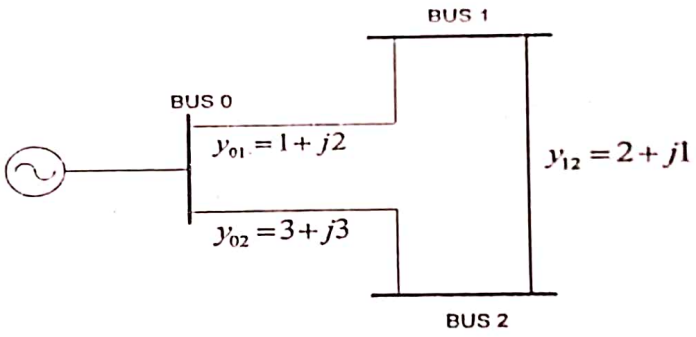


Fig. 1

[4] A 4-bus system is shown in Fig.2. The magnitudes of the bus voltages at all the buses are 1 p.u. each. The per unit values of line admittances, loads and active power generated at different buses are indicated on the figure. Determine (i) reactive power generated at buses (ii) active power and reactive power losses (iii) power flow in each of the transmission lines in the network. **[CO2]**

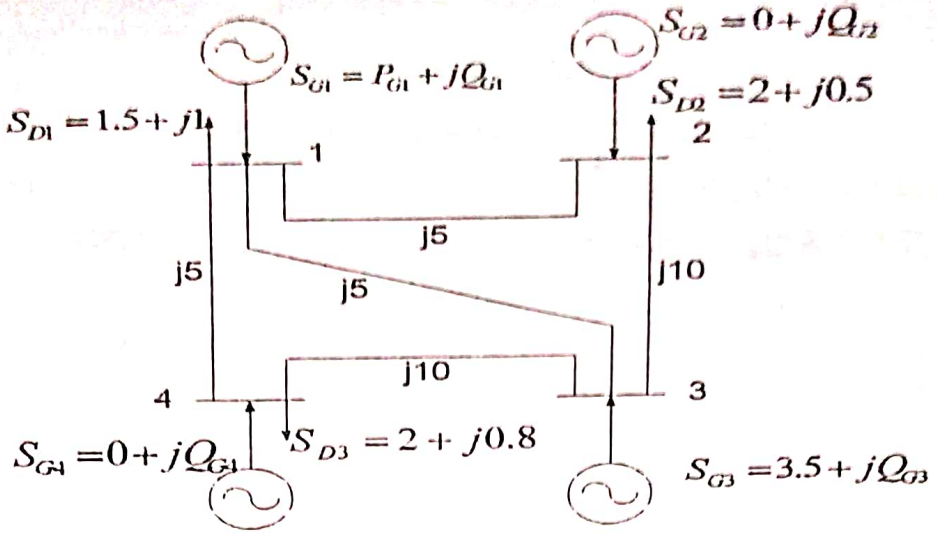


Fig.2

[5] The following is the system data for load flow solution. The line admittance

Bus Code	Admittance
1-2	2-j0.8
1-3	1- j4.0
2-3	0.666-j2.664
2-4	1- j4.0
3-4	2-j.80

The schedule of active and reactive powers:

Bus Code	P	Q	V	Remarks
1	-	-	1.06	Slack
2	0.5	0.2	1+j0.0	PQ
3	0.4	0.3	1+j0.0	PQ
4	0.3	0.1	1+j0.0	PQ

Determine the voltages at the end of first iteration using Gauss-Siedel method. Take $\alpha = 1.6$ **[CO3]**

[6] Incremental fuel costs (Rs/MWhr) for a power plant consisting two generating units are as

$$\frac{dC_1}{dP_{g1}} = 0.18P_{g1} + 41$$

$$\frac{dC_2}{dP_{g2}} = 0.36P_{g2} + 32$$

And generator limits are: $32 \le P_{g1} \le 180$ MW, $22 \le P_{g2} \le 130$ MW

Determine Pg_1, Pg_2 and values of λ for the variation of load from 54 MW to 310 MW. Assume that both generating units are operating at all times **[CO4]**

[7] A two bus power system is shown in Fig. 3. Incremental fuel costs of the two generators are given as :

$IC_1 = (0.35P_{g1} + 41)$ Rs./MWhr, and $IC_2 = (0.35P_{g2} + 41)$ Rs./MWhr and loss expression is $P_L = 0.001(P_{g2} - 70)^2$ MW. Determine the optimal scheduling and power loss of the transmission link. **[CO5]**

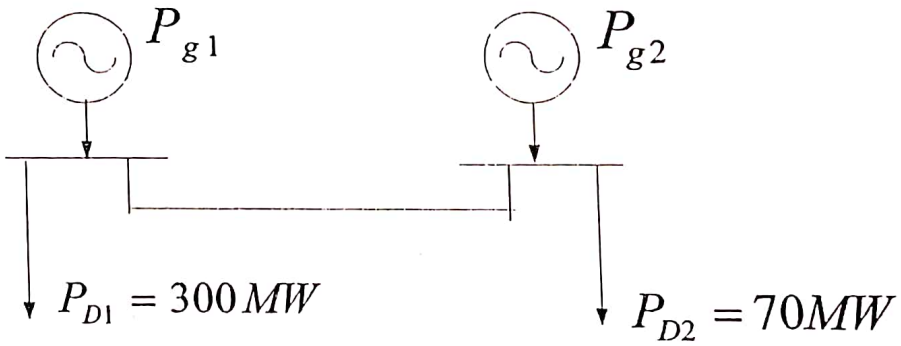


Fig. 3

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

6th SEMESTER **B.Tech. (Evening)**

END TERM EXAMINATION ***May-2024***

COURSE CODE: CEE-308

COURSE TITLE: Power Electronic Applications to Power Systems

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) Define 'FACTS'. Elaborate on the classification of FACTS controllers / FACTS devices. [1+2] [CO1]

(b) Draw a neat diagram of a SVC. How is a SVC better than a TCR ? Draw the V-I characteristics of a TCR and a SVC. [1+3+3] [CO2]

Q.2 (a) With neat diagrams, explain the function of the slope in the SVC V-I characteristics. [3] [CO2]

(b) Draw a neat diagram depicting the physical connection of a UPFC to a transmission line, showing all three phases. [7] [CO3]

Q.3 (a) Draw (i) the V-I characteristics and (ii) P-delta characteristics of a STATCOM and a SVC and explain how STATCOM is better than a SVC. [1.5+1.5][CO2+CO3]

(b) A TCR with $X_L = 20\ \Omega$ at 50 Hz is connected to a single phase, 230 V bus. Compute the TCR current (fundamental) magnitude for firing angles of 90, 120, 150 and 180 electrical degrees. [7] [CO2]

Q.4 (a) Briefly explain, with diagrams, the function of the MOV in a TCSC. What is the range of values of $\sqrt{\frac{X_C}{X_L}}$ for the TCSC ? Why ? [3] [CO2]

(b) Draw the schematic diagram of a SSSC. Also write expressions of the power transfer P_{12} over a transmission line for (i) without any SSSC (ii) SSSC in inductive mode (iii) SSSC in capacitive mode. Also plot the power transfer versus load angle delta 'δ' for both cases. [7] [CO3]

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Q.5 (a) Explain briefly, the function of the smoothing reactors in a typical HVDC transmission system. How much is the value of a typical smoothing reactor ?
[3] [CO4]

(b) With neat diagrams, show that for the same real power transfer, the transmission losses with HVDC transmission are lower than that with AC transmission. Make suitable assumptions. [7] [CO4]

Q.6 (a) How would you (i) reduce and (ii) reverse the real power transfer in a HVDC transmission system ? [3] [CO5]

(b) Draw the schematic diagram of a typical bipolar HVDC transmission system, showing all main components. [7] [CO4]

Q.7 (a) Explain briefly, with neat diagrams, the effect of the transformer leakage inductance / source inductance on the average DC voltage. [3] [CO5]

(b) For a single-phase bridge rectifier (with two thyristors), draw waveforms of the AC voltage, the AC side current and the DC voltage for $\alpha < 90^o$ and $\alpha > 90^o$.
[7] [CO5]

Q.8 Write short notes on (any two): 2 x 5

(a) Equivalent commutating reactance [5] [CO5]

(b) Extinction delay angle [5] [CO5]

(c) Expression of TCSC reactance with firing angle and its plot [5] [CO2]

(d) Physical connections of a two converter IPFC [5] [CO3]

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

VI Semester

B.Tech (Part-time)

End Term Examination **May 2024**

CEE-316, Communication System

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 carrier c(t)=Acos2*(3.14)*10^6t is angle modulated by a sinusoidal signal m(t)=2cos2000*(3.14)t. The deviation constants are k(p)=1.5 rad/V and k(f)=3000 Hz/V.

(a) If the amplitude of m(t) is decreased by a factor of two, then what would be the bandwidths (in kHz) in case of FM & PM? [5][CO3]

(b) If the frequency of m(t) is increased by a factor of two, then what would be the bandwidths (in kHz) in case of FM & PM? [5][CO3]

Q.2 (a) Explain the concept of modulation and demodulation using appropriate block diagram. All the required frequency components must be used while explaining the modulation and demodulation methodology. [5][CO2]

(b) How FM can be done by using PM and vice versa? Explain with the help of generalised formula while using block diagrams. [5][CO2]

Q.3 (a) Time domain equation of FM signal is given below. Determine the maximum frequency deviation, modulation index, bandwidth and power.

$s(t) = 10\cos[2\pi 10^{6}t + 4\sin 4\pi 10^{3}t + 2\sin 2\pi 10^{3}t]$ [5][CO3]

(b) Derive the general equations of single tone phase modulation and compare it with general equation of single tone frequency modulation. Clearly mention the difference observed between two. [5][CO4]

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5. (a) What is tower-footing resistance? What are methods to reduce this resistance? [4][CO1]

(b) Find out the coefficients of reflection and refraction for current and voltage waves when a transmission line terminated through a resistance. [4][CO3]

6. A 3-phase transmission line has conductors 1.5 cms in diameter spaced 1 metre apart in equilateral formation. The resistance and leakage are negligible. Calculate (i) the natural impedance of the line, (ii) the line current if a voltage wave of 11 kV travels along the line, (iii) the rate of energy absorption, the rate of reflection and the state and the form of reflection if the line is terminated through a star connected load of 1 kΩ per phase, (iv) the value of the terminating resistance for no reflection and (v) the amount of reflected and transmitted power if the line is connected to a cable extension with inductance and capacitance per phase per cm of 0.5×10^{-8} H and 1.0×10^{-6} μF respectively. [8][CO5]

7. Write short notes on **any two** of the following: -

(i) Cascaded-Transformer method, (ii) Ground wires, (iii) volt-time curves for insulation coordination, (iv) Vacuum breakdown, (v) Testing of HVAC cables. [4 +4] [CO1]

Total No. of Pages ___

VIII SEMESTER

B.Tech [EE][PT]

END TERM EXAMINATION

MAY -2024

PAPER CODE: CEE-420

SUBJECT: POWER QUALITY

Time: 3 hrs

Max. Marks: 50

Note: Answer all question. All questions carry marks on the top. Assume suitable missing data, if any.

QNO1)

(a) Explain the working of UPQC and its use in Power quality issues.

(b) A single phase unified power quality compensator (UPQC) consisting of DSTATCOM and DVR using two VSC with DC bus capacitor is to be designed for 230 V 50Hz 23 A 0.8 pf(lag) as right hand UPQC-P. The UPQC-P is use to provide reactive power compensation for unity pf at AC mains with a constant regulated voltage of 230 V at 50 Hz across the load. There is a voltage sag of -20% in the supply system. Calculate the RMS current rating of DSTATCOM during the voltage sag condition

QNo2)

(a) A three phase star connected load Z_{LY}= 16-j12 ohm per phase has input AC line voltage 400V 50 Hz AC supply. Its is to be realised as unity power factor load on AC supply system while maintaining same terminal load voltage using PWM synchronous static series compensator (SSSC). Calculate (a) Current rating of Compensator (b) Voltage Rating of the compensator (c) VA rating of compensator.

