



PG – 1417

6

II Semester M.B.A. (Day and Eve.) Examination,
December 2024/January 2025
(CBCS) (2021-22 Onwards)
MANAGEMENT



Paper – 2.6 : Quantitative Techniques and Operation Research

Time : 3 Hours

Max. Marks : 70

SECTION – A

Answer **any five** questions. **Each** question carries **five** marks.

(5×5=25)

1. Discuss the origin and development of OR. What are the limitations of OR ?
2. Explain the significance of the following variables with examples.
 - a) Slack variable
 - b) Surplus variable
 - c) Artificial variables.
3. You are given the following data regarding the processing times of certain number of jobs on three machines. The order of processing on three machines is M1-M2-M3 and passing is not allowed. Determine the sequence for jobs that will minimize the total elapsed time T required to complete the jobs. Also, find out the idle time of M2 and M3.

Machines/Jobs	A	B	C	D	E	F	G
M1	3	8	7	4	9	8	7
M2	4	3	2	5	1	4	3
M3	6	7	5	11	5	6	12

4. A departmental store has a single cashier. During the rush hour customers arrive at the rate of 20 customers per hour. The average number of customers that can be served by the cashier is 24 per hour. Assume that the conditions for the use of single channel queuing model apply :
 - a) What is the probability that the cashier is idle ?
 - b) What is the average time customer spends in the system ?
 - c) What is the average number of customers in the queue ?
 - d) What is the average time customer spends in queue waiting for service ?

P.T.O.



5. Use the Dominance Property to reduce the following game to 2×2 game and find Optimal Strategy and Value of the game :

	B1	B2	B3
A1	3	-2	4
A2	-1	4	2
A3	2	-2	6

6. Describe a general Transportation problem. Explain how to determine an initial basic feasible solution to the problem using Vogel's approximation method.
7. The maintenance cost and resale value per year of a machine whose purchase price is Rs. 7,000 is given below :

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.)	900	1,200	1,600	2,100	2,800	3,700	4,700	5,900
Resale Value (Rs.)	4,000	2,000	1,200	600	500	400	400	400

When should the machine be replaced ?

SECTION – B

Answer **any three** questions. **Each** question carries **ten** marks.

(3×10=30)

8. A company is producing a single product and selling it in five different agencies situated in different cities. All of a sudden there is a demand for a product in another five cities not having any agencies of the company. The company is faced with the problem of deciding on how to assign the existing agencies to dispatch the products to needy cities in such a way that the travelling distance is minimized. The distance in kilometers between the surplus and deficit cities are given in the matrix :

Surplus/Deficit	I	II	III	IV	V
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105



9. A bakery keeps stock of a popular brand of cake. Daily demand based on past experience is given below :

Daily demand	0	15	25	35	45	50
Probability	0.01	0.15	0.20	0.50	0.12	0.02

Consider the following sequence of random numbers : 48, 78, 09, 51, 56, 77, 15, 14, 68 and 09.

- Using the sequence, simulate the demand for the next 10 days.
 - Find the stock situation if the owner of the bakery decides to make 35 cakes everyday. Also estimate the daily average demand for the cakes on the basis of simulated data.
10. Determine the initial basic feasible solution and optimum solution for the transportation problem.

	A	B	C	D	E	Supply
X	4	1	3	4	4	60
Y	2	3	2	2	3	35
Z	3	5	2	4	4	40
Demand	22	45	20	18	30	135

11. Following information is given about a project :

Activity	Pessimistic time (b)	Most likely time (m)	Optimistic time (a)
1-2	3	3	3
2-3	9	6	3
2-4	6	4	2
3-5	8	6	4
4-6	8	6	4
5-6	0	0	0
5-7	5	4	3
6-7	8	5	2

Draw the network diagram for the above and find out :

- Variance for each activity.
- Critical path and expected project length.
- The probability that the project will be completed within 23 weeks.



SECTION – C

Compulsory question.**(1×15=15)**

12. Case study.

Using Simplex Method to solve the following LPP :

$$\text{Max } Z = 6x_1 + 8x_2$$

$$\text{Sub to } 30x_1 + 20x_2 \leq 300$$

$$5x_1 + 10x_2 \leq 110$$

$$x_1, x_2 \geq 0$$
