

K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai
(An Autonomous Institute Affiliated to the University of Mumbai)

End Semester Exam
May-June 2022

M. Tech. (Artificial Intelligence)

Examination: FY - Semester II

Course Code: IPCEC203 and Course Name: Bio-Inspired Artificial Intelligence

Duration: 03 Hours

Max. Marks: 60

Date: July 11, 2022

Instructions:

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

Ques. No.	Question	Max. Marks	CO	BT Level
Q1.	Solve any six questions out of eight:	12		
i)	Explain bio-inspired computing.	2	CO1	U
ii)	Explain different selection methods in Genetic Algorithms.	2	CO2	U
iii)	Explain stigmergy.	2	CO3	U
iv)	Explain cost graph and pheromone graph in Ant Colony Optimization.	2	CO3	U
v)	Explain self cells and non-self cells in Artificial Immune Systems.	2	CO4	U
vi)	Explain the concept of Particle Swarm Optimization.	2	CO5	U
vii)	Explain inertia in Particle Swarm Optimization.	2	CO5	U
viii)	Explain need of optimization in mTSP.	2	CO6	U
Q2.	Solve any four questions out of six:	16		
i)	Explain constraint handling.	4	CO1	U
ii)	Differentiate Genetic Algorithms and Genetic Programming.	4	CO2	U
iii)	Explain the concept of vaporization in Ant Colony Optimization.	4	CO3	U
iv)	Explain Clonal Selection in Artificial Immune Systems.	4	CO4	U
v)	Explain the concept of separation, alignment, and cohesion in Particle Swarm Optimization.	4	CO5	A
vi)	Explain steps to optimize any classification technique using a suitable bio-inspired algorithm.	4	CO6	A
Q3.	Solve any two questions out of three:	16		
i)	Explain suitability of bio-inspired AI for multi-objective optimization.	8	CO1	U
ii)	Explain Ant Colony Optimization. Formulate problem statement of any real-world application that can be solved using Ant Colony Optimization.	8	CO3	A

iii)	Apply Genetic Programming – Decision Tree hybrid approach for optimization for a sports agency who wishes to derive a pattern of whether an applicant is suitable for selection in a tournament or not. Consider the dataset as below:				8	CO2	A	
	Gender	Height	Weight	Training Level				Selection for Tournament
	Male	Short	High	Elementary				No
	Male	Medium	High	Intermediate				No
	Female	Tall	Medium	Intermediate				Yes
	Male	Short	Medium	Complete				Yes
	Female	Medium	Medium	Elementary				Yes
	Male	Tall	Medium	Complete				Yes
	Female	Short	High	Intermediate				No
	Female	Medium	Medium	Complete				Yes
Male	Tall	High	Intermediate	No				
Q4.	Solve any two questions out of three:				16			
i)	Discuss Credit Card Fraud Detection using Artificial Immune Systems.				8	CO4	A	
ii)	Apply Particle Swarm Optimization for minimizing the objective function $f = 10 * (x_1 - 1)^2 + 20 * (x_2 - 2)^2$				8	CO5	A	
iii)	Consider any real-world problem and corresponding solution based on traditional Artificial Intelligence. Design an approach for its optimization using any Bio-Inspired Artificial Intelligence method.				8	CO6	C	