(b) Explain the function of SSSC in the harmonic elimination in Power System

QNo3)

(a) Explain the function of Passive filters in eliminating harmonics

(b) A single phase three branch shunt passive filter is used in a single 220 V 50 Hz system to reduce the (3^{rd} and 5^{th})THD of supply current and to improve the displacement factor to unity. It has load of thyristor bridge converter operating at 45 deg firing angle and drawing constant current of 20A DC. Calculate the value (C_3,L_3,R_3 , C_5,L_5 & R_5)

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QNO4)

(a) How to design active power filter for harmonic elimination

(b) A single phase series active power filters is used to filter voltage harmonics in 230 V 50 Hz AC mains(13 % 3^{rd} , 8 % 5^{th} and 5% 7^{th}) present due to other loads and source impedence before it is connected to a critical linar load. The critical load draws 4 KW power at 0.8 PF(lag) when it is connected to 230V 50 Hz AC supply

QNO5)

(a) A three phase four wire series compensator consisting of lossless passive elements (L&C) is employed at 400V 50 Hz supply system to provide load and unity power factor of single phase 12 KW unity power factor load connected across line and neutral. Calculate the value of Delta (d) connected compensator in mF and mH

(b) A series active filter (consisting of a VSC with AC series inductor and DC bus capacitor) is used in series with single phase AC supply of 220 V 50 HZ feeding diode rectifier used for charging batteries at 264 V at 12 A average current to reduce the harmonics at AC main current and to almost maintain UPF (1) Calculate the RMS value of the voltage at input f the diode rectifier (2) The RMS voltage rating of APS

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

8th SEMESTER **B.Tech. (Evening)**

END TERM EXAMINATION ***May-2024***

COURSE CODE: CEE-424

COURSE TITLE: Flexible AC Transmission Systems

Time: 3 Hours *Max. Marks: 50*

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

Q.1 (a) Define 'FACTS'. Elaborate on the classification of FACTS controllers / FACTS devices. [1+2] [CO1]
(b) Draw a neat diagram of a SVC. How is a SVC better than a TCR ? Draw the V-I characteristics of a TCR and a SVC. [1+3+3] [CO2]

Q.2 (a) With neat diagrams, explain the function of the slope in the SVC V-I characteristics. [3] [CO2]
(b) Design an elementary single phase SVC with rating +4 kVAR, -3 kVAR, 230 V, 50 Hz. [7] [CO2]

Q.3 (a) Draw a neat schematic diagram of a STATCOM. What is the function of the DC side capacitor in a STATCOM ? [2+1] [CO3]
(b) Draw (i) the V-I characteristics and (ii) P-delta characteristics of a STATCOM and a SVC and explain how STATCOM is better than a SVC [4+3][CO2+CO3]

Q.4 (a) Which devices (IGBTs / diodes) are conducting when the STATCOM DC capacitor is (i) being charged (ii) being discharged. [3] [CO3]
(b) STATCOM is connected to a single-phase load bus. Draw the square wave STATCOM output voltage and sinusoidal current waveforms when the bus voltage is (a) high (b) low. Which parameter / factor needs to be controlled so that the square wave voltage waveforms are different in both the cases ? [7] [CO3]

Q.5. (a) Write an expression for the TCSC effective reactance X_{TCSC}. Draw the variation of the TCSC reactance X_{TCSC} with the firing angle α. Also show the different modes of operation of the TCSC. [3] [CO4]

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Q.5. (b) Draw the schematic diagram of a SSSC. Also write expressions of the power transfer P_{12} over a transmission line for (i) without any SSSC (ii) SSSC in inductive mode (iii) SSSC in capacitive mode. Also plot the power transfer versus load angle delta 'δ' for both cases. [7] [CO4]

Q.6. (a) Briefly explain, with diagrams, the function of the MOV in a TCSC. What is the range of values of $\sqrt{\frac{X_C}{X_L}}$ for the TCSC ? Why ? [3] [CO4]

(b) Draw a neat diagram depicting the physical connection of a SSSC to a transmission line, showing all three phases. [7] [CO4]

Q.7 (a) Draw the schematic diagram of a UPFC. With neat diagrams, explain briefly how a UPFC is better than a SSSC ? [3] [CO5]

(b) Draw a neat diagram depicting the physical connection of a UPFC to a transmission line, showing all three phases. [7] [CO5]

Q.8 Write short notes on (any two): 2 x [5]

(a)Physical connection of a STATCOM to a bus showing all 3 phases [5] [CO3]

(b) Harmonics and prevention in TCR [5] [CO2]

(c) Schematic diagram of a two converter IPFC [5] [CO5]

(d) maintaining 90° phase difference between injected voltage and line current in SSSC [5] [CO4]

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Total no. of Pages: 02

Roll no.....

8th SEMESTER

B.Tech.(Evening) EED

End TERM EXAMINATION May-2024

COURSE CODE CEE-426 COURSE TITLE Micro Grid and Smart Grid

Time: 03:00 Hours Max. Marks: 50

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

Q.1 Discuss the concept of microgrid. Draw a conceptual configuration of AC microgrid based on a case study involving at least a wind energy source, Solar photovoltaic system, battery energy storage system and diesel set. Also discuss its operation in grid tied as well as islanded mode of operation [3+3+4 = 10]

Q.2 What do you mean by active distribution network. Elaborate the various issues related to net metering and protection in active distribution network. [4+3+3 = 10]

Q3. Explain the concept of resilient and self-healing grid? Discuss the role of IED's in the transformation of conventional grid into a smart grid while accommodating the distributed energy resources. [5+5 = 10]

Q.4 Describe the systematic approach in managing the domestic load requirement through microgrid concept powered by SPV system. A computer and TV set are connected to the PV system. The computer, which has rated power 40 W, runs 2 hours per day and the TV set with rated power of 60 W runs for 3 hours per day in operation. If these loads are to be fed at 12V, then calculate the daily energy requirements of the devices expressed in DC Ah while considering 15% overall losses in system. If the equivalent sun hour on the same location are 3 hours, then determine the no. of solar panels required while assuming the rated current of 3.15 A at 12 V

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for each panel.

[5+5 = 10]

Q.5 Give a brief description on the grid integration of intermittent renewable energy sources. What kind of modification in the control of grid tied inverter is required to make it smart in terms of regulating its active as well as reactive power while compensating the load harmonics if any at the PCC.

[5+5 = 10]

Q.6 Write short note on any two:

I Advance metering infrastructure

II Demand side management and Load shaping

III PHEV

[5+5 = 10]

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Total No. of Pages ___

II SEMESTER **B.Tech [EE][PT]**

END TERM EXAMINATION MAY -2024

PAPER CODE: CEC-102 SUBJECT: ELECTRONIC DEVICES AND CIRCUITS

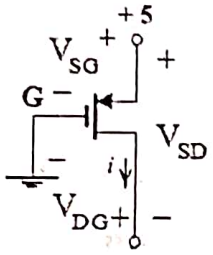
Time: 3 hrs *Max. Marks: 40*

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

QNO1)

(a) Discuss the V-I characteristics of a JFET. Explain the regions of forward and reverse bias

(b) An enhancement type PMOS transistor has k'(W/L)=80 μA/V^2 , Vt= 1-1.5 V, λ=-0.02 V^{-1}. The gate is connected to the ground and the source to +5V. Find the drain current for v_D=+4V , +1.5V, 0V and -5 V.



(04+04)

Fig(1)

QNO2) (08)

a) If the transistor has $V_t = 1$ V, and $k_n' = 2$ mA/V^2, verify that the bias circuit establishes $V_{GS} = 2$ V, $I_D = 1$ mA and $V_D = 7.5$ V.

b) Find g_m, and r_o if $V_A = 100$ V.

c) Find R_{in}, $\frac{v_{gs}}{v_{sig}}$, $\frac{v_o}{v_{gs}}$, $\frac{v_o}{v_{sig}}$.

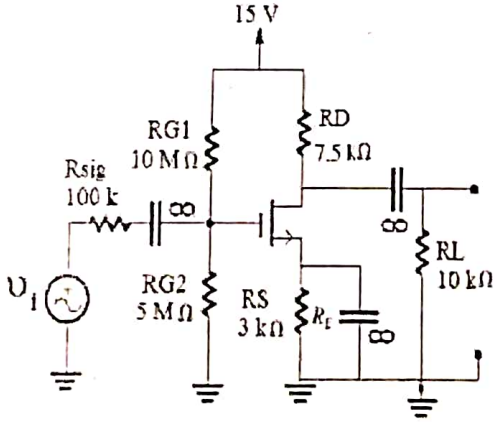


Fig No2

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QNO 3) (04+04)

(a) Explain the Hybrid model of CE type BJT amplifier.

(b) Determine the Q point values of I_D and V_{GS} of the network of the using characteristic equation in the Fig 3

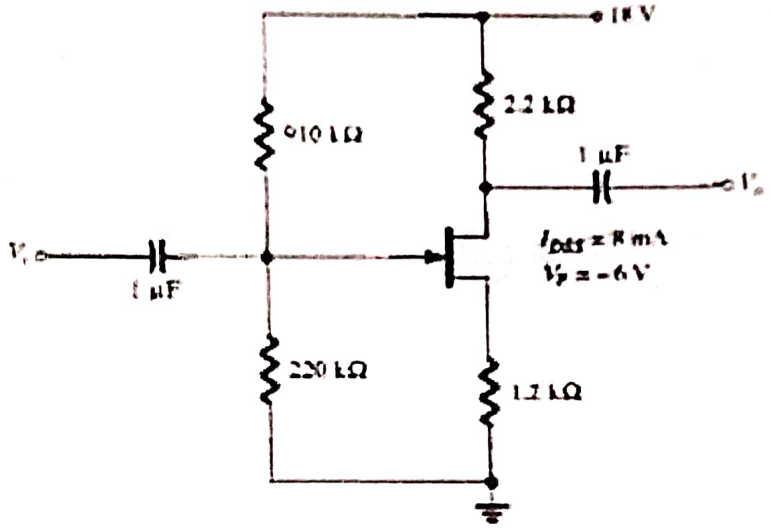


Fig 3

QNO4) (04+04)

(a)The input power to a device is 10,000W at a voltage of 1000V. The output power is 500W and the output impedance is 20Ω. A) Find the power gain in decibels. B) Find the voltage gain in decibels.

b) Explain the frequency response characteristics of CB type of BJT amplifier

QNO5) (04+04)

(a) Discuss the different modes of operation of a MOSFET: cutoff, active, and saturation. Explain how the biasing conditions affect these modes.

(b) Explain the concept of JFET biasing. Discuss the importance of biasing in ensuring proper amplifier operation and stability.

Total No. of Pages:02 Roll no. 497

VI SEMESTER

B.Tech. (Evening)

END TERM EXAMINATION ***May -2024***

CEC302 Microwave Engineering

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

Note: Attempt any 5 questions. All questions carry equal marks
Assume suitable missing data, if any.

Q.1 a) What are the properties of scattering matrix? Explain them with suitable expressions [4M] [CO2]

b) If a microwave having a frequency of 10 GHz is moving out with speed of light, calculate the corresponding wavelength. [2M] [CO1]

c) Give two applications of microwaves where the shorter wavelength can be used. [2M][CO1]

Q.2 a) Construct an isolator using three port circulator. Find the *S* matrix for a matched isolator having an insertion loss of 0.5 dB and an isolation of 25 dB. [3M] [CO2]

b) A signal power 32mW is fed into one of the collinear ports of loss less H-Plane Tee. Determine the powers in the remaining ports when other ports are terminated by means of matched load [2M] [CO3]

c) Explain the working of a two-hole directional coupler with a neat diagram [3M] [CO 3]

Q.3 a) Derive the equation of velocity modulation for a two-cavity Klystron amplifier. [4M][CO4]

b) Explain the construction and operation of Reflex Klystron Oscillator [4M][CO4]

[PTO]

Q.4 a) With schematic diagram, explain the working of travelling wave tube [3M][CO4]

b) An X-band pulsed cylindrical 8-cavity magnetron has V_0= 30 kV, I_0= 80 Amp, B_0=0.01 $\frac{wb}{m^2}$, cathode radius a =4cm and radius of the vane edge center b=8 cm. Calculate i) Cyclotron angular frequency ii) Hull Cut-off voltage iii) Hull Cut-off magnetic flux density iv) Phase difference between adjacent resonators in general. v) Value of integer (n) for the most dominant mode. [5M] [CO4]

Q.5 a) A microwave tunnel diode has a negative resistance R_n and circuit resonance has a circuit resistance R_l. Derive an equation for the gain of a microwave tunnel diode amplifier. [2M] [CO5]

b) Explain the construction details of varactor diode and draw its equivalent circuit [2M][CO5]

c) A Gunn diode has the following parameters: electron drift velocity, v_d=2.5 x10^5 m/sec, negative electron mobility, μ_n= 0.015 m^2/Vs, relative dielectric constant, and ε_r = 13.1. Determine, the criterion for classifying the modes of operation. [4M] [CO5]

Q.6 a) How is plasma trapped in a TRAPATT diode? Why is the operating frequency of this diode lower than IMPATT? Give its major merits and demerits. [4M] [CO5]

b) Determine transit time of the carriers and operating frequency of the IMPATT diode. If an IMPATT diode has drift length of 4 μm and v_d=10^6 m/sec. [2M] [CO5]

c) Determine S-Matrix for magic ring [2M] [CO3]

**********END**********

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Total no. of Pages:01

Roll no.....

VI-SEMESTER

B.Tech. Evening

END TERM EXAMINATION *May-2024*

COURSE CODE-CEC304 **COURSE TITLE-EMBEDDED SYSTEM**

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

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

Q.1 Define following terms [10] [CO1, CO2, CO3]
(i) Embedded Systems Characteristics
(ii) Common Computer Architectures
(iii) PIC Instruction Set
(iv) Software Interrupt Instruction (SWI)
(v) Super Harvard Architecture (SHARC)

Q.2 Draw and explain the TMS320C55x architecture with buses organization. [5] [CO2]

Q.3 Define Digital Signal Processor (DSP) and explain a real-life DSP application. [5] [CO3]

Q.4 What is System on Chip (SoC) design and explain different SoC designs. [5] [CO3]

Q.5 Draw 6T-SRAM cell architecture and explain its read and write operations using suitable example. [5] [CO4]

Q.6 Explain I2C protocol and its data transmission procedure by suitable example. [5] [CO5]

Q.7 Describe digital multimedia processor with architecture and peripherals. [5] [CO5]

Total no. of Pages: 4 Roll no.....

VI SEMESTER

B.Tech.(Eve.)(ECE)

END TERM EXAMINATION ***May-2024***

CEC 312 Software Defined Radio and Cognitive Radio

Max. Marks: 50 **Exam Duration: 3 Hours**

Note: Attempt any 2 questions in Part-A and attempt any 6 questions in Part-B. Table for Q-Function is provided for reference. Use suitable assumptions.

