Bachelor of Science (I.T.) Semester-VI Examination

OPERATION RESEARCH

Paper—6

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagrams wherever necessary.

EITHER

1. (a) Give the classification of Models in Operation Research. 5

(b) Use two phase method to :

Max. $Z = 5x_1 + 3x_2$

subject to constraints :

$2x_1 + x_2 \leq 1$

$x_1 + 4x_2 \geq 6$

where $x_1, x_2 \geq 0$ 5

OR

(c) Solve the following LPP by Simplex Method :

Max. $Z = 3x_1 + 2x_2 + 5x_3$

subject to constraints :

$x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460$

$x_1 + 4x_2 \leq 420;$

where $x_1, x_2, x_3 \geq 0$ 5

(d) Use Graphical method to solve the following LP problem :

Min. $Z = x_1 + x_2$

subject to constraints :

$-x_1 + 3x_2 \leq 10$

$x_1 + x_2 \leq 6$

$x_1 - x_2 \leq 2$

where $x_1, x_2 \geq 0$ 5

EITHER

2. (a) Construct the dual for the following LP problem :

Max. $Z = 3x_1 + 5x_2$

subject to constraints :

$x_1 + 4x_2 \leq 9$

$5x_1 + 2x_2 \geq 6$

$3x_1 + 3x_2 = 9$

where $x_1, x_2 \geq 0$ 5

(b) What is degeneracy in Transportation Problem ? How to solve Unbalanced Transportation Problem ? Explain. 5

OR

(c) Define first feasible solution in Assignment Problem. How to solve Non-square Assignment Problem ? Explain. 5

(d) Determine the optimal solution for the following Transportation Problem by using Vogel's Approximation Method :

Destinations

		D_1	D_2	D_3	D_4	Supply
	S_1	5	3	6	4	30
Sources	S_2	3	4	7	8	15
	S_3	9	6	5	8	15
	Demand	10	25	18	7	

5

EITHER

3. (a) What is recursive nature of dynamic programming ? Explain. 5

(b) Construct the Network Diagram and obtain the minimum time for completion of project for the following tasks :

$A < B$; $B_1C < E$; $D < E_1F$; $F < I$; $G < H$

Tasks	**:**	A	B	C	D	E	F	G	H	I
Time (In days)	**:**	8	9	7	10	11	9	10	8	7

5

OR

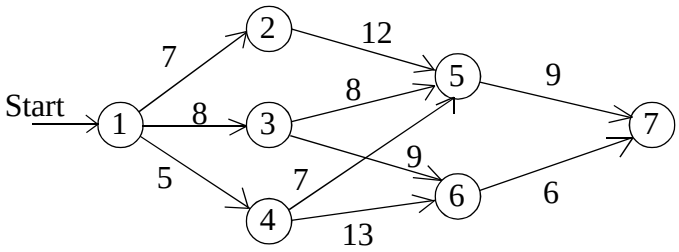
(c) Explain the following with suitable examples :

(i) Merge Event

(ii) Burst Event

(iii) Activity. 5

(d) Use the concept of dynamic programming to find maximum path through the following network :



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EITHER

4. (a) Solve the Assignment Problem by Hungarian method :

Machines

		M_1	M_2	M_3	M_4
	J_1	5	7	11	6
Jobs	J_2	8	5	9	6
	J_3	4	7	10	7
	J_4	10	4	8	3

5

(b) Explain the Branch and Bound Technique to solve the Assignment Problem. 5

OR

(c) Define Assignment Problem. What are the different types of Assignment Problem ? Explain. 5

(d) Explain the zero-one Programming Model for Assignment Problem in detail. 5

5. (a) Define the following terms in graphical solution of LP Problem :

(i) Unbounded solution

(ii) Infeasible solution. 2½

(b) Explain the algorithm for least cost method in Transportation Problem. 2½

(c) What are the different rules to numbering the event in Network diagram ? 2½

(d) Find the first feasible solution of following Assignment Problem : 2½

		Territories			
		I	**II**	**III**	**IV**
Salesmen	A	8	28	17	11
	B	13	28	4	26
	C	38	19	18	15
	D	19	28	24	10