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BT-8/M-20 38031

# OPERATION RESEARCH

Paper–EE-406-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt five questions in all, selecting at least one question from each Unit. All questions carry equal marks.

## UNIT–I

1. (a) Define Operation research. What are the applications and limitations of OR in Industry? 10

   (b) What is scope of operation research in management? Explain its characteristics in detail. 10

2. (a) Consider the LP problem :

   Max. $Z = 2x_1 + 3x_2 + 4x_3$; subjected to the constraints

   $2x_1 + x_2 + 2x_3 \geq 50$, $x_1 + 3x_2 + x_3 \leq 25$, $x_1 + 2x_2 + x_3 \leq 26$ and $x_1, x_2, x_3 \geq 0$.

   Solve this problem using simplex method. 12

   (b) Convert the following L.P.P. to the standard form :

   Max. $Z = 3x_1 + 5x_2 + 7x_3$, subjected to

   $6x_1 - 4x_2 \leq 5$,

$3x_1 + 2x_2 + 5x_3 \geq 11,$

$4x_1 + 3x_3 \leq 2, x_1, x_2 \geq 0.$ 8

UNIT–II

3. (a) Describe the transportation problem and give its mathematical model. 10

(b) Differentiate PERT with CPM in detail. 10

4. (a) Describe in brief the technique given below by taking suitable example :

(i) Least Cost method.

(ii) Vogel's approximation method. 12

(b) Describe forward path, backward path, probability and slack in brief. 8

UNIT–III

5. (a) Define Decision. Explain and illustrate the following principles of decision making :

(i) Laplace, (ii) Maximin,

(iii) Maximax, (iv) Hurwicz. 12

(b) Define Arguement model and compare it with Transport model. 8

6. Describe mathematical representation of Assignment problem and solve it for optimal solution. Figure in

the matrix indicate profits : 20

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | 30 | 37 | 40 | 28 | 40 |
| 2 | 40 | 24 | 27 | 21 | 38 |
| 3 | 40 | 32 | 33 | 30 | 35 |
| 4 | 25 | 38 | 40 | 36 | 36 |
| 5 | 29 | 62 | 41 | 34 | 39 |

## UNIT–IV

7. (a) Describe Queuing theory and its role in decision making. Also explain single and multichannel queuing theory with passion arrival in detail. 12

(b) Discuss theory game with its terminology. 8

8. (a) Explain rules for game theory like saddle point, dominance and mixed strategy (3 × 3 games). 8

(b) Write short notes on any two of the following :

(i) Waiting time and Idle time costs.

(ii) Two person zero sum games.

(iii) Simulation technique. 6×2