PART A : ATTEMPT ANY TWO QUESTIONS :: [10*2=20 Marks]

Q1) A genetic algorithm uses chromosomes of the form x = abcdefgh with a fixed length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of individual x be calculated as:

[10 Marks, CO4]

$$f(x) = (a + b) - (c + d) + (e + f) - (g + h)$$

and let the initial population consist of four individuals with the following chromosomes:

x1 = 6 5 4 1 3 5 3 2 x2 = 8 7 1 2 6 6 0 1

x3 = 2 3 9 2 1 2 8 5 x4 = 4 1 8 5 2 0 9 4

a) Evaluate the fitness of each individual, and arrange them in order with the fittest first and the least fit last.

b) Perform the following crossover operations:

i) Cross the fittest two individuals using one–point crossover at the middle point.

ii) Cross the second and third fittest individuals using a two–point crossover points b and f.

iii) Cross the first and third fittest individuals (ranked 1st and 3rd) using a uniform crossover.

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c) Suppose the new population consists of the six offspring individuals received by the crossover operations in the above question. Evaluate the fitness of the new population. Has the overall fitness improved?

d) By looking at the fitness function and considering that genes can only be digits between 0 and 9 find the chromosome representing the optimal solution (i.e. with the maximum fitness), find the value of the maximum fitness.

e) By looking at the initial population of the algorithm comment whether it will be able to reach the optimal solution without the mutation operator?

Q2) Consider the binary hypothesis problem with received conditional probabilities **[10 Marks, CO3]**

$$f_{Y|H_0}(y|H_0)=\frac{1}{2(1-e^{-1})}e^{-|y|} \text{ for } |y|\le 1 \text{ and } f_{Y|H_1}(y|H_1)=\frac{1}{2}\text{rect}\left(\frac{1}{2}\right)$$

The hypotheses H_0 and H_1 are equally likely.

a) Obtain the likelihood ratio test and the threshold through Neyman Pearson method.

b) Calculate the probability of false alarm P_F

c) Calculate the probability of missed detection P_M

d) Defining probability of error metric as $P(\varepsilon) = P_0P_F + P_1P_M$, calculate the $P(\varepsilon)$.

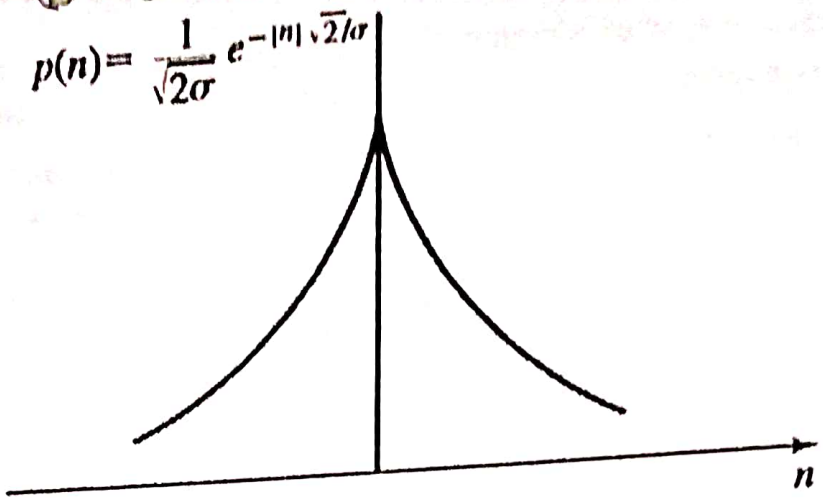
Q.3A) Consider a signal detector with an input **[5 Marks CO4]**

$$r = \pm A + n$$

where +A and -A occur with equal probability and the noise variable n is characterized by the (Laplacian) pdf shown.

The average probability of error is

$$P(e) = \frac{1}{2}P(e|A) + \frac{1}{2}P(e|-A)$$



1. Calculate P(e| +A) and P(e| – A) probability of error as a function of the parameters A and σ.
2. Calculate the noise variance σ^2.
3. Determine the SNR required to achieve an error probability of 10^{-5}.

Q.3B) Binary PSK scheme is used for transmitting information over an AWGN with power-spectral density of $No/2 = 10^{-10}$ *W/Hz*. The transmitted signal energy is $Eb = A^2T/2$, where T is the bit interval and A is the signal amplitude. Determine the signal amplitude required to achieve an error probability of 10^{-6} , if the data rate is

(i) 10 kbps, (ii) 100 kbps, (ii) 1 Mbps. **[5 Marks, CO2]**

PART B: ATTEMPT ANY 6 QUESTIONS :: [5*6=30 MARKS]

Q4) With reference to genetic algorithms, explain: **[5 Marks, CO4]**

a) Encoding b)Fitness Function c) Selection d)Crossover e)Mutation

Q5) With reference to spectrum opportunity, explain the process of spectrum opportunity detection and Listen Before Talk (LBT) methodology. **[5 Marks, CO3]**

Table 1: Values of $Q(x)$ for $0 \leq x \leq 9$

x	$Q(x)$	x	$Q(x)$	x	$Q(x)$	x	$Q(x)$
0.00	0.5	2.80	0.010724	4.55	2.6823×10^{-6}	6.80	5.231×10^{-12}
0.05	0.480061	2.85	0.0093867	4.60	2.1125×10^{-6}	6.85	3.6925×10^{-12}
0.10	0.46017	2.90	0.0081975	4.65	1.6597×10^{-6}	6.90	2.6001×10^{-12}
0.15	0.440382	2.95	0.0071428	4.70	1.3008×10^{-6}	6.95	1.8264×10^{-12}
0.20	0.42074	3.00	0.0062097	4.75	1.0171×10^{-6}	7.00	1.2798×10^{-12}
0.25	0.401294	3.05	0.0053861	4.80	7.9333×10^{-7}	7.05	8.9459×10^{-13}
0.30	0.382089	3.10	0.0046612	4.85	6.1731×10^{-7}	7.10	6.2378×10^{-13}
0.35	0.36317	3.15	0.0040246	4.90	4.7918×10^{-7}	7.15	4.3389×10^{-13}
0.40	0.344578	3.20	0.003467	4.95	3.7107×10^{-7}	7.20	3.0106×10^{-13}
0.45	0.326355	3.25	0.0029798	5.00	2.8665×10^{-7}	7.25	2.0839×10^{-13}
0.50	0.308538	3.30	0.0025551	5.05	2.2091×10^{-7}	7.30	1.4388×10^{-13}
0.55	0.29116	3.35	0.002186	5.10	1.6983×10^{-7}	7.35	9.9103×10^{-14}
0.60	0.27425	3.40	0.0018658	5.15	1.3024×10^{-7}	7.40	6.8092×10^{-14}
0.65	0.257846	3.45	0.0015889	5.20	9.9644×10^{-8}	7.45	4.667×10^{-14}
0.70	0.24196	3.50	0.0013499	5.25	7.605×10^{-8}	7.50	3.1909×10^{-14}
0.75	0.226627	3.55	0.0011442	5.30	5.7901×10^{-8}	7.55	2.1763×10^{-14}
0.80	0.211855	3.60	0.0009676	5.35	4.3977×10^{-8}	7.60	1.4807×10^{-14}
0.85	0.197662	3.65	0.00081635	5.40	3.332×10^{-8}	7.65	1.0049×10^{-14}
0.90	0.184060	3.70	0.00068714	5.45	2.5185×10^{-8}	7.70	6.8033×10^{-15}
0.95	0.171056	3.75	0.00057703	5.50	1.899×10^{-8}	7.75	4.5946×10^{-15}
1.00	0.158655	3.80	0.00048342	5.55	1.4283×10^{-8}	7.80	3.0954×10^{-15}
1.05	0.146864	3.85	0.00040406	5.60	1.0718×10^{-8}	7.85	2.0802×10^{-15}
1.10	0.135674	3.90	0.00033693	5.65	8.0224×10^{-9}	7.90	1.3945×10^{-15}
1.15	0.125072	3.95	0.00028029	5.70	5.9904×10^{-9}	7.95	9.3256×10^{-16}
1.20	0.115070	4.00	0.00023263	5.75	4.4622×10^{-9}	8.00	6.221×10^{-16}
1.25	0.105650	4.05	0.00019262	5.80	3.3157×10^{-9}	8.05	4.1397×10^{-16}
1.30	0.09680	4.10	0.00015911	5.85	2.4579×10^{-9}	8.10	2.748×10^{-16}
1.35	0.088508	4.15	0.00013112	5.90	1.8175×10^{-9}	8.15	1.8196×10^{-16}
1.40	0.080757	4.20	0.0001078	5.95	1.3407×10^{-9}	8.20	1.2019×10^{-16}
1.45	0.073529	4.25	8.8417×10^{-5}	6.00	9.8659×10^{-10}	8.25	7.9197×10^{-17}
1.50	0.066807	4.30	7.2348×10^{-5}	6.05	7.2423×10^{-10}	8.30	5.2056×10^{-17}
1.55	0.060571	4.35	5.9059×10^{-5}	6.10	5.3034×10^{-10}	8.35	3.4131×10^{-17}
1.60	0.054799	4.40	4.8096×10^{-5}	6.15	3.8741×10^{-10}	8.40	2.2324×10^{-17}
1.65	0.049471	4.45	3.9076×10^{-5}	6.20	2.8232×10^{-10}	8.45	1.4565×10^{-17}
1.70	0.044565	4.50	3.1671×10^{-5}	6.25	2.0523×10^{-10}	8.50	9.4795×10^{-18}
1.75	0.040059	4.55	2.5609×10^{-5}	6.30	1.4882×10^{-10}	8.55	6.1544×10^{-18}
1.80	0.03593	4.60	2.0658×10^{-5}	6.35	1.0766×10^{-10}	8.60	3.9858×10^{-18}
1.85	0.032157	4.65	1.6624×10^{-5}	6.40	7.7688×10^{-11}	8.65	2.575×10^{-18}
1.90	0.028717	4.70	1.3346×10^{-5}	6.45	5.5925×10^{-11}	8.70	1.6594×10^{-18}
1.95	0.025588	4.75	1.0689×10^{-5}	6.50	4.016×10^{-11}	8.75	1.0668×10^{-18}
2.00	0.02275	4.80	8.5399×10^{-6}	6.55	2.8769×10^{-11}	8.80	6.8408×10^{-19}
2.05	0.020182	4.85	6.8069×10^{-6}	6.60	2.0558×10^{-11}	8.85	4.376×10^{-19}
2.10	0.017864	4.90	5.4125×10^{-6}	6.65	1.4655×10^{-11}	8.90	2.7923×10^{-19}
2.15	0.015778	4.95	4.2935×10^{-6}	6.70	1.0421×10^{-11}	8.95	1.7774×10^{-19}
2.20	0.013903	5.00	3.3977×10^{-6}	6.75	7.3923×10^{-12}	9.00	1.1286×10^{-19}
2.25	0.012224						

Total no. of Pages: 02 Roll No. 563

VI SEMESTER **B.Tech (Electronics & Communication Engineering)**

END TERM EXAMINATION ***May-2024***

CEC-330 DIGITAL IMAGE PROCESSING

Time: 03 Hours *Max. Marks: 50*

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

Q.1[a] Define the spatial resolution and the frequency resolution of image. Calculate the frequency resolution of image along x-axis if M = 50 and Δx = 0.2. **[5][CO2]**

[b] What is the periodical noise of image? Why is frequency domain filtering required to clean the periodical noise of image? **[5][CO3]**

Q.2[a] Apply histogram equalisation to given image with 4 bits per pixel

$$\begin{bmatrix} 7 & 1 & 5 & 1 \\ 3 & 0 & 0 & 6 \\ 2 & 4 & 4 & 7 \\ 4 & 0 & 1 & 3 \end{bmatrix}$$

[5] [CO2]

[b] What are the separable filters? Explain the advantages of separable filters.

Q.3[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][CO3]**

[b] Write the matrix of cleaned image in case of 3 x 3 windows based (i) median filter and (ii) mid-point filter are applied on given noisy image. **[5][CO3]**

1	2	5	7	11
5	3	4	2	1
5	(0)	(31)	6	3
1	7	3	(25)	2
2	1	1	3	4

Noisy pixels are indicated by circle and apply filter on noisy pixels only.

Q.4[a] Explain the properties of the mask, used in following cases:

i. Horizontal line detection
ii. Vertical line detection
iii. + 45° line detection
iv. - 45° line detection

[5][CO4]

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[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][CO

Q.5[a] Explain, how thresholding can be used for image segmentation? [4][CO4]

[b] For given A and B, calculate (i) Dilation of A by B and (ii) Erosion of by B.

$$A = \begin{bmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \end{bmatrix}$$

[5][CO5]

Q.6[a] Compare the first order and second order edge detection methods. [5][CO5]

[b] What are the applications of Dilation and Erosion operators? For given A and B (As in 5[b]), calculate (i) Internal Boundary of A (ii) External Boundary of A and (iii) Morphological Gradient of A. [5][CO

Total No. of Pages: One

Roll No:_____

8TH SEMESTER

B.Tech.

END TERM EXAMINATION

May-2024

COURSE CODE: CEC402

COURSE TITLE: RADAR & SATELLITE COMMUNICATION

Time: 3 Hours *Max. Marks: 40*

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

1. What do you mean by wave propagation? How atmosphere affects the wave propagation? [4] [CO1]
2. Drive an expression for radar range equation. Differentiate between basic radar range equation for monostatic and bistatic radar systems. [4] [CO1]
3. What is minimum detectable signal? Discuss the various techniques for signal detection. [4] [CO1]
4. What is the correlation between receiver noise and SNR? How it is calculated for radar systems? [4] [CO1]
5. Explain different types of systems losses in case of radar systems. [4] [CO1]
6. Draw the block diagram for Moving Target Indicator [MTI] radar? Describe its working. [4] [CO2]
7. What is a delay line canceller? Why it is required? [4] [CO2]
8. State Kepler three Laws of Planetary motion. Illustrate in each case their relevance to artificial satellites orbiting the earth. [4] [CO3]
9. What are the factors that affect the uplink and down link design in geostationary satellite system? Discuss in detail. [4] [CO4]
10. Explain the principle behind Spectrum spreading and de-spreading and how this is used to minimize interference in CDMA system. [4] [CO5]
11. Describe the operation of typical VSAT system. State briefly where VSAT systems and find widest applications. [4] [CO4]
12. Write short notes on:
    A. Integration of pulses [4] [CO1]
    B. Pulse Repetition Frequency [PRF] [4] [CO1]
    C. TDMA [4] [CO5]

Total no. of Pages: 4 Roll no.....

