Total No. of Questions :4]

SEAT No. :

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T.Y.B.Sc.

MATHEMATICS

MT - 337 (A) : Operations Research

(2013 Pattern) (Semester - III) (Paper - VII) (911A3)

Time : 2 Hours] ***[Max. Marks :40***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic calculater or log table is allowed.***

Q1) Attempt any five of the following. **[5×2=10]**

a) What do you meant by redundant constraint in L.P.P.?

b) Define unit worth of a resource.

c) Justify whether true or false: Assignment problem is a special case of transportation problem.

d) Solve the following L.P.P.

Maximize $z = 3x_1 + 2x_2$

Subject to $x_1 \leq 2, x_1, x_2 \geq 0$.

e) Identify the direction of increase in z of the function maximize $Z = 2x_1 - x_2$.

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

Maximize $z = 2x_1 - x^2$

Subject to $x_1 + 2x_2 = 5$

$3x_1 + 7x_2 \leq 3$

$x_1, x_2 \geq 0$

P.T.O.

g) Find the initial basic feasible solution of the following transportation problem by least cost method.

	I	II	III	IV	Supply
A	10	30	20	13	5
B	22	9	7	16	10
C	4	32	5	29	15
Demand	5	5	10	10	

Q2) Attempt Any <u>two</u> of the following. **[2×5=10]**

a) Ozark Farms uses at least 800 lb of special feed daily. The special feed is a mixture of corn and soyabean meal with the following compositions:

lb per lb of feed stuff

Feedstuff	Protein	Fiber	Cost ($/lb)
corn	0.09	0.02	0.30
Soyabean meal	0.6	0.06	0.90

The dietary requirements of the special feed are at least 30% protein and at most 5% fiber. Formulate the problem as a linear programming 50 as to minimize the cost of the feed mix.

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

Maximize $z = 3000x + 2000y$

Subject to $x + 2y \le 6$

$2x + y \le 8$

$y \le 2$

$x - y \ge -1$

$x, y \ge 0$

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

Maximize $z = 3x_1 + 9x_2$

Subject to $x_1 + 4x_2 \le 8$

$x_1 + 2x_2 \le 4$

$x_1, x_2 \ge 0.$

Q3) Attempt any <u>two</u> of the following. **[2×5=10]**

a) Find the optimal solution of following assignment problem. Also find alternate optional solution if it exists.

	I	II	III	IV	V
A	3	9	2	3	7
B	6	1	5	6	6
C	9	4	7	10	3
D	9	6	2	4	5
E	2	5	4	2	1

b) Four operators are to be assigned to four machines. The assignment costs in dollars are given as below. Operator 1 cannot be assigned to machine C. Also operator 3 cannot be assigned to machine D. Find the optimal assignment.

		Machine			
		A	B	C	D
Operator	1	5	5	–	2
	2	7	4	2	3
	3	8	3	5	–
	4	7	2	6	7

c) Find the initial basic feasible solution of the following transportation problem by VAM.

	F_1	F_2	F_3	supply
A	9	6	0	5
B	5	1	0	20
C	3	2	4	10
D	7	5	2	15
Demand	25	10	15	

Q4) Attempt any <u>one</u> of the following. **[1×10=10]**

a) Solve the following L.P.P. by Big M-method.

Minimize $Z = 600x_1 + 500x_2$

Subject to $2x_1 + x_2 \geq 80$

$x_1 + 2x_2 \geq 60$

$x_1, x_2 \geq 0.$

b) Find the optimal solution of the following transportation problem.

Warehouses		W_1	W_2	W_3	W_4	Supply
	F_1	1	2	1	4	30
Factory	F_2	3	3	2	1	50
	F_3	4	2	5	9	20
Demand		20	40	30	10	

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