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B.Tech (AUTOMOBILE ENGG)-   **III SEMESTER**

FEB, 2019   SUPPLEMENTRY EXAMINATION

QUANTITATIVE TECHNIQUES (PE- 261)

MAX. MARKS: 50   Time : 3:00 hr

NOTE:

   1. *Answer any five questions.*

   2. *Statistics tables are allowed.*

   3. *Assume suitable missing data if any.*

Q1. Solve the following Linear Programming problem by using Two-phase method.

Maximize $Z = x1 + 2x2 + 3x3 - x4$
subject to

$$x1 + 2x2 + 3x3 = 15,$$
$$2x1 + x2 + 5x3 = 20,$$
$$x1 + 2x2 + x3 + x4 = 10,$$
$$x1 \geq 0, x2 \geq 0, x3 \geq 0, x4 \geq 0$$

[10]

Q2. Solve the following game theory problem by using the principle of dominance:

		Player B					
		1	2	3	4	5	6
	1	4	2	0	2	1	1
	2	4	3	1	3	2	2
Player A	3	4	3	7	-5	1	2
	4	4	3	4	-1	2	2
	5	4	3	3	-2	2	2

[10]

Q3. Solve the following Integer Programming problem.

Maximize $Z = 4x1 + 6x2 + 2x3$
subject to

$$4x1 - 4x2 \leq 5,$$
$$-x1 + 6x2 \leq 5,$$
$$-x1 + x2 + x3 \leq 5,$$
$$x1 \geq 0, x2 \geq 0, x3 \geq 0 \text{ and } x1, x3 \text{ integer}$$

[10]

P.T.O

Q4. (a) Discuss the application and role of linear programming models in the field of automobile engineering. How you will utilize them in future? [5]

(b) Paras recorded the speeds of cars driving past his office, where the speed limit is 25 Km per hour. Assume that these speed recordings follow an approximately normal distribution. The mean of 90 readings was 23.84 Km per hour, with a standard deviation of 2.56 Km per hour.

(a) What is the probability that a car goes with a speed of more than 25 Kph?
(b) What is the probability that a car goes with a speed of 20 Kph or less? [5]

Q5. A researcher is interested in determining whether or not review sessions affect exam performance at a significance level of 0.05. The independent variable, a review session, is administered to a sample of students (n=9) in an attempt to determine if this has an effect on the dependent variable, exam performance. Based on information gathered in previous semesters, the population mean for a given exam is 24. The sample mean is 25, with a standard deviation (s) of 4. [10]

Q6. A manufacturer of sprinkler systems designed for fire protection claims that the average activating temperature is at least 135° F. To test this claim, you randomly select a sample of 32 systems and find the mean activation temperature to be 133° F with a standard deviation of 3.3°F. At $\alpha = 0.10$, do you have enough evidence to reject the manufacturer's claim? [10]

Q7. (a) Derive the formulae for the mean and standard deviation of Binomial distribution. Write all the notations and assumptions. [6]

(b) Write the short notes on any two of the following. [4]
   (i) Central Limit Theorem
   (ii) Dual simplex method
   (iv) Gomry's Constraint
   (v) ANOVA

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