K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

April – May 2023
(B.Tech.) Program:_Information Technology__Scheme: **II**
Examination: **LY**   Semester: **VIII**
Course Code: **ITDLC8034** and Course Name: _Optimization Techniques

Date of Exam: **18/05/2023**   Duration: **2.5 Hours**   Max. Marks: **60**

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight:**	12		
i)	Discuss Various element of optimization problem.	2	CO1	Understand
ii)	What is linear programming?	2	CO2	Understand
iii)	List the unconstrained optimization methods.	2	CO3, CO5	Understand
iv)	Discuss Multiple Optimal Solutions	2	CO2	Understand
v)	Discuss classification based on type of constraint	2	CO1	Understand
vi)	Discuss first derivative test for optimality.	2	CO3, CO5	Understand
vii)	List direct methods of constraint optimization.	2	CO4	Understand
viii)	Discuss Application of Ant Colony Optimization algorithm	2	CO6	Understand
Q.2	**Solve any four questions out of six.**	16		
i)	Discuss classification based on nature of optimization.	4	CO1	U
ii)	Find feasible region for min Z= 2x + 6y S.T.C -x + 2y <= 30 3x + 4y >= 120 x,y >= 0	4	CO2	Apply
iii)	Solve the following for optimality function attainment. Y=15 + 10x – x^2	4	CO3, CO5	Apply
iv)	Discuss Penalty method in constraint optimization	4	CO4	Understand
v)	Discuss benefits of Genetic Algorithm in optimization.	4	CO5	Understand
vi)	Discuss various types of optimization problem.	4	CO6	Understand

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Q.3	Solve any two questions out of three.	16		
i)	Discuss steps involved in solving optimization problems with suitable example. List various engineering applications of optimization	8	CO1	Apply
ii)	Find the optimal solution for $\min f(x) = 5x_1^2 + 2x_2^2 - 2x_1x_2 - 4x_1 - 4x_2 + 4$ at starting point [0,0] using newton method.	8	CO3, CO5	Apply
iii)	Apply Ant colony for optimization of vehicle routing problem.	8	CO5	Apply
Q.4	Solve any two questions out of three.	16		
i)	Solve the LPP using Simplex Method $Max\ Z = 12x_1 + 16x_2$ S. T.C $\quad 10x_1 + 20x_2 <= 120$ $\qquad 8x_1 + 8x_2 <= 80$ Where $x_1, x_2 >= 0$	8	CO2	Apply
ii)	Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ staring from the point [0, 0] using steepest descent method.	8	CO4	Apply
iii)	Consider suitable example for optimization and derive the optimal solution. Discuss various optimization techniques.	8	CO6	Apply

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