Printed Pages : 7 **TME-601**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4093 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. VI) EXAMINATION, 2007-08

OPERATIONS RESEARCH

Time : 3 Hours] *[Total Marks : 100*

Note : *Attempt all questions. All question carry equal marks.*

1 Attempt any **two** parts of the following : **10×2=20**

(a) Describe various models and then applications of operations research.

(b) A manufacturing company can sell a maximum of 10,000 units of a products, which are quality approved. The company have 3 processing plants, each with a processing capacity of 5000 units, cost of processing and percentage of rejections varies for various plants.

Plant	*Cost of Processing / unit*	*% age rejections*
A	*100*	*5%*
B	*125*	*3%*
C	*150*	*2%*

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The only cost other then processing cost is Raw Material Cost, which is Rs. 200 per unit. All quality approved goods are sold for Rs. 600 each and rejections are sold per Rs. 50 each. The company have policy of not having more than overall 3% rejections.

Formulate LPP to decide optimum production by various plants.

(c) What is a 'dual' ? How does, it help in linear programming ? Write the dual of following LPP

Minimize $Z = x_1 + \frac{1}{2}x_2$

Subject to $6x_1 + 2x_2 \geq 24$

$3x_1 + 2x_2 \geq 18$

$x_1 + 3x_2 \geq 12$

$x_1,\ x_2 \geq 0$

2 Attempt any two parts of the following : **10×2=20**

(a) Determine the optimal solution of the transportation matrix and check the optimality. The matrix is cost matrix.

Requirement	Availability		30	30	30
	Market	Godown	a	b	c
28	X		7	9	3
50	Y		2	5	7

(b) Write the Hungarian algorithm and prove that Assignment Model is a special cose of transportation model.

(c) Following profit matrix indicates profit in stages A, B and C, when they make 1, 2, 3 or 4 costings.

Determine best productions schedule using DP. Minimum 1 costing is must for every stage

	A	*B*	*C*
1	4	9	8
2	12	10	15
3	20	22	20
4	20	30	30

3 Attempt any two parts of the following : **10×2=20**

(a) The annual demand for a seasonal product follows the distribution as follows :

Demand	**3000**	**3500**	**4000**	**4500**	**5000**
Probability	**0.1**	**0.2**	**0.3**	**0.3**	**0.1**

The manufactures of this item can produce it by one of three methods :

(i) Using existing equipment at a cost of Rs. 8 per unit.

(ii) Buy special equipment for Rs. 22,000, whose salvage value of the end of year would by 2000 the variable cost per unit would be reduced to Rs. 2.

(iii) Buy a superspecial equipment for Rs. 90,000 which would be useful for 4 years and would be depreciated on straight line. The variable cost would further be reduced to Rs. 1.20 / unit which equipment should be used ?

(b) For the following pay off matrix, find the value of the game and strategic using linear Programming :

	Player B		
Player A	1	2	3
1	3	–1	4
2	6	7	–2

(c) Describe the principles of decision making in various conditions. Differentiate between Laplace Criterian, Hurcwitz criteria, Minimax and minimax using a suitable example.

4 Attempt any two of the following : **10×2=20**

(a) Derive expression for EOQ for Inventory models will planed shortages.

(b) A manufacturing company needs 2500 units of a particular component every year. The company buys it at the rate of Rs. 30/unit. The order processing cost is estimated at Rs. 15 and cost of carrying a part in stock comes out to be Rs. 4 per years.

The company can manufacture this part. In this case, it saves 20% of price of product. It estimates a set up cost of Rs. 250 per production run. The annual production rate would be 9800 units. Inventing holding cost remains unchanged :

(i) Determine EOQ and frequency of orders

(ii) Determine production lot-size and average production run

(iii) suggest company on make or buy

(c) What are assumptions in EOQ model ? What are consequences if each one of them are relaxed at a time ? How can they be taken care of in such consequences.

5 Answer any two of the following : **10×2=20**

(a) A single counter reservation office serves passengers with an average service time of

5 minutes (exponentially distributed) Passengers comes for reservation in poisson at an average rate of 8 per hour

(i) What is average queue length

(ii) What is probability that there are 3 passengers in the system

(iii) Probability that a passenger shall wait for more than 10 minutes before getting served

(iv) What is average queue length if avg. no of passengers increase to 12 per Hr ? Why ?

(b) A car garage have an average inter arrival time of 2 hrs in Poisson. The garage does service a car in 3 hrs, exponentially distributed. If cost of retention of cors and operating a new channel of service is same, determine optimum no. of Service channels, the garage should employ.

(c) There are 3 machines to perform an operation each on various jobs. If time consumed, for various variciles of job on each shop is given

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below, determine %age ideal time for machine B and C. The operations one to be done in sequence on machine A, B and C :

Job	Probability	Time in minutes		
		M/C A	M/C B	M/C C
P	0.2	10	15	20
Q	0.3	20	15	10
R	0.4	15	15	15
S	0.1	12	16	15

Assume the workshop to work round the clock. Use Monte Carlo simulation (2 sets) and use random no. as follows :

Set 1	7	3	5	2	8	9	9	0	1	3
Set 2	7	4	2	1	9	1	3	2	8	4

OR

(c) Describe and explain Monte Carlo simulation technique.

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