

Roll No. ....

Total Pages : 4

**BT-8/M-20**

**38052**

**OPERATIONS RESEARCH**

Paper–ME-406E

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note** : Attempt **five** questions in all, selecting at least **one** question from each Unit.

**UNIT-I**

1. A firm manufactures pain relieving pills in two sizes A and B. Size A contains 4 grains of element X, 7 grains of element Y and 2 grains of element Z. Size B contains 2 grains of element X, 10 grains of element Y and 8 grains of element Z. It is found by users that it requires at least 12 grains of element X, 74 grains of element Y and 24 grains of element Z to provide immediate relief. It is required to determine the least number of pills a patient should take to get immediate relief. Formulate the problem as Standard linear programming problem. 20

2. Compute the optimal solutions to the L.P. problem : 20

$$\text{Maximize : } Z = 2x_1 - 4x_2 + 5x_3 - 6x_4$$

$$\text{Subject to the constraints : } x_1 + 4x_2 - 2x_3 + 8x_4 \leq 2$$

$$-x_1 + 2x_2 + 3x_3 - 4x_4 \leq 1$$

$$x_1, x_2, x_3, x_4 \geq 0.$$

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**P. T. O.**

## UNIT-II

3. Find the Optimal solution to the Transportation problem in which the cell contains the transportation cost in Rupees : 20

	W1	W2	W3	W4	W5	Available
F1	7	6	4	5	9	40
F2	8	5	6	7	8	30
F3	6	8	9	6	5	20
F4	5	7	7	8	6	10
Required	30	30	15	20	5	100

4. Given below is the information of a project :

Activity	Immediate Predecessor	Time (days)
A	—	3
B	—	4
C	—	2
D	A,B	5
E	B	1
F	B	3
G	F,C	6
H	B	4

Activity	Immediate Predecessor	Time (days)
I	E,H	4
J	E,H	2
K	C,D,F,J	1
L	K	5

Draw the network and find the Critical path. 20

### UNIT-III

5. (a) What is the need of Simulation ? How you can use Monte Carlo simulation for the Industrial applications ? Give examples. 10
- (b) Ten villages contain 500, 420, 690, 810, 230, 140, 1064, 290, 385 and 680 fields respectively. Make a random selection of 6 fields using Random numbers table. 10
6. A decision problem has been expressed in the following Payoff table : 20

Action	Outcomes		
	I	II	III
A	10	20	26
B	30	30	60
C	40	30	20

- (a) What is the minimum payoff action ?
- (b) What is the minimum opportunity loss action ?

## UNIT-IV

7. Goods trucks arrive randomly at a stockyard with a mean of 8 trucks/hour. A crew of four operatives can unload a truck in 6 minutes. Trucks waiting in queue to be unloaded are paid a waiting charge at the rate of Rs. 60/hour. Operatives are paid a wage rate of Rs. 20/hour. It is possible to augment the crew strength to 2 or 3 (of four operatives per crew) when the unloading time will be 4 minutes or 3 minutes respectively per truck. Find the optimal crew size. 20
8. Find the Optimal strategies of X and Y and the value of the game : 20

		Y	
	-6	10	11
X	-1	-2	-3
	-1	-2	-4