K25P 2255

Reg. No. : .....

Name : .....

Second Semester M.C.A. Degree (CBSS – Reg./Supple./Imp.)
Examination, May 2025
(2021 Admission Onwards)
Stream 6 – Software Engineering
MCA 2E01 : OPERATION RESEARCH

Time : 3 Hours Max. Marks : 60

PART – A

Answer **all** questions. **Each** question carries 2 marks.

1. Define the general form of a linear programming problem.
2. Distinguish between slack and surplus variables.
3. Write the dual of the LPP
   Maximize $Z = 2x_1 + 5x_2$
   Subject to : $2x_1 + x_2 \geq 2$
   $x_1 + x_2 \geq 6$
   $x_1, x_2 \geq 0$
4. What is travelling salesmen problem ?
5. Differentiate between linear programming problems and integer programming problems.
6. Define :
   a) Stage.
   b) State.
7. Describe the basic terminology of sequencing problems.
8. What are the conditions for the optimal solutions in processing 'n' jobs through 'm' machines ?
9. Describe different behavior of arrivals in a queueing system.
10. What is FCFS ?

(10×2=20)

P.T.O.

PART – B

Answer **all** questions. **Each** question carries **8** marks.

11. a) Solve the following LPP graphically.

Minimize $Z = 3x_1 + 5x_2$

Subject to :

$$-3x_1 + 4x_2 \leq 12$$
$$2x_1 - x_2 \geq -2$$
$$2x_1 + 3x_2 \geq 12$$
$$x_1 \leq 4$$
$$x_2 \geq 2$$
$$x_1, x_2 \geq 0$$

OR

b) Solve the LPP using Simplex method.

Maximize $Z = 7x_1 + 5x_2$

Subject to :

$$x_1 + 2x_2 \leq 6$$
$$4x_1 + 3x_2 \leq 12$$
$$x_1, x_2 \geq 0$$

12. a) Solve the following using Dual simplex method.

Minimize $Z = 2x_1 + x_2$

Subject to :

$$3x_1 + x_2 \geq 3$$
$$4x_1 + 3x_2 \geq 6$$
$$x_1 + 2x_2 \geq 3$$
$$x_1, x_2 \geq 0$$

OR

b) Find the initial feasible solution to the following transportation problem.

Plant	W_1	W_2	W_3	W_4	Availability
F_1	11	20	7	8	50
F_2	21	16	10	12	40
F_3	8	12	18	9	70
Requirement	30	25	35	40	

13. a) Solve the following LPP using cutting plane method.

Maximize $Z = x_1 + x_2$

Subject to :

$$3x_1 + 2x_2 \leq 5$$
$$x_2 \leq 2$$
$$x_1, x_2 \geq 0$$

OR

b) Explain the characteristics of dynamic programming problems.

14. a) Describe the key differences between PERT and CPM.

OR

b) Define critical path analysis and its purpose in project management.

15. a) Explain queueing system with the help of a flow chart and examples.

OR

b) What are the classifications of stochastic processes ? (5×8=40)