End Term Examination **May 2024**

CEC410 Advanced Coding Theory

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

Note : Attempt any 5 Questions

Q1)

a) Consider the set of integers G=[0,1,2,3,4]. We denote two operations namely modulo-5 addition and multiplication. Show that the set G is an additive group under Modulo-5 addition and multiplicative group under Modulo-5 multiplication. **[4 Marks CO3]**

b) Let L = (0, 1) and consider two distributions p and q on L. Let p(0) = 1 - r, p(1) = r, and let q(0) = 1 - s, q(1) = s. Obtain the KL Distance for **[4 Marks, CO2]**

(i) D(p||q)
(ii) D(q||p)

Q2)

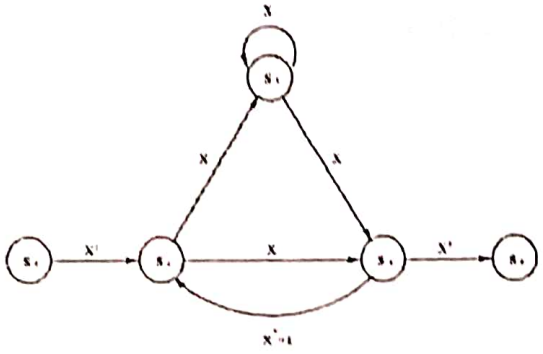
a) For a binary symmetric communication channel whose input source is the alphabet X = {0, 1} with probabilities {0.5, 0.5} and whose output alphabet is Y = {0, 1}, having the following channel matrix where € is the probability of transmission error: **[4 Marks, CO2]**

$$\begin{pmatrix} 1-\epsilon & \epsilon \\ \epsilon & 1-\epsilon \end{pmatrix}$$

(i) How much uncertainty is there about the input symbol once an output symbol has been received?
(ii) What is the mutual information I(X; Y) of this channel?
(iii) What value of ε maximises the uncertainty H(X|Y) about the input symbol given an output symbol?

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b) For a modified state diagram of the (2,1,2) convolutional code given below, find the weight enumerating function and obtain the transfer function using Masons Gain formula. **[4 Marks, CO4]**



Q3)

a) The parity check matrix H of LDPC code is given below:

[4 Marks, CO4]

$$H = \begin{bmatrix} 1 & 0 & 1 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 1 & 0 \end{bmatrix}$$

i.) Determine the degree of rows and column
ii.) State whether the LDPC code is regular or irregular
iii.) Determine the rate of the LDPC code
iv.) Draw the tanner graph representation of this LDPC code.

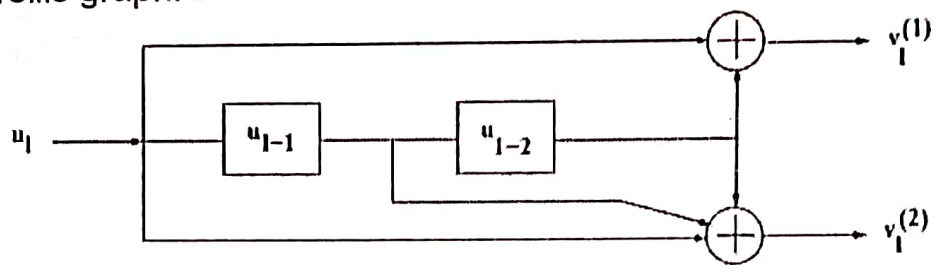
b) For a (7,4) cyclic codeword, the cyclic code with the generator polynomial $g(X)=1+X+X^3$. Using syndrome circuit, calculate the contents of the register and hence the syndrome for for the received codeword r=[0010110]. **[4 Marks, CO3]**

Q4)

a) Calculate the efficiency of Huffman Coding for the following symbol probabilities : **[4 Marks, CO2]**

P(x1)	0.3
P(x2)	0.25
P(x3)	0.2
P(x4)	0.12
P(x5)	0.08
P(x6)	0.05

b) A (2, 1, 2) convolutional code with L = 5 is used on a BSC. Decode the received sequence r = (01, 11, 10, 10, 00, 11, 10) using Viterbi Decoding algorithm and hence find the transmitted codeword using Trellis graph. **[4 Marks, CO4]**



Q5)

a) For a (7,4) linear code, the generator matrix G is described by **[4 Marks, CO3]**

$$G=\begin{bmatrix} 1 & 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

(i) Obtain the encoding circuit and find the transmitted codeword for message 1011

(ii) Obtain the syndrome and hence the correct codeword for the received codeword r=[1001001]

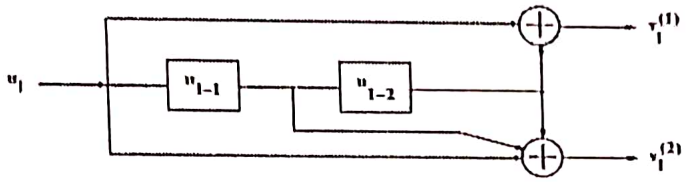
b) In the context of 5G network encoding, let B be a base graph defined as **[4 Marks, CO4]**

$$B = \begin{bmatrix} 2 & -1 & 3 & -1 & -1 & 2 \\ 0 & 2 & 1 & 2 & 1 & 0 \\ 1 & 3 & 0 & 0 & 1 & 3 \end{bmatrix}$$

Obtain a H matrix for LDPC Code with lifting size 4.

Q6)

a) Obtain the state diagram for the (2,1,2) convolutional code given below **[4 Marks, CO4]**



b) Explain the following : **[4 Marks, CO2]**

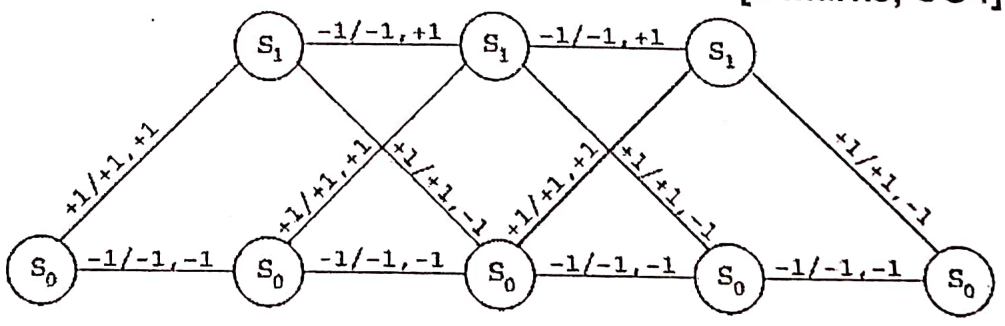
(i) Source Coding Theorem

(ii) Channel Coding Theorem

Q7) Consider the (2, 1, 1) systematic recursive convolutional code with generator matrix G(D) = [1 1/(1 + D)]. We assume an AWGN channel with SNR of Es/N0 = 1/4 (−6.02dB). The received vector normalized by √Es is given by

$$\begin{aligned} \mathbf{r} &= (r_0, r_1, r_2, r_3) = (r_0^{(0)}, r_0^{(1)}; r_1^{(0)}, r_1^{(1)}; r_2^{(0)}, r_2^{(1)}; r_3^{(0)}, r_3^{(1)}) \\ &= (+0.8, +0.1; +1.0, -0.5; -1.8, +1.1; +1.6, -1.6). \end{aligned}$$

Using BCJR decoding algorithm for the given trellis structure, compute the APP L-values and hence find out the transmitted codeword. **[8 Marks, CO4]**



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Total No. of Pages 02 Roll no.....

VIII[th] SEMESTER

B.Tech. (Eve)

END TERM EXAMINATION *May-2024*

COURSE CODE CEC412 COURSE TITLE Machine Learning

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

Note: Question No. 1 is compulsory
Attempt any other FIVE questions.
Assume suitable missing data, if any.

Q.1 Answer all the following questions:

a) What is the role of pre-processing of data in machine learning? Why is it needed? [3] [CO1]

b) Define (i) Prior Probability (ii) Conditional Probability (iii) Posterior Probability [3] [CO2]

c) Explain the unsupervised model of machine learning in detail with an example. [3] [CO3]

d) Implement an artificial neural network to approximate a Boolean function having a 3-input gate. The output of the gate is 1 if at least two of the three inputs are 1, and 0 otherwise. [3] [CO4]

e) Explain the various stages involved in designing a learning system. [3] [CO5]

Q.2 a) What is the likelihood? Difference between likelihood and probability density function. [3] [CO2]

b) Given the set of values $X = (3, 9, 11, 5, 2)^T$ and $Y = (1, 8, 11, 4, 3)^T$. Evaluate the regression coefficients. What is the value of variable Y when $X = 7$? [4] [CO2]

Q.3 a) Write down the major differences between K-means clustering and hierarchical clustering [3] [CO3]

b) Describe the significance of soft margin hyperplane and explain how they are computed. [4] [CO3]

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Q.4 Given a 3 × 3 covariance matrix $\begin{bmatrix} 1 & 0.5 & 0 \\ 0.5 & 0.333 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ calculate the eigen values and eigen vectors using the characteristic equation. Using the eigen vectors obtained, apply the PCA on two data points $X_1 = (2, 3, 3)^T$ and $X_2 = (4, 1, 0)^T$ to reduce the dimensions from 3 to 2. You can use the 2 eigen vectors corresponding to the top 2 eigen values. [7] [CO3]

Q.5 a) Define Hidden Markov Model. What is meant by evaluation problem and how is this solved? [3] [CO3]

b) A decision tree classifier is used to predict the failure mode of a boiler system with a dataset of 300 samples, where 200 samples indicate normal operation and 100 samples indicate tube leakage. What is the entropy of the classifier? [4] [CO3 & CO5]

Q.6 a) Discuss the recent trends in various learning techniques of machine learning? [3] [CO5]

b) Suppose 10000 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 precision and recall for the data. [4] [CO1 & CO5]

Q.7 a) Explain how does Reinforcement Learning Work. State key constituents of reinforcement learning. [3] [CO4]

b) Consider a multilayer feed-forward neural network given below. Let the learning rate be 0.5. Assume initial values of weights and biases as given in the figure below. Train the network for the training tuples *(1, 1, 0)* and *(0, 1, 1)*, where last number is target output. Show weight and bias updates by using back-propagation algorithm. Assume that sigmoid activation function is used in the network. [4] [CO4]

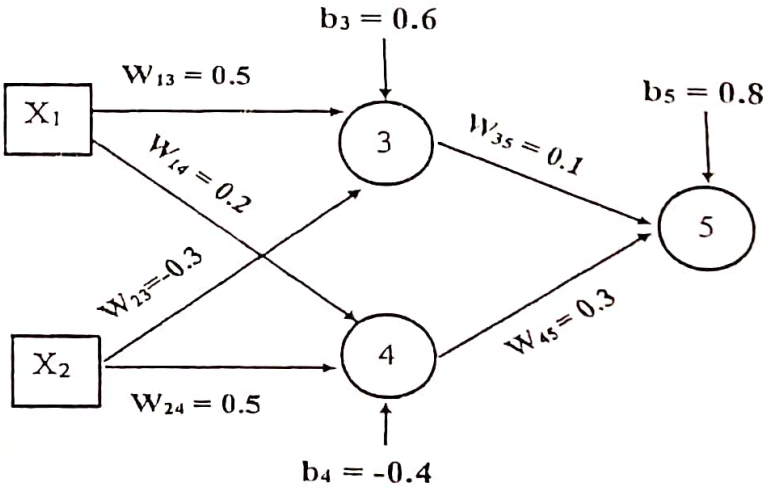


Fig.1. Neural Network

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

Fourth SEMESTER

B.Tech. (Eve)

END TERM EXAMINATION May-2024

CHU 202 Engineering Economics

Time: 3:00 Hours Max. Marks: 50

Note : Attempt any 5 questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 Define:

a) Cash Reserve Ratio
b) Statutory Liquidity Ratio
c) Repo Rate
d) Reverse Repo Rate [2.5 *4 = 10] [CO1]

Q.2 Attempt both parts:

a. Define the concept of credit creation.
b. Define monopoly market with its characteristics. [5*2 = 10][CO3]

Q.3 How does international trade contribute to economic growth and development? [10] [CO2]

Q.4 Define elasticity of demand with appropriate examples and how is it calculated. [10] [CO4]

Q.5 Define inflation and its causes. [10] [CO2 & 3]

Q.6 What are the main sectors contributing to the GDP of the Indian economy and what are their respective contributions? [10] [CO4]

Q.7 Explain the concept of total product, marginal product and average product with respect to the production function with appropriate example. [10] [CO2]

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Total No. of Pages-01 Roll no.....

B. TECH. (CONTINUING EDUCATION)

END TERM EXAMINATION MAY 2024

COURSE CODE - CMG-102

COURSE TITLE – FUNDAMENTALS OF MANAGEMENT

Time: 03 Hours Max. Marks: 50

Note: Answer Any Five Questions. Each Question carry 10 marks. Assume suitable missing data, if any.

