



- Notes :
1. All questions are compulsory and carry equal marks.
 2. Draw neat and labelled diagram and use supporting data wherever necessary.
 3. Avoid vague answers and write specific answer related to question.

1. Either

- a) What is operation Research? Explain its origin and development of OR. 8
- b) Explain the classification of problems in operation Research in brief. 8

OR

- c) Explain Linear programming concepts of Linear programming model in brief. 8
- d) What are the Graphical solution methods in brief. 8

2. Either

- a) Find maximum and minimum value of : 8
 $z = 5x_1 + 3x_2$
 Subject to constraints:
 $x_1 + x_2 \leq 6$
 $2x_1 + 3x_2 \geq 3$
 $0 \leq x_1 \leq 3$
 $0 \leq x_2 \leq 3$
- b) Enlist and explain the various Linear programming Method in brief. 8

OR

- c) Write the dual of the following LPP: Min. Z: 8
 $5x_1 - 6x_2 + 4x_3$
 Subject to:
 $3x_1 + 4x_2 + 6x_3 \geq 9$
 $x_1 + 3x_2 + 2x_3 \geq 5$
 $7x_1 - 2x_2 - x_3 \leq 10$
 $x_1 - 2x_2 + 4x_3 \geq 4$
 $2x_1 + 5x_2 - 3x_3 \geq 3$
 $x_1, x_2, x_3 \geq 0.$
- d) A firm which manufactures three times A,B and C, the data is given below: 8

Time required (in hrs)			
Product	Assembly	Finishing	Profit
A	10	2	800
B	4	5	600
C	5	4	300
Firm capacity : 2,000		1,009	

i) Express the above data in the form of LPP to maximize the profit from the production.

ii) Solve it by simplex method.

3. Either

a) What is Game Theory? Explain its Terminology in brief. 8

b) Describe Two person zero – sum games in brief. 8

OR

c) Explain The Maximin – Minimax Principal in detail. 8

d) Write a brief note on Dominance property. 8

4. Either

a) Explain Assignment problem with suitable example. 8

b) Write a brief note on Hungarian Method. 8

OR

c) Explain EOQ model with constant rate of demand. 8

d) A barber with one man shop takes exactly 25 minutes to complete one hair cut. If customers arrives in a Poisson fashion at an average rate of one every 40 minutes, How long on the average must a customer wait for service? 8

5. Attempt all the following.

a) Write uses and Limitations of operation Research. 4

b) What is the application of Duality? 4

c) What is the Graphical solution of $2 \times n$ and $m \times 2$ games. 4

d) Explain with example the mathematical model for Transportation problem. 4
