Total No. of Questions : 3]

SEAT No. : ____

P-1297

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S.Y. B.Sc. (Computer Science)
MATHEMATICS
MTC - 242 : Operations Research
(2019 Pattern) (Semester - IV) (Paper - II) (24222)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to the right indicates full marks.***
3) ***Non-programmable scientific calculator is allowed.***

Q1) Attempt any Five of the following : **[2 × 5 = 10]**

a) Draw a feasible region for the following constraints.

$3x + y \leq 6$

$x + 2y = 4$

b) Give any two fields where operations research is used.

c) Define degeneracy in transportation problem.

d) Solve the following assignment problem for minimization.

	A	B	C
1	12	10	8
2	8	9	11
3	14	11	12

e) Obtain Initial Basic Feasible Solution of the transportation problem by using least cost entry method.

	D_1	D_2	D_3	Supply
O_1	7	3	12	20
O_2	5	6	10	14
Demand	10	11	13	

P.T.O.

f) Write dual of the following linear programming problem

Minimize $Z = 3x_1 + 25x_2$

Subject to

$$2x_1 + 4x_2 \geq 40$$

$$3x_1 + 2x_2 \geq 50$$

$$x_1, x_2 \geq 0$$

g) Write standard form of the following linear programming problem

Minimize $Z = 4x_1 + 3x_2$

Subject to

$$2x_1 + x_2 \geq 10$$

$$-3x_1 + 2x_2 \leq 6$$

$$x_1, x_2 \geq 0$$

Q2) Attempt any Three of the following : **[3 × 5 = 15]**

a) Solve the following assignment problem.

	I	II	III	IV	V
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

b) Solve the linear programming problem by graphical method.

Minimize $Z = 5x + 2y$

Subject to

$$10x + 2y \geq 20$$

$$5x + 5y \geq 30$$

$$x, y \geq 0$$

c) Solve the following linear programming problem by Big-M method.

Max $Z = 2x_1 + x_2$

Subject to

$$2x_1 - x_2 \leq 1$$

$$x_1 - x_2 \geq 1$$

$$x_1, x_2 \geq 0$$

d) Obtain an Initial Basic Feasible solution to the following transportation problem by North-West corner method.

	W_1	W_2	W_3	W_4	Capacity
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Requirement	5	8	7	14	34

e) Find an Initial Basic Feasible to the following Transportation Problem Using Vogel's Approximation method.

	D_1	D_2	D_3	D_4	Supply
P_1	2	3	11	7	6
P_2	1	0	6	1	1
P_3	5	8	15	9	10
Demand	7	5	3	2	17

Q3) Attempt any One of the following : **[1 × 10 = 10]**

a) Obtain initial basic feasible solution of the following transportation problem using modified Distribution method.

	D_1	D_2	D_3	D_4	
W_1	(35) 6	(35) 1	9	3	70
W_2	(5) 11	5	(50) 2	8	55
W_3	(45) 10	12	4	(45) 7	90
	85	35	50	45	215

b) i) Solve the following linear programming problem by simplex method

Max $Z = 7x_1 + 5x_2$

Subject to

$$x_1 + 2x_2 \leq 6$$

$$4x_1 + 3x_2 \leq 12$$

$$x_1, x_2 \geq 0$$

ii) Solve the following assignment problem.

Machines

Jobs		A	B	C	D
	J_1	5	5	–	2
	J_2	7	4	2	3
	J_3	9	3	5	–
	J_4	7	2	6	7

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