Q-1- Explain the importance of Customer Life Time Value for an organization with the support of suitable examples? [CO1, CO2]

Q-2- Discuss the motivational techniques employed by the promoter of a startup to motivate the employees? [CO2, CO3]

Q-3- Discuss the challenges faced by the Government of India to implement E-Governance initiatives in India? [CO3, CO4]

Q-4- How Fast Moving Consumer Goods companies are using unethical marketing in today's competitive environment? [CO1, CO2, CO3]

Q-5- What do you understand by Knowledge Economy? Explain with the support of suitable examples? [CO1, CO2, CO3]

Q-6- How Indian companies are adopting Corporate Social Responsibility for the benefit of society? [CO2, CO3]

Q-7- Discuss the various components of Business Environment with the support of suitable examples? [CO2, CO3, CO4]

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Total No. of Pages (02) Roll No. .....

SIXTH SEMESTER **B.Tech. (Evening-ME)**

END-TERM EXAMINATION *May-2024*

CME-302 PRODUCTION MANAGEMENT

Time: 3:00 Hours Max. Marks: 40

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

1. [a] Explain various factors that influence the productivity of a firm. (4)
   [b] Discuss briefly various types of organizatsional structures followed in industry. (4)

2. [a] Classify various production systems and give its examples. (4)
   [b] Discuss various product design characteristics. (4)

3. [a] Discuss various types of time series moving average forecasting methods. (4)
   [b] The research department of M/s Hindustan lever has recommended to the marketing department to launch a shampoo of three different types. The marketing manager has to decide one of the types of shampoo to be launched under the following estimated payoffs for various levels of sales:

Types of shampoo	Estimated level of sales		
	High	Medium	Low
Egg shampoo	30	10	10
Clinic shampoo	40	15	5
Delux shampoo	55	20	3

   What will be the marketing manager's decision if regret criteria is applied? (4)

4. [a] What is wage differential? Discuss the reasons of wage differentials. (4)
   [b] Write short notes on job rating and merit rating systems. (4)

5. [a] Discuss Maslow's theory of motivation. (4)

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[b] A manufacturing concern is considering replacement of a mini lathe machine which costs Rs. 1, 25, 000. The estimated resale value and the maintenance cost (in 000s of rupees) of the machine, based on past experience with similar machines are given in the following table. When should the machine be replaced? (4)

Year →	1	2	3	4	5	6
Resale value (in thousand Rs)	100	80	60	40	30	20
Maintenance cost (in thousand Rs)	2	5	8	12	18	25

6. [a] For the data given in Table below. Draw the network diagram. (4)

Activity	A	B	C	D	E	F	G	H
Predecessors	-	-	A	A	C	D	B	E,F,G
Time (weeks)	3	4	5	6	7	8	9	3

[b] Find critical path and project completion time using CPM. (4)

7. [a] What are the advantages of project management? Differentiate between PERT and CPM. (4)

[b] Aircraft arrive at an average interval of 20 minutes. They are unloaded in an average time of 15 minutes per aircraft. Assuming that the inter-arrival time and the unloading time distribution is exponential. Calculate the average number of aircraft in the queue and the average number of aircraft in the system. (4)

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

VI SEMESTER B.Tech. (Eve)

END TERM EXAMINATION May-2024

CME-306 NON-CONVENTIONAL ENERGY SOURCES

Time: 03:00 Hours Max. Marks: 50

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

Q.1 Write the advantages and disadvantages of a concentrating collector over a solar flat plate collector with the help of a schematic diagram. [10][CO#01]

OR

Q.1 Use following data to calculate the overall loss coefficient of the flat plate collector: [10][CO#1]

Size of absorber plate: 2.15m ×1.15 m
Spacing between absorber plate and 1st glass cover: 5 cm
Spacing between 1st and 2nd glass cover: 5 cm
Glass cover emissivity: 0.85
Plate emissivity: 0.90
Mean plate temperature: 75°C
Ambient air temperature: 20°C
Collector tilt: 30°
Wind speed: 3 m/s
Back insulation thickness: 8 cm
Side insulation thickness: 4 cm
Thermal conductivity of insulation: 0.035 W/m-K

Q.2 What are the main elements of PV system? Explain the I-V characteristics of solar cell and define fill factor. What is significance of fill factor [10][CO#2]

OR

Q.2b Using Betz model of wind turbine, drive expression for power extraction from wind. What maximum theoretical power that can be extracted and under what condition? [10][CO#3]

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Q.3 Calculate the rotor radius for a wind turbine operating at wind speed of 7m/sec to pump water at a rate of $5m^3/h$ with a lift of 4 m. Also calculate the angular velocity of the rotor. Assume following: Water density=1000kg/m^3, g=9.8m/sec^2, Water pump efficiency=45%, Efficiency of rotor to pump=75%, Power coefficient=0.3, Tip speed ratio=1.0, Air density=1.2 kg/m^3. [10][CO#3]

OR

Q.3 Describe Binary fluid hydrothermal system with neat sketch. Also discuss its main advantages and disadvantages [10][CO#3]

Q.4 With the help of neat diagram explain the layout of a typical micro hydro plant. [10][CO#4]

OR

Q.4 Explain the process of production of biogas from biomass. What are the main advantages of anaerobic digestion of biomass? [10][CO#4]

Q.5a A deep ocean wave of 2.5m peak to peak appears at a period of 8sec. 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. Draw a schematic layout of linked basin tidal plant and explain its operation. [5][CO#5]

OR

Q5. Write short note on the following: (ANY FIVE) [2×5=10]

a) Solar Photovoltaic Power Generation

b) Concentrated Solar Power

c) Solar space heating

d) Ocean Thermal Energy Conversion Technology

e) Wave Energy

f) Close cycle MHD

g) Fuel cell [CO#1, 2, 3, 4, 5]

Total No. of Pages : 1 Roll No. 516

VI SEMESTER B TECH EVENING

END SEMESTER EXAMINATION May. 2024

CME-308 –INTERNAL COMBUSTION ENGINES

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

Note: 1.Answer ANY FIVE questions.
2. Answer to each question (or its parts/Subparts) must start On a fresh page.
3. Draw properly labeled diagrams wherever required.
4. All questions carry EQUAL marks.

1. a. Explain the principle of working of IC Engines also give their classification. [5][CO1]

   b. Discuss the abnormal combustion in SI engines. Explain with p-theta diagram. [5][CO2]

2. a. Explain the various factors affecting the delay period and briefly describe how it affects the diesel knock. [5] [CO3]

   b. Discuss the design of the combustion chamber for IC engines and describe its various common types. [5] [CO3]

3. a. Why we need a fuel injector in an IC engine? explain the various diesel fuel injector nozzles. [5] [CO4]

   b. Explain the utility of MPFI and CRDI in IC Engines, also describe their advantages [5] [CO4]

4. a. Explain the modifications required to convert a CI engine for CNG operation. Discuss its advantages and limitations. [5] [CO6]

   b. Explain the process for performance testing of IC Engines and discuss various equipment's required for it. [5] [CO5]

5. a. Explain the process for production of biogas and discuss its uses, advantages and limitations. [5] [CO4]

   b. A 4 cylinder 4stroke SI engine running at 1200 rpm delivers 20kW. The average torque when one cylinder was cut is 110Nm. Find the indicated thermal efficiency, if the calorific value of the fuel is 44MJ/kg and the engine uses 350 grams of petrol per kWh. [5] [CO5]

6. Write short notes on the following: ANY FIVE

   i. Necessity of engine cooling ii) Flex fuel engines iii) ignition leg
   iv) Hydrogen as fuel v)Valve Vs Ports vi) supercharger
   vii) Fuel knock ratings Y iii) GDI [2x5][CO1-6]

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Total No.of pages 1 Roll No.....

B. TECH (C) MAY 2024

END SEMESTER EXAMINATION

CME 314 SUPPLY CHAIN MANAGEMENT

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

Note: Answer ANY FIVE questions only
Assume suitable missing data, if any

1. What do you mean by supply chain management? Explain the upstream supply chain and downstream supply chain with an example. (Marks 10) (CO#1)
2. Discuss the role of each driver in creating a strategic fit between the supply chain and competitive strategies. (Marks 10) (CO# 2)
3. Discuss the global supply chain strategy in detail.(Marks 10) (CO# 3)
4. Discuss the MRP in Manufacturing planning and control system. (Marks 10) (CO# 3,4)
5. (a) What would you expect to find as the predominant type of inventory in the following business. (i) Biscuits (ii) make-to-order premium car. (Marks 2) (CO#4)

(b) The demand for an item is deterministic and constant over time, and it is equal to 600 units per year. The per unit cost of the item is Rs.50, while the cost of placing an order is Rs.5. The inventory carrying cost is 20% of the inventory per annum, and the cost of shortage is Rs 1 per unit per month. Find the optimal ordering quantity when stockouts are permitted. If the stockouts are not permitted, what would be the loss to the company? (Marks 8) (CO#4)

6. Write short notes on (Marks 10) (CO#5)

(a) Bullwhip effect (b) Global supply chain risks

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

8th SEMESTER B.Tech. [EVE]

END TERM EXAMINATION, *May-2024*

CME402-Total Quality Management

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

Note : Answer any FIVE questions
All questions carry equal marks.
Assume suitable missing data, if any.
Use of statistical Table is allowed

Q.1 (a) Write the contributions of five leading quality Gurus in the field of quality.

(b) Discuss the five dimensions of service quality. [5+5][CO1]

Q.2 (a) Discuss the major philosophy of Total Quality Management.

(b) Discuss five reasons of popularity of Control charts. [5+5][CO2]

Q.3 Flight delays are of concern to passengers. An airline obtained observations on the average and range of delay times of flights (in minutes), each chosen from a sample of size 4, as shown in Table 1. Construct appropriate control charts and comment on the performance level. What are the chances of meeting a goal of no more than a 10-minute delay?

P.T.O.

TABLE 1

Observation	Average Delay	Range	Observation	Average Delay	Range
1	6.5	2.1	14	9.2	3.5
2	11.1	3.8	15	7.8	2.2
3	15.8	4.6	16	10.6	4.1
4	10.9	4.2	17	10.7	4.2
5	11.2	4.0	18	8.8	3.8
6	5.6	3.5	19	9.8	3.6
7	10.4	4.1	20	10.2	3.6
8	9.8	2.0	21	9.0	4.2
9	7.7	3.2	22	8.5	3.3
10	8.6	3.8	23	9.8	4.0
11	10.5	4.2	24	7.7	2.8
12	10.2	3.8	25	10.5	3.2
13	10.5	4.0			

[10][CO3]

Q.4 Find a single sampling plan for lot size 2500 where it is desired to reject batches that are 1.2% nonconforming no more than 5% of the time, while batches that are 7.5% nonconforming are accepted about 10% of the time. The producer's stipulation must be satisfied exactly. [10][CO4]

Q.5 (a) Discuss the Eight Management Principles of ISO 9000.

(b) Discus the DMADV & DMAIC methods to implement the six sigma program. [5+5][CO5&6]

Q.6 Write Short Notes on

(a) Six basic tools of quality control

(b) Sequential Sampling Plan

(c) Properties of Operating Characteristic Curve

(d) ASN and ATI [2.5×4][CO5&6]

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Total no. of pages :2 *Roll No.*_____

B.Tech (Mechanical) **8th SEMESTER**

END SEMESTER EXAMINATION **May 2024**

CME 406 ROBOTICS & AUTOMATION

Time : 03 Hrs. *Max. Marks: 50*

Note: Attempt any FIVE questions. Assume missing data , if any

Q.1. a. Explain technical specifications of a robot. Also explain precision, accuracy and spatial resolution of a robot

-05-[CO 1]

b.When do you prefer Hydraulic drive system in robots?. Explain with neat diagrams (i) hydraulic pump (ii) electric motor

-05-[CO 1,4]

Q.2.a.Explain step by step procedure and derive homogeneous transformation matrix of D-H convention. -06-[CO 2,5]

b. Derive the expression for combined transformation position matrix for a Cylindrical coordinate robot. -04-[CO 1,2]

Q3.a. Explain with example Joint space trajectory planning with example. -04-[CO 3]

b.Explain and derive 3rd order polynomial trajectory planning, where initial and final velocity is zero. -06-[CO 3]

Q.4.Explain the classification of sensors. With neat diagrams explain the construction and working of:

i. Touch and tactile sensor

ii. Optical Sensor

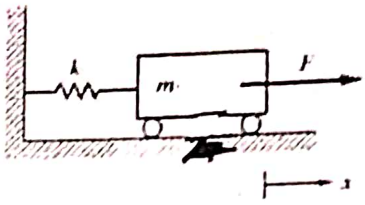
iii. Linear encoder

-10-[CO 1,6]

Q.5.a.Explain L-E Mechanics. Using Lagrangian Mechanics derive Force equation for the following system shown in Fig. -

07-[CO 4,5]

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b. Write a note on Robot programming languages. -03-[CO 1,3]

Q.6.a. Explain R-P-Y angle orientation matrix. -05-[CO 2,6]
b. Write a note Task level Robot Programming. -05-[CO 1,6]

Q.7.Write short notes on with figs and examples:
i. End Effectors as tools
ii. Cartesian space trajectory planning
iii. Pneumatic actuator
iv. Painting robot -10-[CO 1,2,3,6]

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Total no. of Pages 02 *Roll No.....*

EIGTH SEMESTER
B. TECH.
END TERM EXAMINATION ***May-2024***
CME-412 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 reasons for uncertaining inventory? [4][CO1]
(b) Derive the expression of purchasing of expensive spares while importing equipment without salvage value. [6][CO3]

2 (a) Explain LIFO and FIFO system [5][CO2]
(b) What are the reasons for classification, codification, and standardization of materials? [5][CO3]

3 (a) Explain lot size model with Planned Backlogging and calculate optimum system cost, economic lot size, stock level and backlogging level. [6][CO3]
(b) What are the need and rationale of physical verification? [4][CO2]

4 (a)What are the advantages of decentralized material management system? [4][CO4]
(b) A hardware store procures and sells hardware items. The following information is available: [6][CO4]

Expected annual sales – 2000 units
Ordering cost – Rs. 250 per order
Holding cost – 20% of average inventory value
The item can be purchased in the following schedule:

Lot size	Unit price (Rs.)
1 – 500	25.00
501 - 1000	23.00
1001 and above	20.00

Determine order size.

