

CBCS SCHEME

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18ME735

Seventh Semester B.E. Degree Examination, July/August 2022 Operations Research

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of Normal distribution table is allowed.**

Module-1

- 1 a. List and explain the phase of Operation Research. (08 Marks)
 b. Old Hens can be brought at Rs 20.00 each and Young one at Rs 50 each. The old hens leys 3 eggs per week and young one leys 5 eggs per week. Each egg being worth of Rs 2.00. A hen cost Rs 4.00 per week to feed. He has only Rs 800.00 to spend for hens. How many of each kind should be purchased to get a profit of more than Rs 600.00 per week. Assume that he cannot have more than 200 hens. Formulate the problem as LPP model. (12 Marks)

OR

- 2 a. Define Operating Research and mention its application. (06 Marks)
 b. Use Graphical method to solve the following LPP.
 Maximize $Z = 2x_1 + 3x_2$.
 Subject to constraints i) $x_1 + x_2 \leq 30$ ii) $x_2 \geq 3$ iii) $0 \leq x_2 \leq 12$
 iv) $0 \leq x_1 \leq 20$ v) $x_1 - x_2 \geq 0$, $x_1, x_2 \geq 0$. (14 Marks)

Module-2

- 3 a. Define the importance of Slack, Surplus and Artificial variable with respect to LPP. (06 Marks)
 b. Solve the following LPP by Simplex method.
 Maximize $Z = 5x_1 + 6x_2$
 Subject to constraints $2x_1 + 5x_2 \leq 1500$
 $3x_1 + x_2 \leq 1200$; $x_1, x_2 \geq 0$. (14 Marks)

OR

- 4 Solve the following LPP by Big – M method.
 Maximize $Z = 2x_1 + 5x_2$
 Subject to constraints $x_1 \leq 40$
 $x_2 \leq 30$
 $x_1 + x_2 \geq 60$; $x_1, x_2 \geq 0$. (20 Marks)

Module-3

- 5 a. List out the difference between Transports and Assignment problem. (04 Marks)
 b. A Company has three plants located at A, B and C which supply to warehouses 1, 2, 3, 4 and 5. Monthly plant capacities are 800, 500 and 900 units respectively. Monthly warehouse requirements are 400, 400, 500, 400 and 800 units respectively. The unit cost of transport in Rs is given in the table. Determine the Optimal cost of transport with Optimal allowance.

From \ To	D	E	F	G	H
A	5	8	6	6	3
B	4	7	7	6	6
C	8	4	6	6	4

(16 Marks)

OR

- 6 a. Find the Optimum assignment where 5 tasks to be assigned to 5 persons.

Persons \ Tasks	I	II	III	IV	V
A	6	5	8	11	16
B	1	13	16	1	10
C	16	11	8	8	8
D	9	14	12	10	16
E	10	13	11	8	16

(10 Marks)

- b. Solve the following Travelling Salesman Problem.

	A	B	C	D	E
A	∞	3	6	2	3
B	3	∞	5	2	3
C	6	5	∞	6	4
D	2	2	6	∞	6
E	3	3	4	6	∞

(10 Marks)

Module-4

- 7 The time estimates in weeks for PERT network is given below. Calculate the following :
- Total expected time for critical path.
 - Standard deviation and variance of the project.
 - Probability of project completed atleast 4 weeks earlier than expected time.
 - If the project due date is 19 weeks, what is the probability of not meeting to due date?

Activity	t_o	t_m	t_p
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	2	8
2 – 5	1	1	1
3 – 5	2	5	14
4 – 6	2	5	8
5 – 6	3	6	15

(20 Marks)

OR

- 8 a. Explain the Kendall and Lee's notation for representing queuing models. (06 Marks)
- b. At certain petrol pump, customers arrive according to Poisson process with an average time of 5min between arrivals. The service time is exponentially distributed with mean of 2 mins.
- What would be the average queue length?
 - What is the average waiting time of vehicle before receiving petrol?
 - The management is willing to install a second pump, if the average waiting time is 5 min. What should be the minimum arrival rate to justify the decision? (14 Marks)

Module-5

- 9 a. Explain the following terms with respect to game theory :
- Pure strategy
 - Saddle point
 - Mixed strategy. (06 Marks)

b. Solve the following game :

		Player B			
		I	II	III	IV
Player A	I	6	4	8	0
	II	6	8	4	8
	III	8	4	8	0
	IV	0	8	0	16

(14 Marks)

OR

- 10 a. Explain the assumptions made while solving Sequencing problems. (06 Marks)
 b. Use Graphical method to find minimum Elapsed total time. The sequence of two Jobs on five machines are given

Job 1	Sequence	A	B	C	D	E
	Time (hr)	2	3	4	6	2
Job 2	Sequence	C	A	D	E	B
	Time (hr)	4	5	3	2	6

(14 Marks)

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