KMM INSTITUTE OF POST GRADUATE STUDIES :: TIRUPATHI
MCA – 2ND SEMESTER – PRE FINAL EXAMINATION – 2022-25
SUB : MCA 201 – Computer oriented Operations Research

Set A

Time : 3 Hours **Max. Marks : 100**

PART – A (Compulsory)

Answer any **FIVE** of the following questions. Each question carries **5** marks (5 X 5 = 25)

1. a) Write the General structure of Linear Programming .
   b) Application of SIMPLEX method and BIG-M method based on problem
   c) What is Maximization of Assignment model and how to solve it ?
   d) What is Degeneracy in Transportation model and how to remove them
   e) List the techniques applied for Minimum Spanning Tree method. Discuss briefly.
   f) Discuss about Two-person Zero-sum game and mixed strategy.
   g) What is Saddle point in Game theory. Discus its importance.
   h) List the classification of Queuing models.
   i) Discuss above Rules for drawing the Net work diagram.
   j) Discuss about the applications of CPM and PERT.

PART -- B

Answer any **ONE** Full Question from each **UNIT**. Each question carries 15 marks. (5 X 15 = 75)

UNIT -- I

2. a) Solve the following by Simplex method.

$$\text{Max } Z = 2X_1 + 2X_2 + X_3$$

$$\text{S.t. to } \quad 4X_1 + X_2 + 3X_3 \leq 8,\ 3X_1 - 6X_2 - 4X_3 \leq 6,$$

$$X_1 + X_2 - 5X_3 \leq 4 \quad \text{and} \quad x_1, x_2, x_3 \geq 0.$$

   b) Explain the concept of Duality with suitable example.

(OR)

3. Solve the following Graphically
   a) Max $z = 12x_1 + 16x_2$
   S/to $3x_1 + 4x_2 \geq 24,\ 2x_1 + x_2 \geq 10,\ 5x_1 + 3x_2 \geq 30$ and $x_1, x_2 \geq 0$.

   b) Max $z = 5x_1 + 3x_2$
   S/to $3x_1 + 5x_2 \leq 15,\ 5x_1 + 2x_2 \leq 10$ and $x_1, x_2 \geq 0$.

UNIT - II

4. Find the feasible solution to the following. Apply Phase – 1 methods

					Supply
	2	3	4	2	35
	3	2	1	5	15
	4	2	3	2	25
	3	4	2	5	30
Demand	10	25	37	30	

(OR)

5. a) Find the Optimal solution for Maximization to the following

						Supply
	6	4	6	4	8	100
	6	6	4	10	8	200
	11	10	7	14	14	100
	15	12	6	14	9	80
Demand	60	120	150	70	90	

b) Explain the concept of Branch and Bound technique.

UNIT - III

6. Explain the method of Shortest path method with DIJKSTRA's method with numerical example.

(OR)

7. Explain the method of Minimum Spanning Tree method with PRIM 's method with numerical example.

UNIT - IV

8. Solve the following Game model by Graphical method.

1	3	-1	4	2	-5
-3	5	6	1	2	0

(OR)

1	-3
3	5
-1	6
4	1
2	2
-5	0

9. Briefly explain the Dominance Propriety. Solve the following by Dominance Propriety.

19	6	7	5
7	3	14	6
12	8	18	4
8	7	13	-1

2	4	3	8	4
5	6	3	7	8
6	7	9	8	7
4	2	6	4	3

UNIT - V

10. Draw the Network diagram and find Critical path and various Time Estimations & Floats

Activity	A	B	C	D	E	F	G	H	I
Precedence	-	-	-	A	B,C	A	C	D,E,F	D
Duration	13	8	20	16	24	18	19	14	10

(OR)

11. a) Describe the characteristics of Queuing system and Probability Distribution applied.
b) In a Railway yard goods trains arrive at the rate of 40 trains per day. Assuming that the service time follows exponential distribution with an average of 46 minutes. Find a) the probability that the number of trains in the yard exceeds 10. b) the average number of trains in the yard. C) Idle time of yard.

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Set B

Time : 3 Hours **Max. Marks : 100**

PART – A (Compulsory)

Answer any **FIVE** of the following questions. Each question carries **5** marks (5 X 5 = 25)

1. a) Write the Matrix form of Linea Programming model .
   b) The role of Duality in finding the solution to LPP.
   c) Briefly explain about Infeasibility and unbounded in Graphical method.
   d) Discuss about techniques applied in Phase -2 of Transportation model.
   e) Explain about unbalanced Assignment model and solve it.
   f) Define Max-mini and Mini-max criteria
   g) How to find saddle point for m X n Game model ?
   h) Discuss about various techniques applied for shortest path in Network.
   i) Explain about basic characteristics of Queuing model.
   j) Discus about time estimations and floats in CPM.

PART -- B

Answer any **ONE** Full Question from each **UNIT**. Each question carries 15 marks. (5 X 15 = 75)

UNIT -- I

2. Solve the following by SIMPLEX method

$$\text{Max } Z = X_1 + 3X_2 + X_3$$

$$\text{S.t. to } X_1 + X_2 + 2X_3 \leq 22,\ 3X_1 + 2X_2 + X_3 \leq 26,\ X_1 + X_2 + X_3 \leq 8 \text{ and } x_1, x_2, x_3 \geq 0.$$

(OR)

3. Solve the following by SIMPLEX method

$$\text{Max } Z = X_1 - 2X_2 + 3X_3$$

$$\text{S.t. to } X_1 + 2X_2 - X_3 \leq 2,\ X_1 - 4X_2 \leq 3,\ 2X_2 + 3X_3 \leq 5 \text{ and } x_1, x_2, x_3 \geq 0.$$

UNIT -- II

4. Find the Optimal solution to the following.

					Supply
	8	10	7	6	40
	12	9	4	7	40
	9	11	10	8	40
Demand	25	22	40	33	

(OR)

5. Apply both Minimization and Maximization. Draw the conclusions.

62	78	50	101	82
70	85	60	75	55
88	96	118	85	71
48	64	87	77	80
60	70	98	66	83

UNIT – III

6. Explain the method of Shortest path method with FLOYID' s method with a numerical example.

(OR)

7. Explain about Maximum follow problem Algorithm with a numerical example.

UNIT – IV

8. Discus about importance about Saddle point in TWO-person Zero-sum game, with an example.

(OR)

9. Explain the concepts of Graphical solution for 2 x N and M x 2, Dominance rule, Arithmetic method with a suitable numerical example.

UNIT – IV

10. Draw the Network diagram and find Critical path, Expected Time and Variances.
Find the probability that the project will be completed in 17 days.

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
Optimistic time	1	1	2	1	2	2	2
Most likely time	1	4	2	1	5	5	5
Pessimistic time	7	7	8	2	9	8	15

(OR)

11. a) Describe the characteristics of (M/M/C) :: (GD/ $\bar{\alpha}$ / $\bar{\alpha}$)
b) List out various Formulae applied in the Queuing theory and their importance.