



K24P 0024

Reg. No. :

Name :

**V Semester M.C.A./M.C.A. (Lateral Entry) Degree (C.B.S.S. –
Supplementary-One Time Mercy Chance) Examination, November 2023
(2014 to 2019 Admissions)
MCA 5E09 : OPERATIONS RESEARCH (Elective – III)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **any ten** questions. **Each** question carries **3** marks.

1. What are the uses of linear programming ?
2. Distinguish between feasible solution and optimal solution.
3. What are artificial variables and why are they introduced ?
4. Define duality with an example.
5. How are the unbalanced assignment problems solved ?
6. Explain the concept behind the branch and bound method of solving the integer programming problem.
7. What are the steps in solving dynamic programming problem ?
8. Define PERT and its characteristics.
9. What are sequencing problems ?
10. Explain stochastic process.
11. What is birth and death process ?
12. Explain queue discipline.

(3×10=30)

P.T.O.



SECTION – B

Answer **all** questions. **Each** question carries **10** marks.

13. a) i) Explain the characteristics of linear programming problems. 5
 ii) Write the standard form of a mathematical model of LPP and explain the terms. 5

OR

- b) Solve using two phase simplex method : 10

$$\text{Minimize } Z = 2x_1 + 3x_2$$

$$\text{Subject to } x_1 + x_2 \geq 5$$

$$x_1 + 2x_2 \geq 6$$

$$x_1, x_2 \geq 0$$

14. a) Find the initial feasible solution to the transportation problem given below : 10

	Destination			Supply
	D ₁	D ₂	D ₃	
	7	3	4	2
	2	1	3	3
	3	4	6	5
Demand	4	1	5	

OR

- b) Solve the following LPP : 10

$$\text{Maximize } Z = x_2 + 3x_3$$

$$\text{Subject to } x_1 + x_2 + x_3 \leq 10$$

$$3x_1 - 2x_3 \geq 0$$

$$2x_2 - x_3 \leq 10$$

$$0 \leq x_1 \leq 8$$

$$0 \leq x_2 \leq 4, x_3 \geq 0$$



15. a) Maximize $Z = x_1 + 10x_2$
Subject to $4x_1 + 3x_2 \leq 36$
 $2x_1 + 4x_2 \leq 40$
 $x_2 \geq 3$

$x_1, x_2 \geq 0$ and x_1, x_2 are integers.

10

OR

- b) Solve using dynamic programming :

Minimize $Z = u_1^2 + u_2^2 + u_3^2$

Subject to $u_1 + u_2 + u_3 \geq 15$

$u_1, u_2, u_3 \geq 0$

10

16. a) Write a short note on different types of floats and its characteristics.

10

OR

- b) 1) Draw the network diagram to the following activities.

5

Activity (i, j) : 1-3 1-2 1-4 2-4 3-5 4-6 5-6

Time duration : 2 4 3 1 6 5 7

- 2) Find critical path in the above diagram.

5

17. a) Write a note on classification of the states in a Markov chain.

10

OR

- b) Arrivals at a telephone booth are considered to be Poisson, with an average time of 10 minutes between one arrival and the next. The duration of a phone call assumed to be distributed exponentially, with 3 minutes. Then,

i) What is the probability that a person arriving at the booth will have to wait ? 3

ii) What is the fraction of the time the phone will be in use ? 3

iii) Find the average number of units in the system. 4

(5x10=50)