Reg. No ..... Name **22P1058**

M. Sc. DEGREE END SEMESTER EXAMINATION : OCTOBER 2022

SEMESTER 1 : MATHEMATICS

COURSE : **21P1MATT05: OPTIMIZATION TECHNIQUES**

(For Regular - 2022 Admission and Supplementary - 2021 Admission)

Duration : Three Hours Max. Weights: 30

PART A

Answer any 8 questions **Weight: 1**

1.	The linear or non-linear function of variable which is to be maximised is called.....	(U)
2.	What are the methods used to solve unconstrained non- linear programming problem ?	(R)
3.	Identify whether the feasible region formed by the constraints x+y≤4, 3x+3y≥18, x≥0, y≥0 is bounded or unbounded.	(A)
4.	What do you mean by sub-problem.	(U)
5.	What do you mean by branching?	(R)
6.	When does a reverse flow exist in a flow?	(R)
7.	Explain the terms. (a) Circuit (b) Tree (c) Centre (d) Arboresence	(R)
8.	Define monotonically increasing and monotonically decreasing function with example.	(U)
9.	Explain (a) Saddle point. (b) Global minimum.	(R)
10.	What is the difference between *Fibonacci* and *Golden search method* ?	(U)

(1 x 8 = 8)

PART B

Answer any 6 questions **Weights: 2**

11. Describe Simplex Multipliers (R)

12. Find the first Simplex Multipliers of

$$\begin{aligned} \text{Maximize} \quad & z = 2x_1 + 3x_2 \\ \text{Subject to} \quad & 5x_1 + 7x_2 \leq 35 \\ & 4x_1 + 9x_2 \leq 36. \end{aligned}$$ (A)

x_1, x_2 are non negative .

13. Explain Convex Set with an example. (A)

14. Briefly explain the process of generating a Gomory cut. (U)

15. Describe the maximum flow algorithm. (U)

16. Explain the minimum spanning tree algorithm. (U)

17. Minimize $f(x) = 3x_1^2 + x_2^2 + 2x_1x_2 + 6x_1 + 2x_2$ subject to $2x_1 - x_2 = 4$. (A)

18. Explain Golden section search method. (U)

(2 x 6 = 12)

PART C

Answer any 2 questions **Weights: 5**

19. Solve using Simplex method

$$\begin{aligned} \text{Maximize} \quad & z = 2x_1 + 3x_2 \\ \text{Subject to} \quad & 6x_1 + 5x_2 \leq 25, x_1 + 3x_2 \leq 10 \\ & x_1, x_2 \geq 0 \end{aligned}$$ (A)

.

20. Solve by cutting plane method

$$\begin{aligned} \text{Minimize} \quad & 4x_1 + 5x_2 \\ \text{subject to} \quad & x_1 + 4x_2 \geq 5 \\ & 3x_1 + 2x_2 \geq 7, 3x_1 + x_2 \geq 2 \\ & x_1, x_2 \geq 0, \end{aligned}$$ (A)

and integers.

21. Find the maximum non-negative flow in the following network. (A)

Arc	$(a,1)$	$(a,2)$	(1,2)	(1,3)	(1,4)	(2,4)	(3,2)	(3,4)	(4,3)	$(3,b)$	$(4,b)$
Capacity	8	10	3	4	2	8	3	4	2	10	9

22. Solve the problem through classical Lagrangian technique. (A)

(a) Minimize $f(x) = x_1^2 + x_2^2 - 4x_1 + 2x_2 + 5$ subject to $g(x) = x_1 + x_2 = 4$.

(b) Minimize $f(x) = (x_1 - 2)^2 + (x_2 - 1)^2$ subject to $g(x) = x_1 - 2x_2 + 1 = 0$.

(5 x 2 = 10)

OBE: Questions to Course Outcome Mapping

CO	Course Outcome Description	CL	Questions	Total Wt.

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;