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5 (a) What are the various vendor rating plans? Explain [6][CO3]
(b) What are the factors considered in favour of buying? [4][CO4]

6 Write short notes on any FOUR of the following: [10][CO1]
(a) MISS model
(b) Salvage value
(c) JIT
(d) Importance of good store-keeping
(e) Assumptions of Wilson model

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

SEMESTER II/IV

B.Tech./B.Des.

END TERM EXAMINATION *May-2024*

FEC-6, VAC-3 **CORPORATE SOCIAL RESPONSIBILITY**

Time: 02 Hour *Max. Marks: 50*

Note: All questions are compulsory. There is a choice within 5th question Assume suitable missing data, if any.	

Q.1 A popular fashion retail chain launches its new clothing line targeting young adults. The marketing campaign portrays the clothing line as trendy, eco-friendly, and ethically produced, enticing consumers with promises of sustainable fashion and fair labour practices. However, as the clothing line gains popularity, several concerning issues emerge. Consumers who purchase clothing soon discover discrepancies between the advertised quality and the products received. Many report that the garments quickly lose shape and colour after a few washes, contrary to the promised durability. Additionally, there are allegations of the clothing being manufactured in sweatshops with substandard working conditions, despite the company's claims of ethical sourcing and fair labour practices. As dissatisfaction spreads among consumers, they seek recourse for their grievances. However, they encounter obstacles in resolving their issues with the company. Customer service representatives provide vague responses or offer minimal compensation, leaving consumers frustrated and deceived.

(i) Describe the consumer rights violated in the case. Evaluate the potential jurisdictions of the National Consumer Disputes Redressal Commission (CDRC) in addressing consumer grievances, considering the multinational nature of the fashion retail chain.

(ii) Identify and discuss the unethical marketing practices employed by the company. [CO1] [5+5 Marks]

Q.2 "GreenTech Solutions," which specialises in developing renewable energy technologies. GreenTech Solutions is known for its innovative approach to sustainability and has gained significant attention for its contributions to combating climate change. However, recent developments have raised concerns about the company's corporate social responsibility (CSR) practices. During an annual shareholders' meeting, several investors raised questions about GreenTech Solutions' commitment to CSR and its alignment with ethical standards. They highlighted issues such as the company's supply chain transparency, labour practices in overseas manufacturing facilities, and the environmental impact of its operations. As the CEO of GreenTech Solutions you are tasked with addressing these concerns and demonstrating how the company's CSR initiatives align with its core values and business objectives.

Applying Carroll's Pyramid Model, critically present GreenTech Solutions' CSR initiatives and their alignment with the model. Provide specific examples and recommendations for enhancing the company's CSR performance while maintaining its competitive edge in the renewable energy industry.

[CO4][10 Marks]

Q.3 XYZ Corporation, a multinational retail giant, has recently been scrutinised for its labour practices in overseas manufacturing facilities. Reports have surfaced alleging poor working conditions, low wages, and lack of employee rights protection in factories contracted by XYZ Corporation to produce its products. Additionally, concerns have been raised about the environmental impact of XYZ Corporation's supply chain operations, particularly in regions with lax environmental regulations. In response to these issues, XYZ Corporation's management team faces mounting pressure to address concerns about CSR and uphold ethical standards throughout its operations. As the company evaluates its CSR strategy, it must consider various drivers influencing its approach to CSR.

Identify and analyse the key CSR drivers applicable to XYZ Corporation's current situation. Evaluate how these drivers can help shape XYZ Corporation's CSR strategy and impact its business practices. Based on your analysis, provide recommendations for XYZ Corporation to effectively address CSR concerns, improve its corporate reputation, and ensure ethical conduct across its global supply chain.

[CO4][10 Marks]

Q.4 Global Green Solutions (GGS) is a multinational corporation specialising in renewable energy technology. As a leader in the sustainable energy sector, GGS faces a critical decision regarding its corporate social responsibility (CSR) practices. The company must choose between three conflicting ethical theories to guide its CSR strategy: utilitarianism, deontology and virtue.

Identify and analyse the ethical theory GGS applied in its CSR strategy. Assess how the company's approach aligns with the principles and objectives of the chosen ethical theory. Based on your assessment, recommend strategies for GGS to enhance further its CSR efforts in alignment with the chosen ethical theory. [CO3][10 Marks]

Q.5 Write short notes on ***any two*** of the following:

(A) Importance of Sustainable Initiatives

(B) Factors influencing the quality of Corporate Governance

(C) Importance of ESG for Investors

(D) Difference between Ethics and Morals

[CO 1, 2, 3][5 + 5 Marks]

Total No. of pages: 01 Roll No: 526

I/II/III/IV SEMESTER B.Tech./B.Des.

END-TERM EXAMINATION May / 2024

VAC27 / FEC7 INTRODUCTION TO ENVIRONMENTAL SCIENCES

Duration: 2 Hours Maximum Marks: 50

Note: All questions are compulsory and carry equal marks.	Marks	CO#

Q. 1 Attempt the following questions

a. Explain causes of acid rains, along with the effects on the environment. 5 CO1

b. Explain ex-situ methods for conservation of species. 5 CO1

Q. 2 Attempt the following questions

a. Classify India's biogeographic regions based on their unique characteristics. 5 CO2

b. Apply environmental management in reducing the risk of disasters. 5 CO2

Q. 3 Attempt the following questions

a. Analyze climate change and its impacts on the environment. 5 CO3

b. Analyze the causes, effects, and control measures of soil pollution. 5 CO3

Q. 4 Attempt the following questions

a. Evaluate features of <*your branch of Bachelor's program*> for improving environmental health. 5 CO4

b. Evaluate impact of air pollution on the environment. 5 CO4

Q.5 Attempt ANY ONE of the following

a. Develop a strategy for achieving sustainable lifestyle. 10 CO5

b. Develop a methodology to enhance waste segregation at household levels. 10 CO5

Total No. of Pages- 1 Roll No. 527

B.Tech

END TERM EXAMINATION May 2024

COURSE CODE: AEC 18/FEC 9
COURSE TITLE: SPOKEN SKILLS IN ENGLISH

TIME: 1:30 HRS. MAX. MARKS: 50

NOTE: Attempt Any Five Questions.

1. Explain the importance of tone, intonation and body language in English Communication. (CO2) (10)

2. Demonstrate the process of Communication. (CO3) (10)

3. Analyze how spoken skills in English helps in the diverse fields such as engineering. (10) (CO4)

4. Identify the importance of pronunciation, vocabulary, and phonetics in daily life. (CO 1) (10)

5. Explain Extempore. Plan some effective strategies to be used in Extempore. (CO5, CO4) (10)

6. Write a debate on "Artificial Intelligence is boon or a bane". (CO 4) (10)

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Total no. of pages:01 Roll no...6...9...

B.Tech. (2nd and 4th Semester)

End Term Exam May: 2024

Course Code: FEC11/AEC11

Course Title: Soft Skills and Personality Development

Time: 2:00 hours Max marks:50

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

1. Write a short note on the following. CO1 (10)
   (a)Barrier of communication
   (b)Values and believe

2. Differentiate between Self-esteem and Self-confidence CO2 (10)

3. Write a paragraph on how Goal setting is important for a successful life. CO3 (10)

4. Give arguments for a GD on 'Social work activities to create a successful personality'. CO4 (10)

5. Write a resume with a cover letter for applying to a famous startup as a creative director. (Imagine details) CO5 (10)

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Total No. of Pages : 1 Roll Number.....

II/IV SEMESTER

B.Tech./B.Des.

FINAL TERM EXAMINATION May-2024

FEC 12/AEC 4 : Business Communication and Presentation Skills

Time: 2:00 Hours Max. Marks: 50

Note : All questions are compulsory.

Q.1 What are the different types of interviews? State which type of interview is the most difficult to handle according to you and mention the reason? [10 Marks; CO 2]

Q.2 What is a resume? Differentiate between a Curriculum Vitae and resume? [5 Marks; CO 4]

Q.3 Explain all the barriers to business communication with suitable examples. [10 Marks; CO 3]

Q.4 What is a presentation? Differentiate between presentation and lecture with appropriate basis. [5 Marks; CO 1]

Q.5 Elaborate any three C's of effective communication with examples. [5 Marks; CO 4]

Q.6 Write a short note on <u>any three</u> of the following: [3 X 5= 15 Marks; CO 1, 4, 5]

1. Essential characteristics of a presentation
2. Informal Communication
3. Oral and Written Communication
4. Benefits of Business Communication
5. Nonverbal Communication

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

B.Tech. 2nd/4th year

End-Term Examination May 2024

AEC 3/FEC 14 Appreciation of Short Stories

Time: 2-hours Total Marks: 50

Note: All questions are compulsory

1. Critically appreciate the story "The Catbird Seat." (10 marks) (CO3)
2. What is the psychoanalytical approach to the story "The Use of Force?" (10 marks) (CO1)
3. What are the themes of "In Another Country?" Explain. (10 marks) (CO2)
4. Explain the predicament of human nature in "Wet Saturday." (10 marks) (CO 3)
5. Write short notes on any two of the following: (10 marks)(CO1,CO 2, CO 3)
   a. Symbolism in "In Another Country"
   b. Mrs. Barrows
   c. The concept of force in "The Use of Force"
   d. The condition of soldiers in "In Another Country."

Roll no. 572

Total no. of Pages: 1

SEMESTER- 2nd & 4th

B.Tech.

May-2024

END TERM EXAMINATION

AEC-2/ FEC-15 APPRECIATION OF PROSE AND POETRY

Time: 02:00 Hours

Max. Marks: 50

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

Q.1 Illustrate how Chaucer's Canterbury Tales is a mirror to the society. [10] [CO 2]

Q.2 Demonstrate the point of view towards Female Orators in Joseph Addison's essay. [10] [CO 3]

Q. 3 Explain the multiple ways in which literary works such as Prose and Poetry find application in fields such as engineering. [10] [CO 1]

Q.4 Critically assess how the character of the Duke and the poem "My Last Duchess" represent the social issues prevalent in the era. [10] [CO 2]

Q.5 Examine how "The Death of the Moth" represents the psychological and social turmoil of writer's life. [10] [CO 1]

OR

Critically analyse "Sonnet-66" written by Shakespeare. [CO 3]

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Total no. of pages: 02

Roll No.....

End Term Examination

May 2024

Course Code: AEC1/FEC16

Max. Marks: 50

Course Title: Appreciation of Fiction

Time: 2 Hour

Note: Read instructions carefully and answer accordingly.

Q1 a) Answer Briefly in a word/ sentence . **[CO1][5 M]**

i. Who is the author of *The Man Who Died* ?
ii. In which year *The Death of Ivan Illyich was* first published
iii. Mention the main characters in *The Man Who Died ?*
iv. Mention the vocation taken up by the protagonist in *The Man Who Died?*
v. What does symbol of 'cock' refers to?

b) Write short note on *anyone* (100 words): **[5M]**

i. Gerasim
ii. Madeline
iii. Praskovya Fëdorovna

Q2. Compare and contrast the protagonist's perspective on life before and after their transformative experiences in the books The *Man who Died* and *The Death of Ivan Illyich.*

[CO2] [10M]

Q3. Identify key elements of symbolism in fiction. Give examples from the texts in syllabus.

[CO1,3] [10 M]

Q4. Your college has a magazine called *English Quarterly*. Write a critical review of the book *The Man Who Died* OR *The Death of Ivan Illych* with the following points: i) the central message or moral lesson ii) significance of the novel in modern times iii) why everyone should read the book.

[CO2,3] [10M]

OR

Attempt the following RTC: **[CO1,3]**

"Yes, I am making them wretched," he thought. "They are sorry, but it will be better for them when I die." He wished to say this but had not the strength to utter it.

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"Besides, why speak? I must act," he thought. With a look at his wife he indicated his son and said: "Take him away . . .sorry for him . . . sorry for you too. . . ."

a) Who is the speaker referred to in the above lines? [1M]

b) Who are 'they' he is referring to? [1 M]

c) Explain the significance of phrase 'making them wretched' in the above lines? [2M]

d) What made speaker feel 'sorry'? [2M]

e) What information you get about the speaker? [2M]

f) Name the book and the author from which above lines have been taken. [2M]

Q5. Compare and contrast the theme of 'death and liberation' manifested in the narratives of the two novellas i.e. *The Man Who Died/ The Death of Ivan Illych*? [CO1,4] [10M]

OR

Attempt the bibliographical entries (MLA 8) for the following fictions as per the details mentioned

S.no	Title of Book	Name of Author	Publisher	Year of Publication
1	*The Alchemist*	Paulo Coelho	Harper Collins	2005
2.	*The Picture of Dorian Grey*	Oscar Wilde	Penguin	2013
3.	*The Metamorphosis*	Franz Kafka	Oxford University Press (OUP)	2009
4.	*Nineteen Eighty Four*	George Orwell	AITBS Publisher	2001
5.	*Pride and Prejudice*	Jane Austen	Orient Blackswan Publishers	1997

Total no. of Pages: 03

Roll no.....

