

Day : Tuesday  
Date : 16/10/2018

W-2018-0962

Time: 03.00 PM TO 05.00 PM  
Max. Marks: 40

N. B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non programmable **CALCULATOR** is allowed.

Q.1 Attempt any **TWO** of the following: (10)

- a) Explain
  - i) Slack variable in L.P.P.
  - ii) Decision variables in L. P. P.
- b) Solve the following L.P.P. graphically:

$$\text{Maximize } Z = x + 3y$$

Subject to,

$$3x + 6y \leq 8$$

$$5x + 2y \leq 10$$

$$x, y, \geq 0$$

- c) Using Big-M method to solve the following L.P.P.

$$\text{Maximize } Z = 3x_1 - x_2$$

Subject to,

$$2x_1 + x_2 \geq 2$$

$$x_1 + 3x_2 \leq 3$$

$$x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

Q.2 Attempt any **TWO** of the following: (10)

- a) Describe the steps for finding the initial solution by Vogel's approximation method.
- b) The following table gives IBFS for a transportation problem. Obtain the optimal solution.

	P	Q	R	S	Supply
A	8	10	7	6	50
B	12	9	4	7	40
C	0	11	10	8	30
Demand	25	32	40	23	

- c) Solve the following game.

Player A	Player B		
	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
A <sub>1</sub>	1	7	3
A <sub>2</sub>	6	2	7
A <sub>3</sub>	6	1	6

P. T.O

**Q.3** Attempt any **TWO** of the following: (10)

- a) Explain Hungarian method to solve the assignment problem for minimization.
- b) Determine the optimum assignment so as to minimize the total cost. Where '-' indicates job cannot be assign to machine table:

	P	Q	R	S	T
S <sub>1</sub>	7	7	-	4	8
S <sub>2</sub>	9	6	4	5	6
S <sub>3</sub>	11	5	7	-	5
S <sub>4</sub>	9	4	8	9	4
S <sub>5</sub>	8	7	9	11	3

- c) Solve the following game graphically:

		Player B		
		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
Player A	A <sub>1</sub>	3	4	0
	A <sub>2</sub>	4	3	7

**Q.4** Attempt any **FIVE** of the following: (10)

- a) Write the dual of following L.P.P.  
 $\text{Max. } Z = 3x + 4y$   
 Subject to,  
 $2x - y_2 \leq 1$   
 $-x + y \leq 0$   
 $x, x \geq 0$
- b) Explain how to solve maximization assignment problem.
- c) Define:
  - i) Value of the game
  - ii) Saddle point
- d) What is optimal strategy in game described by the following matrix?

$$\begin{bmatrix} -5 & 3 & 1 & 20 \\ 5 & 5 & 4 & 6 \\ -4 & -2 & 0 & -5 \end{bmatrix}$$

- e) Define: Transportation problem.
- f) How many solutions are there for the following assignment problem?

	I	II	III
A	3	5	3
B	5	3	5
C	3	5	3

- g) Use dominance rule to solve the following game.

		Player B			
		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
Player A	A <sub>1</sub>	-2	-4	3	4
	A <sub>2</sub>	-6	-5	2	1

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