

Seat No. : \_\_\_\_\_

**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 <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	D <sub>5</sub>
01	12	4	3	4	4
		8	9	11	0
02	6	7	10	1	0
	6			7	
03	5	9	8	6	0
			7		

**OR**

Obtain optimum solution of following problem :

	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

<b>Activity :</b>	1 – 2	1 – 3	2 – 5	3 – 5	5 – 6
<b>Optimistic time :</b>	7	7	8	10	10
<b>Most likely time:</b>	12	10	13	12	14
<b>Pessimistic time :</b>	13	12	15	22	18

**OR**

Prepare a network and determine critical path.

<b>Activity</b> :	A	B	C	D	E	F
<b>Preceding Activity</b>	-	A	B	-	D	C, E
<b>Estimate Time</b> :	2	3	4	5	2	5

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

5

<b>Activity</b> :	1-2	1-3	2-3	2-4	3-4	4-5
<b>Duration</b> :	20	25	10	12	6	10

**OR**

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

<b>Activity</b> :	1-2	1-3	2-3	2-4	3-4	4-5
<b>Time</b> :	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

	<b>P</b>	<b>Q</b>	<b>R</b>	<b>S</b>
<b>A</b>	11	12	13	14
<b>B</b>	14	15	16	17
<b>C</b>	15	16	17	18
<b>D</b>	18	17	16	15

**OR**

Solve the following assignment problem :

	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>A</b>	16	20	20
<b>B</b>	12	13	16
<b>C</b>	18	20	15
<b>D</b>	16	14	17

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

5

	<b>Player B</b>	
<b>Player A</b>	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 :

14

- (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  $4 \times 3$ , 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 ?

\_\_\_\_\_