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MBAH 503

Third Semester MBA Degree Examination, April/May 2024
BUSINESS ADMINISTRATION
Operations Research

Time : 3 Hours

Max. Marks : 70

SECTION – A

Answer **any two** questions. **Each** question carries **ten** marks. Answer to **each** question should **not** exceed **five** pages. **(2×10=20)**

1. Explain the concept of a decision-making environment and its role in Operations Research.
2. Write a detailed note on the requirements of a Linear Programming problem.
3. Define Simulation and different types of Simulation. Explain the application of Simulation in Business Operation.

SECTION – B

Answer **any three** questions. **Each** question carries **twelve** marks. Answer to **each** question should **not** exceed **six** pages. **(3×12=36)**

4. Solve the LPP using simplex method.

$$\text{Maximize } Z = 3x + 2y$$

$$\text{Subject to } 4x + 3y \leq 12$$

$$4x + y \leq 8$$

$$4x - y \leq 8$$

$$x, y \geq 0$$

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P.T.O.



5. Determine an initial basic feasible solution to the following transportation problem using NWCR.

		Destination				Supply
		D ₁	D ₂	D ₃	D ₄	
Origin	O ₁	6	4	1	5	14
	O ₂	8	9	2	7	16
	O ₃	4	3	6	2	5
	Demand	6	10	15	4	35

6. A machine costs Rs. 10,000. Its operating cost and resale value are given below.

Year	1	2	3	4	5	6	7	8
Maintenance cost in Rupees	1000	1200	1400	1700	2000	2500	3000	3500
Resale price	6000	4000	3200	2600	2500	2400	2000	1600

Determine at what time it could be replaced ?

7. A sample of 100 arrivals of a customer at a retail sales depot is according to the following distribution.

Time between arrival (min.)	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Frequency	2	6	10	25	20	14	10	7	4	2

A study of the time required to service customers by adding up the bills, receiving payments and placing packages yields the following distribution.

Time between service (min.)	0.5	1	1.5	2	2.5	3
Frequency	12	21	36	19	7	5

Estimate the average percentage of customer waiting time and average percentage of idle time of the server by simulation for the next 10 arrivals.



8. There are 5 jobs each of which must go through the 2 machines A and B in the order AB. Processing times are given below.

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

Determine the sequence of 5 jobs that will minimise the total elapsed time.

**SECTION – C
(Compulsory)**

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Answer to the question should **not** exceed 6 pages.

(1×14=14)

9. Consider a project for which time estimates are given below. Construct the PERT network. What is critical path ? Find the probability of completing the project before 23 days.

Activity	Time Estimates (Day)		
	Optimistic	Most likely	Pessimistic
1 – 2	2	5	8
1 – 3	1	4	7
2 – 4	0	0	0
2 – 3	2	4	6
2 – 6	5	7	12
3 – 4	3	5	10
3 – 5	3	6	9
4 – 5	4	6	10
4 – 6	2	5	8
5 – 6	2	4	6