O.P.Code: 25MC9116 | R25 | H.T.No. | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
MCA I Year II Semester Regular Examinations May-2026
OPERATIONS RESEARCH

**Time: 3 Hours** **Max. Marks: 60**

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

1 Solve the following Linear Programming Problem using Graphical method. CO1 L1 12M

Minimize $Z = 2x_1 + 3x_2$

Subject to constraints $X_1 + X_2 \geq 6$ , $7X_1 + X_2 \geq 14$ ,

$x_1$ and $x_2 \geq 0$

**OR**

2 Solve the following Linear Programming Problem using Simplex method. CO1 L3 12M

Minimize $Z = 8x_1 - 2x_2$

Subject to $-4X_1 + 2X_2 \leq 1$, $5X_1 - 4X_2 \leq 3$

$x_1$ and $x_2 \geq 0$

**UNIT-II**

3 Solve the following LPP using the result of its dual problem CO2 L2 12M

Minimize $Z = 24x_1 + 30x_2$

Subject to

$$2x_1 + 3x_2 \geq 10$$
$$4x_1 + 9x_2 \geq 15$$
$$6x_1 + 6x_2 \geq 20$$
$$x_1 \text{ and } x_2 \geq 0$$

**OR**

4 Obtain the initial basic feasible solution by using VAM to the following Transportation Problem CO2 L5 12M

| | $D_1$ | $D_2$ | $D_3$ | $D_4$ | Supply |
|---|---|---|---|---|---|
| $O_1$ | 3 | 1 | 7 | 4 | 300 |
| $O_2$ | 2 | 6 | 5 | 9 | 400 |
| $O_3$ | 8 | 3 | 3 | 2 | 500 |
| Demand | 250 | 350 | 400 | 200 | |

**UNIT-III**

5 a Determine the optimal strategy for company A and company B CO3 L1 6M

$$\begin{array}{cc} & \text{Company B} \\ & \begin{array}{ccc} 1 & 2 & 3 \end{array} \\ \text{Company A} \begin{array}{c} 1 \\ 2 \\ 3 \end{array} & \begin{bmatrix} 20 & 15 & 22 \\ 35 & 45 & 40 \\ 18 & 20 & 25 \end{bmatrix} \end{array}$$

b Solve the following the game CO3 L1 6M

player B

$$\text{playerA} \begin{array}{c} \\ 1 \\ 2 \end{array} \begin{array}{c} \begin{array}{cc} 1 & 2 \end{array} \\ \begin{bmatrix} -5 & 2 \\ -7 & -4 \end{bmatrix} \end{array}$$



**OR**

6 Player A and B play a game in which each player has three coins (20p,25p and 50p) each of them selects a coin without the knowledge of the other person.if the sum of the values of the coin is an even number,A wins B'scoin.if the sum of an odd number B wins A's coin CO4 L5 12M

(i)Develop a payoff matrix with respect to player A

(ii)Find the optimal strategies for the players

**UNIT-IV**

7 A service station receives customers at a rate of 12 per hour.The service rate is 15 customers per hour.Assuming an M/M/1 FIFO system, find: CO5 L2 12M

(i)The average number of customers in the system (L)

(ii)The average number of customers in the queue (Lq)

(iii)The average waiting time in the queue (Wq)

(iv)The probability that the server is idle.

**OR**

8 A computer center has 3 technicians.Jobs arrive at 15 per hour.Each technician services 7 jobs per hour.Find: CO5 L3 12M

(i)Traffic intensity

(ii)Probability of idle system

(iii)Average number of jobs waiting

(iv)Average waiting time in system

**UNIT-V**

9 Simulate a single server queue using event list method for the following data CO6 L2 12M

Inter arrival time is **2,3,4**

Service times is **3,2,3**

To Construct the event list table

**OR**

10 Using Transformation method for the following data CO6 L4 12M

$$U = 0.1, 0.6, 0.9$$

$$F(x) = \frac{x-2}{6}, 2 \leq x \leq 8$$

Find

i).Inverse function

ii).corresponding X values

*** END ***