

NL-106

November-2013

B.B.A. (Sem.-V)**CC-304 : Operations Research and Q.T.****Time : 3 Hours]****[Max. Marks : 70**

1. (a) Discuss various types of Modelling in O.R.
- 4**

OR

What is Linear Programming ? Give its mathematical formulation. Also write its uses.

- (b) Solve the following LPP by graphical method :
- 6**

Maximize $Z = 2.3x + 2y$
 Subject to, $30x + 20y \leq 7200,$
 $12x \leq 2400,$
 $x + y \leq 275,$
 $x, y \geq 0$

OR

Solve following LPP by Graphical method :

Minimize $Z = 3x + 2y$
 Subject to, $2x + 4y \geq 10,$
 $4x + 2y \geq 10,$
 $y \geq 4,$
 $x, y \geq 0$

- (c) Write dual of the following problem :
- 4**

Minimize $Z = 600x + 400y$
 Subject to, $300x + 100y \geq 2400,$
 $100x + 100y \geq 1600,$
 $200x + 600y \geq 4800,$
 $x, y \geq 0$

OR

Write dual of the following problem :

Minimize $Z = 5x + 7y$
 Subject to, $x + y \leq 4,$
 $3x + 8y \leq 24,$
 $5x + 2y \geq 10,$
 $x, y \geq 0$

2. (a) What is Transportation Problem ? Why it is called special case of LPP ? 4

OR

Write short note on North-West Corner method.

(b) Find initial solution of following problem by least cost method : 5

| | W | X | Y | Z | Supply |
|--------|----|-----|----|----|--------|
| A | 50 | 150 | 70 | 60 | 50 |
| B | 80 | 70 | 90 | 10 | 60 |
| C | 15 | 87 | 79 | 81 | 40 |
| Demand | 20 | 70 | 50 | 10 | |

OR

Find initial solution of following problem by Vogel's Approximation method :

| | X | Y | Z | Supply |
|--------|----|----|----|--------|
| A | 5 | 1 | 7 | 50 |
| B | 6 | 4 | 6 | 80 |
| C | 3 | 2 | 5 | 15 |
| Demand | 75 | 20 | 50 | |

(c) Check whether the given solution is optimum or not. If it is not then find it 5

| | D ₁ | D ₂ | D ₃ | D ₄ | D ₅ |
|----|----------------|----------------|----------------|----------------|----------------|
| 01 | 12 | 4 8 | 3 9 | 4 11 | 4 0 |
| 02 | 6 6 | 7 | 10 | 1 7 | 0 |
| 03 | 5 | 9 | 8 7 | 6 | 0 |

OR

Obtain optimum solution of following problem : 5

| | I | II | III | Supply |
|--------|----|----|-----|--------|
| 1 | 7 | 12 | 9 | 16 |
| 2 | 8 | 10 | 6 | 10 |
| 3 | 10 | 9 | 12 | 12 |
| Demand | 8 | 11 | 19 | |

3. (a) Give difference between PERT & CPM. 4

OR

Give advantages and limitations of PERT.

(b) Draw PERT diagram from the following information. Also find critical path. 5

| | | | | | | |
|-------------------------|---|-----|-----|-----|-----|-----|
| Activity | : | 1-2 | 1-3 | 2-5 | 3-5 | 5-6 |
| Optimistic time | : | 7 | 7 | 8 | 10 | 10 |
| Most likely time | : | 12 | 10 | 13 | 12 | 14 |
| Pessimistic time | : | 13 | 12 | 15 | 22 | 18 |

OR

Prepare a network and determine critical path.

| | | | | | | | |
|---------------------------|---|---|---|---|---|---|------|
| Activity | : | A | B | C | D | E | F |
| Preceding Activity | : | - | A | B | - | D | C, E |
| Estimate Time | : | 2 | 3 | 4 | 5 | 2 | 5 |

- (c) Find Free, Total and Independent Float time for each activity. 5

| | | | | | | | |
|-----------------|---|-----|-----|-----|-----|-----|-----|
| Activity | : | 1-2 | 1-3 | 2-3 | 2-4 | 3-4 | 4-5 |
| Duration | : | 20 | 25 | 10 | 12 | 6 | 10 |

OR

Find EST, LST, EFT & LFT for each activity.

| | | | | | | | |
|-----------------|---|-----|-----|-----|-----|-----|-----|
| Activity | : | 1-2 | 1-3 | 2-3 | 2-4 | 3-4 | 4-5 |
| Time | : | 5 | 7 | 3 | 4 | 3 | 5 |

4. (a) What is Assignment Problem ? Represent it as a Linear Programming Problem. 4

OR

What is Game Problem ? What are the assumptions made in Game theory ?

- (b) Find optimal assignment of the following problem : 5

| | | | | |
|----------|----------|----------|----------|----------|
| | P | Q | R | S |
| A | 11 | 12 | 13 | 14 |
| B | 14 | 15 | 16 | 17 |
| C | 15 | 16 | 17 | 18 |
| D | 18 | 17 | 16 | 15 |

OR

Solve the following assignment problem :

| | | | |
|----------|----------|----------|----------|
| | X | Y | Z |
| A | 16 | 20 | 20 |
| B | 12 | 13 | 16 |
| C | 18 | 20 | 15 |
| D | 16 | 14 | 17 |

- (c) Solve the following payoff Matrix, determine optimal strategies and value of the game : 5

| | | |
|-----------------|-----------------|---|
| | Player B | |
| Player A | 1 | 7 |
| | 6 | 2 |

OR

Solve the following game :
$$\begin{bmatrix} 9 & 8 & -7 \\ 3 & -6 & 4 \\ 6 & 7 & -7 \end{bmatrix}$$

5. Answer the following questions :

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- (1) Define Linear Programming Problem.
- (2) Write difference between solution and feasible solution.
- (3) Define Objective Function.
- (4) What do you mean by unbounded solution ?
- (5) What do you mean by balanced transportation problem ?
- (6) What is basic condition for applying MODI method ?
- (7) _____ is taken into consideration for allocation in LCM of solving transportation problem.
- (8) For a transportation matrix of order 4×3 , how many no. of occupied cells for non-degenerate solution ?
- (9) What is the value of decision variable X_{ij} in Assignment problem ?
- (10) What is demand of each destinations in Assignment problem ?
- (11) What do you mean by unbalanced Assignment Problem ?
- (12) Explain LFT with respect to PERT.
- (13) In PERT the project is divided into different _____, while in CPM it is divided into different _____.
- (14) What is Saddle Point ?
