Total No. of Questions : 6] **SEAT No. :**

P5889 **[Total No. of Pages : 2**

BE/Insem./Oct.-521
B.E. (Mechanical)
OPERATION RESEARCH
(2015 Pattern) (Semester - I)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Draw neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) Solve by simplex method **[10]**

Maximize $z = 3x_1 + 2x_2$

$x_1 + x_2 <= 4$

$x_1 - x_2 <= 2$

$x_1 >= 0, x_2 >= 0$

OR

Q2) A company manufactures three products namely X, Y, Z. Each of products require processing on three machines, Turning, Milling, Grinding. Product X requires 10 hours of turning, 5 hours of milling, 1 hour of grinding. Product Y requires 5 hours of turning, 10 hours of milling, 1 hour of grinding. Product Z requires 2 hours of turning, 4 hours of milling, 2 hours of grinding. In the coming planning period, 2700 hours of turning, 2200 hours of milling, 500 hours of grinding are available. The profit contribution of X, Y, Z are Rs. 20, Rs. 15, Rs. 20 per unit respectively. Find the optimal product mix to maximize the profit. **[10]**

Q3) a) Find the initial basic feasible solution to the following transportation problem by Vogel's approximation method **[6]**

	Warehouses				supply
	W_1	W_2	W_3	W_4	
1	19	30	50	10	7
2	70	30	40	60	9
3	40	8	70	20	18
	5	8	7	14	

Factories

b) Explain Branch and Bound Method. **[4]**

P.T.O.

OR

Q4) Five different machines can do any five required components with different profit resulting from each assignment as shown in table below. Find out maximum profit possible through optimum assignment. **[10]**

Machine

Component	1	2	3	4	5
A	30	37	40	28	40
B	40	24	27	21	36
C	40	32	33	30	35
D	25	38	40	36	36
E	29	62	41	34	39

Q5) Reduce the following Game by Dominance and determine the value of game in table below. **[10]**

Person B

Person A	1	2	3	4
1	3	2	4	0
2	3	4	2	4
3	4	2	4	0
4	0	4	0	8

OR

Q6) Define the following : **[10]**

a) Saddle point

b) Pay-off matrix

c) Dominance

d) Game theory