

Enrollment Number: _____

Roll Number: _____

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Examination: Odd Semester Examination 2024

Sub: Optimization Techniques

Sub. Code: MTCSE – PE352

Max. Time: $2\frac{1}{2}$ Hours

Max. Marks: 60

Note: Follow proper numbering for answering the questions.

SECTION – A

*Attempt all questions.**4 x 5 = 20 Marks*

SL. NO	Questions	Marks	CO	BL
1.	A company produces two types of Hats. Each hat of the first type requires twice as much labour time as the second type. If all hats are of the second type only, the company can produce a total of 500 hats of day. The market limits daily sales of the first and second type to 150 and 250 hats. Assuming that the profits per that are Rs. 8 for type A and Rs. 5 for type B, formulate the problem as a linear programming model in order to determine the number of hats to be produced of each type so as to maximize the profit.	5	CO1	L5
2.	Discuss the benefits of optimization techniques in various engineering applications?	5	CO1	L2
3.	Obtain the set of necessary conditions for the non-linear programming problem: Maximize $Z = x_1^2 + 3x_2^2 + 5x_3^2$, Subject to the constraints: $x_1 + x_2 + 3x_3 = 2$, $5x_1 + 2x_2 + x_3 = 5$, and $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$.	5	CO2	L3
4.	What is ant colony optimization? Illustrate the scenario where ant colony optimization is used.	5	CO5	L5

SECTION – B

*Attempt any four out of six questions.**4 x 10 = 40 Marks*

SL. NO	Questions	Marks	CO	BL
1.	Describe the general structure of optimization algorithms.	10	CO1	L2
2.	Apply Wolfe's method for solving the quadratic programming problem: Maximize $Z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$, Subject to the constraints: $x_1 + x_2 \leq 2$, and $x_1 \geq 0, x_2 \geq 0$.	10	CO2	L3
3.	Solve the integer programming problem: Maximize $Z = 7x_1 + 9x_2$, Subject to the constraints: $-x_1 + 3x_2 \leq 6, 7x_1 + x_2 \leq 35$, and $x_1 \geq 0, x_2 \geq 0$.	10	CO3	L3

4.	Solve the LP problem (Using simplex method): $\text{Min } Z = x_1 + 2x_2 + 3x_3$, Subject to the constraints: $x_1 + 2x_2 + 3x_3 \leq 10$, $x_1 + x_2 \leq 5$, and $x_1 \geq 0$, $x_2 \geq 0$, $x_3 \geq 0$.	10	CO3	L3
5.	Write a short note on the following: i. Particle Swarm optimization ii. Genetic optimization	10	CO4	L1
6.	Discuss how mathematical formulation of real-life problems can be used as standard programming problems. Justify with a suitable example.	10	CO5	L5

BL – Bloom's Taxonomy Levels (1 – Remembering, 2 – Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 – Creating)