4th SEMESTER

B.Tech

END TERM EXAMINATION *May-2024*

FEC 18 Financial Statement Analysis

Time: 02:00 Hours *Max. Marks: 50*

Note : Q1(case study:20 marks) is compulsory and answer any three questions from the rest. Assume suitable missing data, if any.

Q.1 **Case study:**

You have been hired as an analyst for RBS Bank and your team is working on an independent assessment of Daffy Duck Food Inc. (DDF Inc.) DDF Inc. is a firm that specializes in the production of freshly imported farm products from France. Your assistant has provided you with the following data for Daffy Duck Food Inc. (DDF Inc.) and it's industry.

Ratio s	2023	2022	2021	Industry Average (2023)
Long-term debt	0.45	0.40	0.35	0.35
Inventory Turnover	62.65	42.42	32.25	53.25
Depreciation/Total Assets	0.25	0.014	0.018	0.015
Days' sales in receivables	113	98	94	130.25
Debt to Equity	0.75	0.85	0.90	0.88
Profit Margin	0.082	0.07	0.06	0.075
Total Asset Turnover	0.54	0.65	0.70	0.40

Quick Ratio	1.028	1.03	1.029	1.031
Current Ratio	1.33	1.21	1.15	1.25
Times Interest Earned	0.9	4.375	4.45	4.65

a. In the annual report to the shareholders, the CEO of DDF Inc. wrote, "2021 was a good year for the firm with respect to our ability to meet our short-term obligations. We had higher liquidity largely due to an increase in highly liquid current assets (cash, account receivables and short-term marketable securities)." Is the CEO correct? Explain and use only relevant information in your analysis.

b. What can you say about the firm's asset management? Be as complete as possible given the above information, but do not use any irrelevant information.

c. You are asked to provide the shareholders with an assessment of the firm's solvency and leverage. Be as complete as possible given the above information, but do not use any irrelevant information.

d. State any 5 limitations of ratio analysis.

[5x4)][CO1,2]

Q.2 Explain the Meaning of Assets, Liabilities, and Stockholders 'Equity and State the Basic Accounting Equation. Also explain any four Basic Assumptions and Principles Underlying Financial Statements.

[10][CO1]

Q3. Consider the company which you had chosen for the Term long project in this semester. Comment on the mission and vision of the company. How significant is this in the analysis of the company. What is the shareholding pattern of the company and how does it impact the analysis? Also comment on the different sources of revenue that your company generates and identify some of the risk that might affect the revenue of your chosen company.

[10][CO2]

Q.4 What would trend analysis of financial statements reveal about a company? How is it different from Common size statement analysis? Illustrate with a hypothetical example. Would you invest in a company which never paid dividend? Give reasons.

[10][CO1,2]

Q.5 What is the purpose of Income statement prepared by an organisation? Arrange the items given below in the format of income statement for the Tasva ltd. (a retailer) and ascertain the different kinds of profits which the user of the financial information would like to analyse for the year ending March 31, 2023 , given the information below:

	(Rs.)
Advertising expenditures	68,000
Beginning inventory	2,56,000
Depreciation	78,000
Ending inventory	248,000
Gross Sales	3,210,000
Interest expense	64,000
Lease rental payments	52,000
Management salaries	240,000
Materials purchases	2,425,000
R&D expenditures	35,000
Repairs and maintenance costs	22,000
Returns and allowances	48,000
Taxes	51,000

[10][CO1]

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Roll no.....

Total no. of Pages: 01

2nd/4th Semester
B.Tech/B.Des.

May-2024

END TERM EXAMINATION
(VAC-22/FEC-25) -Universal Human Value(self & Family)

Time-2 Hrs

Total Marks-50

Total Five Questions(all are compulsory) Marks indicated in the questions

1. Choose any two advertisements('Ads') from your surroundings & for Each ad, answer the followings:-
   a. Give short description of the ad.
   b. Is the ad describing the qualities of the product, or trying to take Advantage of your temptations & insecurities? Explain how.
   c. What underlying beliefs does it end up planting in its viewers? Analyse & discuss.
   d. What belief has it planted or reinforced in you? How are you coping with it? [2.5X4=10] -CO3

2.a. What do you mean by happiness & prosperity? Critically examine the prevailing happiness in the society & their consequences. [5]- CO1
   b. Physical facilities are necessary & complete for animals, while they are necessary but not complete for humans. Comment. [5]- CO2

3. a. What is purpose of education? How content should be discussed in Education? [4]- CO1
   b. What is the role of education Sanskar? Define and clarify. [3] -CO2
   c. What is the difference between Traditional and Progressive education System? [3] -CO3

4. a. What is self-exploration? Explain. How does the "dialogue within" help us to do self exploration? [3] – CO1
   b. What are the contents of self-exploration? Explain the process of self-Exploration. [4] – CO2
   c. Differentiate between effort for excellence & efforts for competition. [3] - CO3

5. a What is peer pressure? Explain Erikson's four stage peer pressure. How can you handle peer pressure. [5] –CO4
   b. What are the classification of units in four orders? [2] –CO3
   c. How do you prioritize myriads of your activities every day? Do you set specific goals or targets for yourself to accomplish them? [3] -CO4

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Total Pages 1

Roll No .....

B.Tech. II/ IV Semester

End Term Examination

May-2024

VAC16/ FEC 27

Professional Ethics And Human Values

Time: 2:00 Hours

Max. Marks: 50

Note: Attempt any five questions.
All questions carry equal marks.

Q1. Define ethics and elaborate on its practical importance in contemporary contexts. [10 Marks] [CO7]

Q2. Enumerate the rights of professionals. Discuss the significance of professional prerogatives such as whistleblowing and intellectual property rights (IPR). [10 Marks] [CO2 &CO3]

Q3. Evaluate the objectives and boundaries of Engineering Ethics. Analyze the ethical dilemmas, particularly those pertaining to each stage of product development, encountered by engineering practitioners. [10 Marks] | CO1& CO4]

Q4. Examine the prevailing concerns within Environmental Ethics. Discuss the primary issues that command attention in contemporary environmental discourse. [10 Marks] [CO6& CO8]

Q5. Identify the principal ethical quandaries associated with computer technology. Write some measures to mitigate the ethical challenges inherent in this domain. [10 Marks] [CO6 &CO8]

Q6. Define Risk-Benefit analysis in the context of engineering projects. Assess the extent to which ethical considerations should factor into such analyses. [10 Marks] [CO5]

Q7. Compare and expound upon the principal Normative ethical theories (utilitarianism, deontology, virtue ethics) as they pertain to engineers. [10 Marks] [CO6]

Total No. of pages: 01 Roll No. 539

2nd/4th Semester

B.Tech.

END TERM EXAMINATION **May-2024**

FEC-28/VAC5 Emotional Intelligence

Time: 02:00 hours **Max. Marks: 50**

Note: All questions are compulsory.
All questions carry equal marks.
Illustrate your answers with suitable examples.

Q.1 Explain self-awareness and self-regulation as an element of personal competence. How can self-awareness and self-regulation play a key role in helping students in achieving their goals? 10 marks [CO#1, 4]

Q.2 What are display rules according to Daniel Goleman? Why these rules are considered a central aspect of social competence? Substantiate your answer with suitable examples. 10 marks [CO#1, 5]

Q.3 Describe the state of 'flow' as an element of self-motivation. Explain with suitable examples why the state of flow is called a journey starting from a conscious effort to a state of self forgetfulness. 10 marks [CO#1, 4]

Q.4 Do you agree that reason is superior to emotion? Can schooling of emotions be a reason for a gendered view of looking at the dichotomy of emotion and reason? 10 marks [CO#3]

Q.5 What is Empathy? What is the role of empathy in emotional intelligence? How empathy can be said to be the root of our moral behaviour, explain. 10 marks [CO#4, 6]

Total No. of Pages : 1

Roll No. 540

2nd /4th SEMESTER

B.Tech.[All]

DELHI TECHNOLOGICAL UNIVERSITY
END TERM EXAMINATION, MAY-2024
AEC13/ FEC32 Logical Reasoning

Time: 2:00 Hours *Max. Marks : 50*

Note: ANSWER ALL THE QUESTIONS

Q.1 Answer in detail any two of the following: (6x2= 12 marks) [CO#1 & CO#6]

a. Truth and Validity
b. Traditional Square of Opposition
c. Deductive and Inductive Argument

Q.2 Test the validity/ invalidity of the following syllogistic mood and figure by Venn diagram (Any two) (5×2=10 marks) [CO# 8 & CO# 5]

a. AAA- 4
b. AOO- 2
c. IAI- 2

Q.3 Determine distributed and Undistributed terms of the following propositions (Any two) (2x2=4 marks) [CO# 5 & CO#7]

a . All soldiers are brave people.
b . Some ambitious people are successful people.
C . No Saint is a cheater.

Q.4 Find contrary /sub contrary , contradictory and subaltern / superaltern of the following propositions: (Any two) (2 x2=4 marks) [CO# 1 & CO#8]

a. All voters are citizens.
b. No philosophers are traders.
c. Some good speakers are not good writers.

Q. 5 Identify the form of the following arguments and determine their validity/invalidity (Any one) (5x1=5 marks) [CO#2 & CO#3]

a. If it rains in time, then there will be good harvest. It rains in time. Therefore, there will be good harvest.
b. If man is happy, then he is virtuous. Ram is virtuous. Therefore, he is happy.

Q. 6 Symbolize the following statements using suggested notions : (Any five) (1x5 = 5 marks) [CO#3 & CO#4]

a. She attended to her duties and earned promotion. (A,E)
b. We will go if it does not rain. (G,R)
c. If the wind blows fast, then tents will be uprooted and soldiers will have tough times. (B,V,T)
d. He failed though he tried. (F,T)
e. He is neither hard-working nor intelligent. (H,I)
f. If mathematics is difficult, then you will pass only if you work hard. (D,P,W)
g. Either both Aarti and Belu both go to library or neither will. (A,B)

Q.7 Test the validity/invalidity of the following using truth table method : (Any two) (5x2=10 marks) [CO#7&CO#8]

a. $P \supset Q$
$Q \supset R$
Therefore Q

b. $P \vee Q$
$\sim P$
Therefore Q

c. $P \supset Q$
$Q \supset R$
Therefore $P \supset R$

-- END --

Total No. of Pages:3

Roll no.....

II / IV SEMESTER

B.Tech.

ENDTERM EXAMINATION ***May -2024***

FEC-39/AEC-12 JAPANESE

Time: 2:00 Hour ***Max. Marks: 50***

Note: All questions are compulsory.

Q.1 Write the following words in Hiragana. [5][CO-1]

Example: nihon-にほん

(1) honmyō
(2) boenkyō
(3) chūshajō
(4) nyūjōken
(5) gyōsha
(6) massugu
(7) kōchō
(8) shokubutsu
(9) dankyūsei
(10) shōgakkou

Q.2 Write the following words in Katakana. [5][CO-1]

Example: aisu-アイス

(1) jogingu
(2) intabyū
(3) karēraisu
(4) kechappu
(5) basukettobōru
(6) painappuru
(7) orinpikku
(8) barēbōru
(9) chiketto
(10) hottodoggu

Q.3 Write the following numbers in Hiragana. [10][CO-3]

Example: 25- にじゅうご

(1) 358
(2) 612
(3) 785
(4) 887
(5) 1396
(6) 1971
(7) 2024
(8) 3776
(9) 6439
(10) 8373

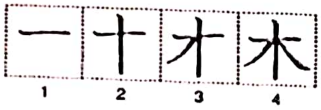
Q.4 Find the correct Adjective for English word. [10][CO-5]

(ちいさい、やすい、くらい、おおきい、くろい、あたらしい、
あかるい、ふるい、たかい、あかい)

(1) Bright
(2) Old
(3) Red
(4) Dark
(5) Black
(6) Cheap
(7) big
(8) New
(9) Small
(10) Expensive

Q.5 Write the Stoke order of following Kanjis. [10][CO-4]

Example: 木 (ki)



(1) 金 (kin)
(2) 日 (nichi)
(3) 月 (gatsu)
(4) 水 (mizu)
(5) 百 (hyaku)

Q.6 Arrange the following sentences. [5][CO-2]

Example: ほん/ です。/ は/ これ
→ これは ほん です。

1. タイじん/ インドじん/です/あなた/です/、/は/か/か。
2. ノート/ か。/ の/ は/です/ だれ/ それ
3. です。/ と/ わたし/ これ/ の/ は /ほん / これ
4. にほんご/ は/ の/ です/ あなた/ か。/がくせい
5. ほん/ さん/ です。/ の/ は/ これ/ たなか

Q.7 Find the correct Katakana word. [5][CO-2]

1. gesuto (guest) ⓐ ゲスタ ⓑ ケスト ⓒ ゲスト ⓓ ゲセト
2. moderu (model) ⓐ モテル ⓑ モデレ ⓒ マデル ⓓ モデル
3. hoteru (hotel) ⓐ ホテル ⓑ ハテル ⓒ ホテレ ⓓ ボテル
4. gaido (guide) ⓐ ガイデ ⓑ ガイド ⓒ ガエド ⓓ ガイデ
5. piano (piano) ⓐ ピオノ ⓑ ピアナ ⓒピアノ ⓓ ピオナ

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Roll no.....

Total no. of Pages: 1

SEMESTER- 2nd & 4th

B.Tech.

