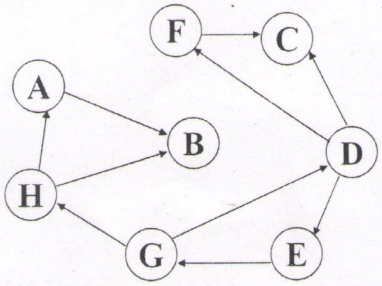
K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai
(An Autonomous Institute Permanently Affiliated to the University of Mumbai)

End Semester Exam
November – December 2022

M.Tech. (Artificial Intelligence)

Examination: FY - Semester I
Course Code: PCEC101 **Course Name:** Building Blocks of Artificial Intelligence
Date: February 22, 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.

Ques. No.	Question	Max. Marks	CO	BT Level
Q1.	**Solve any six questions out of eight:**	**12**		
i)	Explain Hill Climbing.	2	CO1	U
ii)	Explain Supervised and Unsupervised Learning.	2	CO2	U
iii)	State the role of Bias and Learning Rate in Neural Networks.	2	CO3	U
iv)	Argue why weights are modified in Neural Networks.	2	CO3	U
v)	Explain Crossover and Mutation in Genetic Algorithms.	2	CO4	U
vi)	Explain Exploration versus Exploitation.	2	CO4	U
vii)	Explain Triangular Membership Function.	2	CO5	U
viii)	Explain Sequential and Auxiliary Hybrid Systems.	2	CO6	U
Q2.	**Solve any four questions out of six:**	**16**		
i)	Explain the applications of AI in Agriculture.	4	CO1	U
ii)	Differentiate Soft and Hard Computing.	4	CO2	U
iii)	Differentiate Case Updating and Epoch Learning.	4	CO3	U
iv)	Explain different encoding methods in Genetic Algorithms. Apply a suitable encoding method for solving Knapsack problem.	4	CO4	A
v)	Assume suitable fuzzy sets and apply different fuzzy operations on them.	4	CO5	A
vi)	Explain nature of real-world applications for using Genetic Algorithms and Neural Networks.	4	CO6	U
Q3.	**Solve any two questions out of three:**	**16**		
i)	Consider the following graph available with a user:  Apply Breadth-First Search algorithm to obtain the Graph's traversal sequence with node D as the source. Show all steps.	8	CO1	A
ii)	For the below use cases, state whether to use supervised or unsupervised learning algorithm and justify it: a. Recommend news articles to a user based on previously read articles b. Segment customers to better assign marketing campaigns using customer characteristics	8	CO2	AN

iii)	Consider a fully-connected multilayer feed-forward neural network with architecture 3-2-1. Let the learning rate be 0.7. Assume weights and bias as mentioned below: w14 w15 w24 w25 w34 w35 w46 w56 θ1 θ2 θ3 0.2 -0.3 0.4 0.1 -0.5 0.2 -0.3 -0.2 -0.4 0.2 0.1 Consider a training tuple, X = (1, 1, 0), whose class label is 1. Calculate the net input, output and error of each unit in hidden and output layer once the tuple is fed into the network. Also show updated values of weights and bias after first iteration calculating the error.	8	CO3	A
Q4.	**Solve any two questions out of three:**	**16**		
i)	Apply Genetic Algorithm for solving Traveling Salesman Problem.	8	CO4	A
ii)	For fuzzy relations $\tilde{A}$ and $\tilde{B}$ defined as follows: $\tilde{A} = \begin{bmatrix} 0.2 & 0.4 & 0 \\ 0.6 & 0.3 & 0.1 \end{bmatrix}$ $\tilde{B} = \begin{bmatrix} 0.3 & 0.5 & 0 \\ 0.2 & 1 & 0.6 \\ 0.8 & 0 & 0.4 \end{bmatrix}$ Compute the max-min composition.	8	CO5	A
iii)	Apply hybrid soft computing method of Genetic Algorithms and Neural Networks to predict if a patient is pre-diabetic or not, based on health information of previously examined patients.	8	CO6	AN

****