Reg. No ..... Name **23P156**

M. Sc. DEGREE END SEMESTER EXAMINATION : NOVEMBER 2023

SEMESTER 1 : MATHEMATICS

COURSE : **21P1MATT05 : OPTIMIZATION TECHNIQUES**

(For Regular - 2023 Admission and Improvement/Supplementary -2022/2021 Admissions)

Duration : Three Hours Max. Weights: 30

PART A

Answer any 8 questions **Weight: 1**

1.	Give an example of non - linear programming problem and LPP.	(A)
2.	Why do we evaluate the equivalent canonical form of an LPP	(R)
3.	Explain either or constraint.	(R)
4.	In a Branch-and-Bound problem, if X_1 = 5 and X_2 = 3.7, then which variable would be a possible branching option and how?	(U)
5.	When does a reverse flow exist in a flow?	(R)
6.	Define monotonically increasing and monotonically decreasing function with example.	(U)
7.	What do you mean by a feasible solution?	(R)
8.	Define spanning Tree of a Graph.	(U)
9.	What is the difference between integer LPP and non integer LPP.	(R)
10.	Define slack , surplus and artificial variables.	(R)

(1 x 8 = 8)

PART B

Answer any 6 questions **Weights: 2**

11.	Prove that if a primal variable x_j is positive then the corresponding dual slack variable y_{m+j} is zero and if a primal slack variable x_{n+i} is positive then the corresponding dual slack variable y_i is zero; and vice versa.	(U)
12.	What can be concluded regarding the solution of the problem Max $f(x) = 3x_1 + 4x_2$ subject to $4x_1 + 3x_2 \geq 12, x_1 + 2x_2 \leq 2$, $x_1, x_2 \geq 0$.	(A)
13.	Briefly describe the Fibonacci search plan.	(R)
14.	Describe the algorithm for minimum path problem with all are length non negative.	(U)
15.	Discuss Taylors series development in two dimensions and hence state the sufficient condition for minimum.	(U)
16.	Briefly explain the process of generating a Gomory cut.	(U)
17.	Solve graphically, $$\begin{aligned} \text{Maximize} \quad & z = x + 2y \\ \text{subject to,} \quad & 3x + 2y \leq 9 \\ & x \leq 2 \\ & x, y \geq 0 \text{ and integers.} \end{aligned}$$	(U)
18.	Describe the maximum flow algorithm.	(U)

(2 x 6 = 12)

PART C

Answer any 2 questions **Weights: 5**

19. Solve

$$\begin{aligned} \text{Minimize} \quad & 5x_1 + 3x_2 \\ \text{subject to} \quad & 2x_1 + 4x_2 \leq 12 \\ & 2x_1 + 2x_2 = 10 \\ & 5x_1 + 2x_2 \geq 10 \\ & x_1, x_2 \geq 0 \end{aligned}$$ (A)

20. A building activity has been analysed as follows, v_j stands for a job.
(1) v_1 and v_2 can start simultaneously, each one taking 10 days to finish.
(2) v_3 can start after 5 days and v_4 after 4 days of starting v_1.
(3) v_4 can start after 3 days of work on v_3 and 6 days of work on v_2. (A)
(4) v_5 can start after v_1 is finished and v_2 is half done.
(5) v_3, v_4 and v_5 take respectively 6,8 and 12 days to finish. Find the critical path and the minimum time for completion.

21. Maximize the function, $f(x) = -3x^2 + 21.6x + 1$ with a minimum resolution of 0.5 over 6 functional evaluation. The optimal value of $f(x)$ is assumed to lie in the range $0 \leq x \leq 25$. (A)

22. Solve by cutting plane method.
Max $z = x_1 + x_2$ subject to
$7x_1 - 6x_2 \leq 5,$
$6x_1 + 3x_2 \geq 7$
$-3x_1 + 8x_2 \leq 6$
x_1, x_2 and integers. (A)

(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;