

Code No: RT41242

R13
Set No. 1

IV B.Tech I Semester Supplementary Examinations, February/March - 2018

OPERATION RESEARCH

(Automobile Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B

PART-A(22 Marks)

1. a) Explain briefly the graphical method of solving LPP. [3]
- b) Explain Vogel's approximation method of solving a transportation problem? [4]
- c) Describe briefly some of the replacement policies? [4]
- d) What is a saddle point? [4]
- e) Differentiate holding cost and set up cost. [4]
- f) What are the advantages of simulation? [3]

PART-B(3x16 = 48 Marks)

2. Minimize $Z = x_1 - 3x_2 + 2x_3$,
 Subject to: $3x_1 - x_2 + 3x_3 \leq 7$
 $-2x_1 + 4x_2 \leq 12$
 $-4x_1 + 3x_2 + 8x_3 \leq 10$,
 and $x_1, x_2, x_3 \geq 0$ Solve the problem by using Simplex method. [16]

3. A steel company has three open hearth furnaces and five rolling mills. Transportation cost(rupees per quintal) for shipping steel from furnaces to rolling mills are shown in the following table, what is the optimal shipping schedule?

		Mills					Capacities (in quintals)
		M ₁	M ₁	M ₁	M ₁	M ₁	
Furnaces	F ₁	4	2	3	2	6	8
	F ₂	5	4	5	2	1	12
	F ₃	6	5	4	7	3	14
Requirement(In quintals)		4	4	6	8	8	

[16]

4. a) The following failure rates have been observed for a certain type of light bulbs given in the table, The cost of replacing an individual bulb is Rs. 1.25. The decision is made to replaces all bulbs simultaneously at fixed intervals and also to replace individual bulbs as they fail in service. If the cost of group replacement is 30 paise per bulb. What is the best interval between group replacements?

End of week:	1	2	3	4	5	6	7	8
Probability of failure to date:	0.05	0.13	0.25	0.43	0.68	0.88	0.96	1.00

[8]

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- b) There is a special light bulb that never lasts longer than 2 weeks. There is a chance of 0.3 that a bulb will fail at the end of first week. There are 100 new bulbs initially. The cost for individual replacements is Rs.1.25 and the cost per bulb for group replacement is Rs.0.50. Is it cheaper to replace all the bulbs,
 (i) Individually (ii) every week (iii) every second week? [8]
5. a) For the game given below determine optimal strategies for A.
- | | | |
|---|---|----|
| | B | |
| A | 3 | 1 |
| | 2 | 7 |
| | 1 | 11 |
- b) A company has two manufacturing shops and 2 tool cribs one for each shop. Both tool cribs handle identical tools, gauges and measuring instruments. The service time is negative exponentially distributed with a mean of 3 minutes per workman. Arrival of the workman follows Poisson distribution with a mean of 15 per hour. The production manager feels if tool cribs are combined for both shops efficiency will improve and waiting time in the queue will reduce. Do you agree with this operation? [8]
6. a) Describe in detail ABC analysis. State its advantages and limitations. [8]
 b) The probability distribution of monthly sales of a certain company is given in the table. The cost of holding inventory is Rs. 10 per unit per month. A stock of 5 items is maintained at the start of each month. If the shortage cost is proportional to both time and quantity short. Find the imputed cost of shortage of unit item for unit item.

Monthly Sales	0	1	2	3	4	5	6	7	8
Probability	0.01	0.05	0.24	0.33	0.20	0.07	0.06	0.02	0.02

7. a) Explain utility of simulation to solve inventory problems. [8]
 b) Use dynamic programming to solve
 Maximize $Z = Y_1^2 + Y_2^2 + Y_3^2$
 Subjected to constraints
 $Y_1 + Y_2 + Y_3 \geq 15$
 $Y_1, Y_2, Y_3 \geq 0$ [8]