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

MayMay-June-2026
M.Tech. Program: AI Scheme :IIB
Regular Examination: FY Semester: II
Course Code: PCEC203 Course Name: Bio-inspired Artificial Intelligence
Date of Exam: 30/5/2026 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.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	**Solve any two questions out of three: (05 marks each)**	10		
a)	Explain the Stochastic Ranking method for constrained optimization problems and discuss how it balances the objective function and constraint violations.		CO1	U
b)	Explain the working of a Genetic Algorithm with a flow of operations including selection, crossover, mutation, and generation creation.		CO2	U
c)	Discuss the pheromone update mechanism in Ant Colony Optimization. Explain both local and global pheromone updates.		CO3	U
Q 2	**Solve any two questions out of three: (05 marks each)**	10		
a)	Explain the Ant Colony Optimization algorithm for solving the Traveling Salesman Problem (TSP).		CO3	U
b)	Discuss the key features of the biological immune system that inspire Artificial Immune Systems.		CO4	U
c)	Explain a case study where Genetic Algorithms were used for optimization problems (e.g., scheduling or routing). What were the results and benefits?		CO6	U
Q.3	**Solve any two questions out of three. (10 marks each)**	20		
a)	Discuss the Separation of Constraints and Objectives approach. How is multi-objective optimization concepts used for constraint handling?		CO1	U
b)	Apply a Genetic Algorithm to solve the Knapsack Problem by demonstrating how individuals are represented, how fitness values are calculated, and how new solutions are generated through genetic		CO2	Ap

	operations.			
c)	Describe the advantages and limitations of Ant Colony Optimization techniques.		CO3	U
Q.4	**Solve any two questions out of three. (10 marks each)**	20		
a)	Apply the principles of bird flocking such as alignment, cohesion, and separation to explain how Particle Swarm Optimization (PSO) guides particles toward optimal solutions.		CO5	Ap
b)	Demonstrate how information sharing among individuals in a swarm can be used to enhance the search process in PSO by solving an example optimization problem.		CO5	Ap
c)	Apply the Ant Colony Optimization (ACO) technique to the Traveling Salesman Problem (TSP) and illustrate how the algorithm imitates the path-finding behavior of real ants to obtain an optimal route.		CO6	Ap