May-2024

END TERM EXAMINATION

FEC-46/ AEC-19 TECHNICAL COMMUNICATION

Max. Marks: 50

Time: 02:00 Hours

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

Q.1 What do understand by Notice, Agenda and Meeting Minutes? Discuss in detail. [10] [CO 2]

Q.2 What is the meaning of Office Etiquettes and Netiquettes? Explain. [10] [CO 1]

Q.3 Write a Resume for the post of Executive Engineer in ABC company. [10] [CO 3]

Q.4 Group Discussion as an effective tool for assessment during placement session. Explain. [10] [CO 1]

Q.5 Write **Any Two** short notes on the following: [5+5] [CO 3]

A. Technical Proposal
B. Communication Skills
C. SOP (Statement of Purpose)

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

BTech

END TERM EXAMINATION May-2024

FEC 47/VAC 25(Values Driven Leadership)

Time: 02:00 Hours Max. Marks: 50

Note: All questions carry equal marks (12.5 Marks).
Attempt any FOUR questions.
Assume suitable missing data, if any.

Q.1 How would you react if your team received negative feedback about a part of the project that was entirely assigned to you? Discuss the concept of values and how would you manage your values in this situation? [CO1]

Q.2 How can a company improve diversity? Discuss the concept of Diversity and explain the negative effects of diversity. [CO2]

Q.3 Explain the four tiers of corporate social responsibility as defined by Archie Carroll? How applicable is this paradigm in India? [CO3]

Q.4 Discussing the concept of social capital elaborate how social capital can play a role in the governance of the country. [CO4]

Q.5 Define corporate social responsibility in the context of India. What are the provisions related to it and what are its primary benefits for organizations? [CO2]

Q.6 Describe the various ways in which an organisation can ensure that ethics are being followed in marketing. [CO5]

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

II/IV SEMESTER

B.Tech

END TERM EXAMINATION *May-2024*

FEC48/VAC9 **Introduction to Biological Sciences**

Time: 02:00 Hours *Max. Marks: 50*

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

Q.1 Explain how the Miller-Urey experiment contributed to our understanding of the origin of life. Describe two key pieces of evidence supporting the theory of chemical evolution. Write significant recent developments in the field of biology, highlighting their potential applications in various domains.

[3+2+5][CO1]

Q.2 Explain how the cardiovascular system and respiratory system work together to maintain the normal functioning of body

[10][CO4]

Q.3 Differentiate between (a) Blood and Lymph (b) Open circulatory and closed circulatory (c) SA node and AV node. Give functions of following in blood (i) Fibrinogen, (ii) globulin (iii) neutrophils and (iv) Lymphocytes

[6+4][CO4]

Q.4 Compare and contrast the structure and function of prokaryotic and eukaryotic cells.

[10][CO5]

Q.5 Explain how biotechnology is applied in improving human nutrition

[10][CO5]

Total No. of Pages 1

Roll no.....

2nd/4th SEMESTER
B.Des/B.Tech

END TERM EXAMINATION *MAY-2024*

COURSE CODE FEC49 **Course Title: Sketching & Rendering**

Time: 2:00 Hours *Max. Marks: 50*

Note: All questions are compulsory to attend.
No References/ Internet/ Laptops/ Phones are allowed.
Assume suitable missing data, if any.
Material: 03 A3 Drawing Sheet

Q.1 You are provided with the still image of a Wooden Manikin, Imagine and sketch <u>ANY TWO</u> of the following poses of it in line drawing with details:



a) Running on a track
b) Sitting & reading book on a chair/ bench
c) Walking with a stick in hand

[15 Marks] [CO-1,2]

Q.2 Draw and color in a 10x10 inch square, a floral design inspired from nature study you studied in class on the A3 drawing sheet provided. (Any 2 color combination of your choice)

[15 Marks] [CO-2,3]

Q.3 Draw a detailed one-point perspective scene of a city <u>OR</u> interior room with light & shade to show details.

[20 Marks] [CO-2,3]

Total no. of Pages: 1 Roll no.....547

B.Tech./B. Des

END TERM EXAMINATION *May-2024*

COURSE CODE:- FEC-50 COURSE TITLE :-Tinkering Studio and Elements of Design

Time: 02:00 Hours *Max. Marks: 50*

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

Q.1 Explain A- FORM B- SHAPE C- TEXTURE D- VALUE (Element of Design) in detail with example. (Any two) [5+5 Marks]

Q.2 Define the concept of Space. [5 Marks]

Q.3 Define the concept of Color. [5 Marks]

Q.4 Illustrate with the size of (5x5") (inch) any picture of your choice.

A- Define the concept of positive space.

B- Define the concept of negative space.

C- Balance the positive and negative space by using Rule of thirds.

D- Explain the Gestalt principle. [5+5+5+5 Marks]

Q.5 Briefly discuss about ACCESS FM.

OR

Explain the product life cycle with example and graph. [10 Marks]

END

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

B.Tech Semester 2nd & 4th

END TERM SEMESTER EXAMINATION May-2023-24

FEC-53 COMMUNICATIVE HINDI & AEC- HINDI -6

Time 02 Hours. Max Marks:50

Attempt Any FIVE questions. (कोई पांच प्रश्न कीजिए।)

प्रश्न- 1. अपना परिचय दस (10) पंक्तियों में लिखिए। (CO-2)-10

Write your introduction in Ten lines.

प्रश्न- 2. शरीर के किन्हीं दस (10) अंगो के नाम लिखिए। (CO-2)-10

Write any ten parts of the Body name.

प्रश्न-3 किन्हीं दस (10) भारतीय त्योहारों के नाम लिखिए। (CO-3)-10

Write any ten indian festivals names.

प्रश्न- 4 इक्कीस से पचास (21-50) तक हिंदी शब्दों में गिनती लिखिए। (CO-3)-10

Write counting from Twenty One to Fifty in hindi.

प्रश्न-5 वर्ष के महीनों के नाम हिंदी में लिखिए। (CO-4)-10

Write names of months in a year in hindi.

प्रश्न-6 संज्ञा और सर्वनाम को अलग-अलग वर्गों में विभाजित कीजिए। (CO-5)-10

Differenciate between the Noun and Pronoun and allocate under correct heading.

जयपुर (Jaipur), आप (Aap), तुम्हारा (Tumhara),गाय (Gaay), सच्चाई (Sachchai), कौन (Kaun), श्याम (Shyam) , कहाँ (Kahan), सीता (Sita), इधर (Idhar)

प्रश्न -7 निम्लिखित शब्दों के विपरीतार्थक शब्द लिखिए। (CO-5)-10

Write the ooposite Words.

जवान (Jawaan), दिन (Din), ऊपर (Ooper),मोटा (Mota), हँसना (Hansana)

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Total no. of Pages: 01

Roll no.....

2nd/4th Semester
B.Tech/B.Des.

Final Term Examination

May-2024

(VAC-13/FEC-54) -Negotiation & Leadership

Total Marks-50

Time-2Hrs

Total five Questions(All are compulsory), Marks indicated in the questions

1 a. Explain top ten elements of culture which can affect your negotiation. [6]- CO1

b. What is bargaining? Explain three different Schools of bargaining ethics. [4]- CO1

2 a. What is collaborative strategy for negotiation?. What are the four major Steps in carrying out a collaborative strategy?.- [6] -CO1

b. Explain how you can be successful with collaborative negotiation?. [4] –CO2

3. a. What are three factors which tend to heavily influence the course of negotiation? [4]- CO1

b. Explain interest based negotiation Model. List out seven steps of negotiation preparation along with the preparation worksheet . [6] -CO2

4. a. What are the four steps strategy for a successful every day negotiation explain & describe with examples? [6] - CO1

b. When negotiators do not want to give you what you are asking for. How can you get the conversation back on track ? [3] – CO3

5. Write notes on the followings:- [5x2=10] -CO2

a) Seven Myths of effective negotiation

b) Seven elements of effective negotiation

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I/II/III/IV SEMESTER B. Tech./B. Des.

END-TERM EXAMINATION May 2024

VAC-24 / FEC-56 UNIVERSAL HUMAN VALUES: UNDERSTANDING HARMONY

Duration: 2 Hours **Maximum Marks: 50**

Note: All questions are compulsory and carry equal marks.

	Marks	CO#
Q. 1 Attempt the following questions		
a. Explain education-sanskar.	5	CO1
b. Summarize the concept of respect.	5	CO1
Q. 2 Attempt the following questions		
a. Apply right understanding in context of prosperity.	5	CO2
b. Apply right feeling in context of gratitude in relationship.	5	CO2
Q. 3 Attempt the following questions		
a. Analyse the role of education-sanskar in achieving human consciousness.	5	CO3
b. Analyse trust as the foundational value in relationship.	5	CO3
Q. 4 Attempt ANY ONE of the following		
a. Evaluate Basic Human Aspiration.	10	CO4
b. Give arguments for a G.D on what is important for continuous happiness.	10	CO4
Q.5 Attempt ANY ONE of the following		
a. Develop a program for trust in relationship based on intention and competence.	10	CO5
b. Compose a resume with cover letter for an NGO for position of a Social Reformer for Education.	10	CO5

Total No of Pages 2 *Roll No.....* 551

IInd/IVth SEMESTER

B.Tech./B. Design

END SEMESTER EXAMINATION **MAY 2024**

FEC 57/VAC 11 - Leadership Mastery through Self-Management

Time: 2 hours **Max. Marks: 50**

PART A – 30 Marks (Short Questions)

1. What is peak performance? How can you reach peak performance?
CO 2(2 Marks)
2. What is the 'Power of Suggestion?' How is a Suggestion to be given? How does it help you in your life, as a student and later as a working professional? Give a brief explanation and an example for each of the questions.
CO4 (5 Marks)

OR

What is situational awareness? How does situational awareness benefit professional life? In what ways can we improve our situational awareness?
CO4 (5 Marks)
3. How does the power of pause help you in your student life? will it help you in your career? Give an example for each question
CO 4 (5 Marks)
4. What is your understanding of *Pranahuti* (transmission)? What does it do to you while meditating?
CO 4 (2 Marks)
5. What do we understand through 'The Yerkes-Dodson law'? Draw the diagram and explain.
CO 5 (3 Marks)
6. How can Heartfulness relaxation, meditation, and cleaning help in de-stressing?
CO 5 (5 Marks)
7. What is your understanding of being in a state of flow? When was the last time you felt that you were in *flow*?
CO 4 (3 Marks)
8. Explain the Heartfulness detox technique for the removal of Fear.
CO 5 (5 Marks)

Part B – 20 Marks (Fill up the blanks)

1. _____ is the energy used for the transformation of human beings. (sun's energy, transmission, moon's energy, light energy)
CO 3 (1 Marks)
2. Regarding the power of suggestion, the _____ is always most effective. (subtle, forceful, relaxed, aggressive)
CO 5 (1 Mark)

3. While doing cleaning, if you try to remove a specific thing by force, you will actually _____ its effect. (deepen, lighten, remove totally, not sure) CO 1 (1 Mark)

4. ---------- is when you focus with effort. (meditation, daydreaming, frustration, concentration) CO 2 (1 Mark)

5. ---------- is when you put effort but unfocussed. (concentration, cleaning, frustration , daydreaming) CO 2 (1 Mark)

6. Throughout our daily activities, we continuously suppose things with the voice inside our head, even if we do not voice them aloud. These thinking patterns are _____. (likes, dislikes, likes and dislikes, reaction and response) CO 5 (1 Mark)

7. Fear arises out of the perception of _____ or _____. (joy or lightness, cheerfulness or happiness, action or inaction, danger or separation). CO 5 (2 Marks)

8. By developing _____ and _____, we learn how to deal with fear effectively. (logic and perceptiveness, sharpness and aggressiveness, clarity of thought and a courageous heart, belligerence and attacking). CO 4 (2 Marks)

9. _____ is the antidote to fear. (confidence, compassion, courage, calmness) CO 5 (1 Mark)

10. Our inability to deal with situations well and solve problems leads to accumulated effects of ___. (sadness, happiness, lightness, stress & fear). CO 4 (1 Mark)

11. To relieve stress then and there, breath in and out through your _____.(right nostril, left nostril, both nostrils, pause breathing). CO 4 (1 Mark)

12. Cleaning the mind of its excessive _____ and _____ restores and rejuvenates the mind. (thoughts and actions, intentions and thoughts, suggestions and intentions, thoughts and worries). CO 2 (2Mark)

13. Aside from the simple practices of heartfulness, all that is really required our _____ and _____to look at ourselves honestly. (discipline and confidence, attention and willingness, sharpness and courage, humility and simplicity). CO 1 (2 Mark)

14. The magic of _____ and _____instead of reacting c make the most dramatic and profound change in us.(reacting and responding, pausing and accepting, liking and disliking, eating and drinking).

15. Fear detox is a technique of _____. (normal cleaning, spot cleani liinb cleaning, toe cleaning) CO 5 (2 Mark CO 5 (1 Mark

Total no. of Pages: ONE

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END SEMESTER EXAMINATION MAY-2024

COURSE CODE: VAC 19/ FEC58 COURSE TITLE: Science and Practice of Happiness

Time: 02:00 Hours *Max. Marks: 50*

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

Q.1 What is Growth Mindset? Explain with examples how it is essential for flourishing and wellbeing. [10 marks] [CO2]

Q.2 Write Short Notes on (Attempt any 2) [10 marks] [CO 1, 2,3]

a) Neurophysiology and Happiness
b) Theories of Emotion
c) Effective leadership and Happy Workplace

Q.3 What are positive emotions? Describe their role in happiness and wellbeing in society. [10 marks][CO1,3]

Q.4 Define meaningful work. Discuss the factors affecting meaningful work and their consequences. [10marks][CO2]

Q.5 Discuss the role of yoga and meditation for positive mental health and wellbeing. [10marks][CO1]