Duration: 3 Hrs

Marks: 80

N.B: (1) Question 1 is compulsory.

(2) Attempt any **four** out of remaining **six** questions.

(3) Assume any additional data, if required, but justify the same.

(4) Figures to the right indicate full marks for that question.

(5) Use of calculator is allowed.

Q.1) a) Solve the following LPP using graphical method [10]

Maximize $Z=5X_1+8X_2$

Subject to $15X_1+10X_2 \leq 180$

$10X_1+20X_2 \leq 200$

$15X_1+20X_2 \leq 210$

and $X_1,X_2 \geq 0$

b) Solve the following assignment problem and find the optimum assignment that will result in [10] minimum man hours needed.

Jobs

Workers		A	B	C	D	E
	P	10	12	15	12	8
	Q	7	16	14	14	11
	R	13	14	7	9	9
	S	12	10	11	13	10
	T	8	13	15	11	15

Q.2) a) Solve the following LPP by Simplex Method [8]

Maximize $Z=300X_1+200X_2$

Subjected to, $5X_1+2X_2 \leq 180$

$3X_1+3X_2 \leq 135$

And $X_1,X_2 \geq 0$

b) Find the initial basic feasible solution for the following transportation problem by Vogel's [7] approximation Method.

To				Supply
3	1	7	4	300
2	6	5	9	400
8	3	3	2	500

Demand   250   350   400   200

[TURN OVER]

Q.3) a) Solve the following LPP using Big-M Method.   [8]

Minimize $Z = 2X_1 + X_2 + X_3$

Subjected to, $4X_1 + 6X_2 + 3X_3 \leq 8$

$3X_1 - 6X_2 - 4X_3 \leq 1$

$2X_1 + 3X_2 - 5X_3 \geq 4$

and $X_1, X_2, X_3 \geq 0$

b) Suppose the following estimates of activity times (days) are provided   [7]

Activity	Optimistic time	Most Likely time	Pessimistic time
1-3	1	3	5
1-2	3	4	5
3-5	4	5	6
2-4	3	5	7
4-5	5	6	13
5-6	4	7	10
4-6	6	8	10

i)Draw a network ii)Find the expected duration and variance for each activity.

ii) Find the critical path of the project

Q.4) a) Five jobs are to be processed at three machines A,B and C in the order ABC.The time taken   [8]
by each job on the three machines is given below.each machine can process one job at a time
Determine the optimum sequence for the jobs and total elapsed time .also find the idle time for
Each machine.

Task	1	2	3	4	5
A	7	12	11	9	8
B	8	9	5	6	7
C	11	13	9	10	14

b) Find the optimal strategies and value of the game where pay-off matrix of the two player   [7]
is given by

		Player B		
		B1	B2	B3
Player A	A1	-1	2	1
	A2	1	-2	2
	A3	3	4	-3