

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII • EXAMINATION – SUMMER • 2014****Subject Code: 171901****Date: 22-05-2014****Subject Name: Operation Research****Time: 02:30 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) State the phases of Operation Research. Discuss in brief the areas of application of Operation Research **07**

(b) Solve the following LPP by simple method : **07**

Maximize $Z = 3x_1 + 2x_2$ subject to $2x_1 + x_2 \leq 5$, $x_1 + x_2 \leq 3$ and x_1 and $x_2 \geq 0$

Q.2 (a) Company wants to find out the minimum time require to complete four tasks by available four workers with him so that he can take another from the order party. Following table gives the time in hours for each workers for each job **07**

	A	B	C	D
1	24	10	21	11
2	14	22	10	15
3	15	17	20	19
4	11	19	14	13

(b) Explain Monte Carlo simulation procedure. Also discuss its applications with suitable example **07**

OR

(b) A school wants to pick up students from five different areas. Cost in rupees of going from one area to another is shown in table. Find the optimal route to the bus drive such that no repetition of the area comes before picking up students from all areas **07**

	I	II	III	IV	V
I	0	30	60	80	20
II	70	0	40	90	30
III	90	80	0	50	80
IV	130	50	70	0	60
V	20	40	30	90	0

Q.3 (a) Reduce following matrix by rule of dominance **07**

		Player			
		B1	B2	B3	B4
Player	A1	6	4	8	0
	A2	6	8	4	8
	A3	8	4	8	0
	A4	0	8	0	16

(b) Two companies are thinking on selecting the advertising media. There are three medias available along with the pay of as shown in the pay of matrix **07**

		TV	Radio	Internet
Player A	TV	150	200	-400
	Radio	0	75	-100
	Internet	450	100	250

Value is in gain sales in (1000 rupees) suggest optimal strategy for the marketing and find out the value of the game

OR

- Q.3 (a)** A person is planning to purchase a car. A new car is costing rupees 3 lacs. The resale value of the car at the end of the year is 85 % of the previous year. Maintenance and repair cost during the first year are rupees 10000 and they increase by 15 % every year. The minimum resale value of the car can be rupees 75000. (a) When should the car be replaced to minimize average annual cost? (b) If interest rate of 12 % is assumed, calculate the average cost at the end of 10 years **07**

- (b)** A copy maker has one copy making machine and he operates as the order comes. The order arrival is poisson distribution having interval time of 0.5 min. The average time to serve a copy is distributed with mean of 0.3 min. Determine the following: (1) Utilization factor of the machine (2) Idle time for machine in a day having working hours of 10 hours (3) No of persons waiting in the system (4) No of persons waiting in the queue (5) Average waiting time in the queue **07**

- Q.4 (a)** From the following given data find out shortage cost for the item. $C_1 = \text{Rs.}900/-$ and critical probability = 0.70 **07**

Units Stocked	50	58	65	70	75
Probability	0.2	0.25	0.14	0.34	0.07

- (b)** Consider the following given data and based on that find out critical path for the given project. **07**

Activity	1-2	1-3	2-4	3-4	3-5	3-6	4-6	5-6
Time in days	6	9	3	4	8	12	7	1

OR

- Q.4 (a)** A utensil manufacturing company manufactures around 140 units of utensils. Depending upon the availability of raw material and other conditions the daily production has been varying from 136 units of utensils to 144 units of utensils whose probability is as given below. **07**

Production per day	136	137	138	139	140	141	142	143	144
Probability	0.03	0.06	0.14	0.13	0.22	0.16	0.12	0.08	0.06

The finished units of utensils are transported in a specially designed rickshaw that can accommodate only 140 units of utensils. Using the following given random numbers simulate the process to find out (1) What will be the average number of utensils waiting in the factory? (2) What will be the number of empty spaces in rickshaw

Random Numbers: 84, 72, 28, 52, 38, 65, 13, 79, 27, 54, 01

- (b)** Solve the cargo loading problem with following data and maximum weight capacity is five. **07**

Item (n)	Weight (W _n)	Return (R _n)
1	1	3
2	2	7
3	3	10

- Q.5 (a)** Explain the following terms in connection with inventory management. (1) Re-order point (2) Safety stock (3) Lead time (4) Economic lot size (5) Carrying cost **07**

- (b)** Explain the term crashing of network. Why it is required? **07**

OR

- Q.5 (a)** The annual demand of a product is 15,000 units. Each unit cost Rs.50/- if the orders are placed in quantity below 150 units. For order of 200 and above the unit price is Rs.44/-. Assume inventory holding cost is 12% of the value of item and ordering cost is Rs.2/- per order find the economic lot size **07**

- (b) A company is presently buying an item of worth Rs.90,000/- from a supplier at an optimal purchasing policy at a discount of 1%. Presently the ordering cost is Rs.100/- per order and 20% as inventory handling cost of the average inventory level. The company receives another two offers from the other suppliers. First supplier offers 5% discount if the order is placed twice a year and second supplier offers 3% discount if the order is placed quarterly a year. Which offer the company should accept? **07**

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