Total No. of Questions : 6]

SEAT No. :

PA-2917

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[5956]-403

M.Com.

MATHEMATICS

402-B : Operations Research

(CBCS 2019 Pattern) (Semester-IV)

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 questions No. 2 to questions No. 5***
3) ***Figures to the right side indicates full marks.***

Q1) Fill in the blanks by selecting suitable choice (any 6 out of 8). **[6]**

a) In game theory, the outcome or consequence of a strategy is referred as the _____

i) Penalty ii) Pay off

iii) Reward iv) end-game strategy

b) A mixed strategy game can be solved by_____

i) Simplex method ii) Hungarian method

iii) Graphical method iv) Degeneracy

c) For a maximization problem, objective function coefficient for an artificial variable is _____

i) +M ii) 0

iii) –1 iv) –M

d) A set of feasible solution to a linear programming problem is _____

i) Polygon ii) triangle

iii) bold iv) convex

e) To find initial basic feasible solution of a T.P. the method which starts allocations from the lowest cost is called_____ method.

i) north west corner ii) South east corner

iii) least cost iv) Vogel's approximation

f) In a T.P the method of penalties is called_____

i) least cost ii) vogel's approximation

iii) north east corner rule iv) Hungarian method

P.T.O.

g) _____ is an event oriented network diagram.

i) PERT ii) Histogram

iii) CPM iv) Ogive

h) An activity which doesnot consume either resource or time is called_____

i) Predecessor activity ii) Successor activity

iii) Terminal activity iv) Dummy activity

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

a) Find IBFS of the following transportation problem using North west corner method Also find the transportation cost.

Destination → / Origin ↓	A	B	C	D	E	Supply
P	2	11	10	3	7	4
Q	1	4	7	2	1	8
R	3	9	4	8	12	9
Demand	3	3	4	5	6	

b) Solve the following L.P.P. by graphical method

Minimize $Z = 40x_1 + 36x_2$

Subject to $x_1 \leq 8$

$x_2 \leq 10$

$5x_1 + 3x_2 \geq 45$

$x_1, x_2 \geq 0$

c) Explain rules of dominance in game theory.

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

a) Write the dual of the following L.P.P.

Maximize $(Z) = 5x_1 + 7x_2$

Subject to $x_1 + x_2 \leq 4$

$3x_1 + 8x_2 \leq 24$

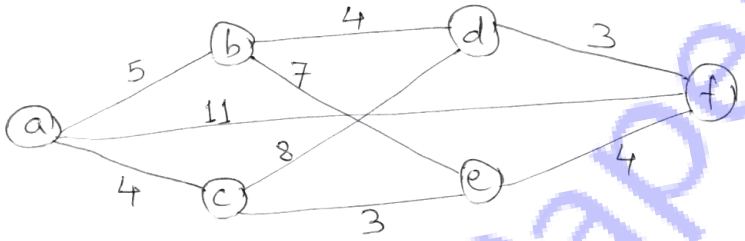
$10x_1 + 7x_2 \leq 35$

$x_1, x_2 \geq 0$

b) Obtain IBFS of the following T.P. using matrix minima method. Also find the transportation cost.

Destination / Origin	D_1	D_2	D_3	D_4	Supply
O_1	5	3	6	2	18
O_2	4	7	9	1	37
O_3	3	4	7	5	35
Demand	15	16	34	25	

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



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

a) Solve the following assignment problem to minimize the total cost.

	a	b	c	d	e
I	160	130	175	190	200
II	135	120	130	160	175
III	140	110	155	170	185
IV	50	50	80	80	110
V	55	35	70	80	105

b) Define network. Explain what do you mean by directed and undirected network? Also explain the terms Node and Arc.

c) Determine the saddle point and optimal strategies for each player'. Also find value of the game.

Player B

Player A	I	II	III
I	−4	−3	0
II	3	0	3
III	6	−3	4

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

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

b) Solve the following L.P.P. by simplex method

Minimize $(Z)=x_1-3x_2+2x_3$

Subject to $3x_1 - x_2 + 3x_3 \leq 7$

$-2x_1 + 4x_2 \leq 12$

$4x_1 + 3x_2 + 8x_3 \leq 10$

$x_1, x_2, x_3 \geq 0$

c) Solve the following assignment problem for maximization.

	A	B	C	D
P	42	35	28	21
Q	30	25	20	15
R	30	25	20	15
S	24	20	16	12

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

a) Draw the graph and highlight the feasible region for the given constraints

$x_1 + x_2 \leq 2$ and $2x_1 + x_2 \geq 3$

b) Write canonical form of the following LPP.

Maximize $(Z) = 15x_1+x_2$

Subject to $x_1 + 2x_2 \leq 10$

$2x_1 + 3x_2 = 12$

$x_1 + x_2 \geq 3$

$x_1, x_2 \geq 0$

c) Explain the following terms with reference to transportation problem

i) Balanced T.P.

ii) I.B.F.S.

iii) Optimal Solution

d) i) Explain Minimum cost capacitated network

ii) Give model difinition of Max-min networks.

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