

Seat No.: _____

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GUJARAT TECHNOLOGICAL UNIVERSITY**M.E –Ist SEMESTER–EXAMINATION – JULY- 2012****Subject code: 711305 N****Date: 11/07/2012****Subject Name: Statistics and Optimization Techniques****Time: 2:30 pm – 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is conditional probability? Explain with an example **07**
 (b) Write the mathematical formulation of transportation problem and Explain its application. **07**

- Q.2** (a) What is hypothesis testing? What are the types of hypothesis testing? Explain with example. **07**
 (b) What are the factors to be consider while designing questionnaire? **07**

OR

- (b) An automobile company has three manufacturing plants at Pune, Madras, and Nagpur. Company has two major distributors based at Bombay and Delhi. The capacities of the three plants during the next quarters are 1000, 1500 and 1200 cars. The quarterly demands at two distribution centers are 2300 and 1400 cars. The mileage chart between the plants and the distribution centers are given in Table 1. Formulate the transportation problem **07**

	Delhi	Bombay
Pune	1275	850
Madras	1000	2690
Nagpur	1250	1350

- Q.3** (a) Explain Byes theory and state Engineering applications. **07**
 (b) For the purpose of designing the left turn for the east bound traffic the observations are of car waiting for left turns at intersection yielded the following results. **07**

No. of Cars	No. of Observation
0	4
1	16
2	20
3	14
4	3
5	2
6	1
7	0
8	0

E1=Event more than 2 cars waiting for the left turn

E2=Event that 2 to 4 cars waiting for the left turn

Find the probability of E1, E2, $E1 \cap E2$ and $E1 \cup E2$ **OR**

- Q.3** (a) Explain least square method for regression analysis. **07**
 (b) The following table shows growth of traffic in lacs of vehicle number from year 2001 to 2006. **07**

Year (x)	2001	2002	2003	2004	2005	2006
Vehicles in year (y)	15	20	22	24	25	30

Find equation of least square line which will predict y in terms of x . Also calculate standard error.

How many numbers of vehicles can be expected in year 2012?

- Q.4** (a) Explain Poisson distribution with an example. **07**
 (b) Briefly state about various optimization techniques. **07**

OR

- Q.4** (a) Explain Markov process and Queuing Models **07**
 (b) Write short note on central limit theorem. **07**

- Q.5** (a) Solve the following linear programming problem using graphical method **07**
 Maximize $Z = 6x_1 + 8x_2$

$$\text{Subject to } 5x_1 + 10x_2 \leq 60$$

$$4x_1 + 5x_2 \leq 40$$

$$x_1, x_2 \geq 0$$

- (b) Solve the following assignment problem. The matrix entries represent the time in hours of the job i if it is assigned to the operator j **07**

		<u>Operators</u>		
<u>Job</u>		<u>1</u>	<u>2</u>	<u>3</u>
	<u>1</u>	13	5	8
	<u>2</u>	9	15	18
	<u>3</u>	12	14	10

OR

- Q.5** (a) Solve the following linear programming problem using simplex method **07**
 Maximize $Z = 3X_1 + 2X_2 + 5X_3$

Subject to

$$X_1 + X_2 + X_3 \leq 9$$

$$2X_1 + 3X_2 + 5X_3 \leq 30$$

$$2X_1 - X_2 - X_3 \leq 8$$

$$X_1, X_2, \text{ and } X_3 \geq 0$$

- (b) The arrival rate of customers at a banking counter follows Poisson distribution with mean rate of 30 per hour. The service rate of counter clerk also follows Normal distribution with mean of 45 per hour. **07**

What is probability of having zero customers?

What is probability of having 2 customers in queue?

What is average number of customers in queue?