Total No. of Questions : 6]

SEAT No. :

P2238

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M.Com.

422B/402 : OPERATIONS RESEARCH

(2019 Credit Pattern) (Semester - IV) (CBCS)

Time : 3 Hours] *[Max. Marks : 60*

Instructions to the candidates:

1) ***Question No. 1 and Question No. 6 are compulsory.***
2) ***Solve any three questions from question No. 2 to question No. 5.***
3) ***Figures to the right side indicates full marks.***

Q1) Fill in the blanks by selecting suitable choice (any 6) : **[6]**

a) A game is said to be strictly determinable if _____

i) Maximin value = minimax value

ii) Maximin value ≤ minimax value

iii) Maximin value ≥ minimax value

iv) Maximin value ≠ minimax value

b) Linear Programming method should be used to determine value of the game when size of payoff matrix is _____

i) 3 × 4 ii) 2 × 2

iii) m × 2 iv) 2 × n

c) Key element is also known as _____

i) Slack ii) Surplus

iii) Artificial iv) Pivot

d) If the given Linear programming Problem is in its standard form then primal-dual pair is _____

i) Square ii) Triangle

iii) Un-symmetric iv) Symmetric

e) _____ or _____ are used to "Balance" an assignment or transportation problem.

i) Destination, sources ii) Dummy rows, dummy columns

iii) Units supplied, units demanded iv) Artificial cells, degenerate cells

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f) When a maximization assignment problem is converted in minimization problem, the resulting matrix is called _____ .

i) Cost matrix ii) Profit matrix

iii) Regret matrix iv) Dummy matrix

g) The difference between total and free float is _____

i) Total ii) Initial activity

iii) Independent iv) Interference

h) Activities lying on critical path are called _____

i) Dummy activities ii) Critical activities

iii) Non-critical activities iv) Initial activities

Q2) Attempt any two of the following : **[14]**

a) Solve the following LPP by

Graphical method

Maximize $z = 50x_1 + 40x_2$

Subject to, $6x_1 + 4x_2 \leq 24$

$x_1 + 2x_2 \leq 6$

$-x_1 + x_2 \leq 1$

$x_1 \leq 2$

$x_1, x_2 \geq 0$

b) Find an initial basic feasible solution of the following transportation problem using North-West corner method.

Destination → / Origin ↓	D_1	D_2	D_3	Supply
O_1	13	15	16	17
O_2	7	11	2	12
O_3	19	20	9	16
Demand	14	8	23	

Also find the transportation cost.

c) Define the following terms :

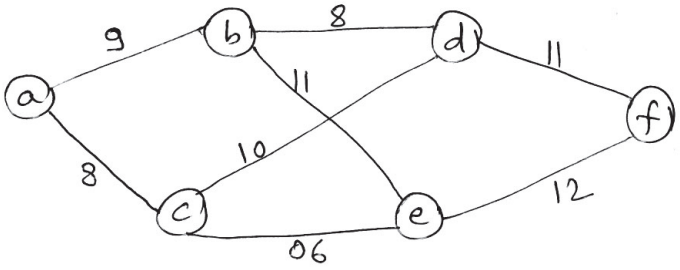
i) Pure strategy

ii) Pay off

iii) Fair game

Q3) Attempt any two of the following : **[14]**

a) Find the minimum cost spanning tree for the following network.



b) Solve the following assignment problem for minimization.

	I	II	III	IV	V
A	25	18	32	20	21
B	34	25	21	12	17
C	20	17	20	32	16
D	20	28	20	16	17

c) Write canonical form of the following LPP.

Maximize $z = 15x_1 + 3x_2$

Subject to, $x_1 + 2x_2 \leq 10$

$2x_1 + 3x_2 = 14$

$x_1 + x_2 \geq 3$

$x_1, x_2 \geq 0$

Q4) Attempt any two of the following : **[14]**

a) Solve the following 2 × 2 game by algebraic method.

		Player B	
		I	II
Player A	I	2	–1
	II	–1	0

b) Discuss the various steps involved in the application of PERT and CPM.

c) The following is a solution of a transportation problem.

(20) 1	2	(10) 1	4
3	(20) 3	(20) 2	(10) 1
4	(20) 2	5	9

Show that it is an optimal solution and find an alternate optimal solution, if it exists.

Q5) Attempt any two of the following : **[14]**

a) Define the following terms :

i) Loop

ii) Forward pass

iii) Backward pass

b) Solve the following LPP by simplex method

Maximize $z = x + 4y$

Subject to, $x + 2y \leq 2$

$4x + 3y \geq 12$

$x, y \geq 0$

c) Solve the following assignment problem for maximization.

	A	B	C	D
I	100	140	280	70
II	130	160	200	60
III	80	130	300	90
IV	150	110	250	50

Q6) Attempt any two of the following : **[12]**

a) Define the following terms :

i) Objective function

ii) Optimum solution

b) Draw the graph and highlight the feasible region for the constraints given below :

$x + 2y \geq 6$

$3x + y \geq 9$

$x + y = 7$

$x, y \geq 0$

c) Write the dual of the following LPP.

Minimize $z = 10x_1 + 8x_2$

Subject to, $x_1 + 2x_2 \geq 5$

$2x_1 - x_2 \geq 12$

$x_1 + 3x_2 \geq 4$

$x_1 \geq 0$, x_2 is unrestricted

d) Explain the following terms :

i) Critical event

ii) Earliest finish time