

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]**

$$\begin{aligned} \text{Maximize } z &= 3x_1 + 2x_2 \\ x_1 + x_2 &\leq 4 \\ x_1 - x_2 &\leq 2 \\ x_1 &\geq 0, x_2 \geq 0 \end{aligned}$$

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				
		1	2	3	4	5
Component	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			
		1	2	3	4
Person	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 :

- a) Saddle point
- b) Pay-off matrix
- c) Dominance
- d) Game theory

