

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

End Semester Exam
May – June 2023

M.Tech. (Artificial Intelligence)

Examination: FY - Semester I

Course Code: PCEC101

Course Name: Building Blocks of Artificial Intelligence

Date: June 24, 2023

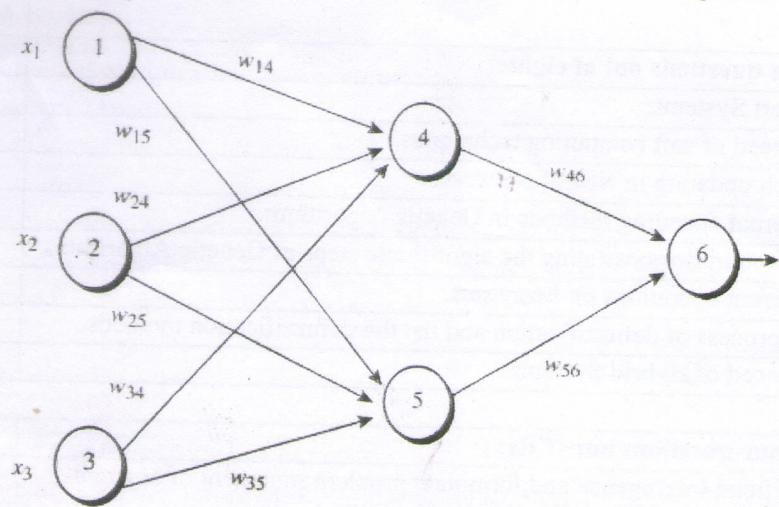
Duration: 2.5 Hours

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 Expert Systems.	2	CO1	U
ii)	Explain the need of soft computing techniques.	2	CO2	U
iii)	Explain epoch updating in Neural Networks.	2	CO3	U
iv)	Explain different encoding methods in Genetic Algorithms.	2	CO4	U
v)	Sketch a flowchart demonstrating the algorithmic steps of Genetic Algorithms.	2	CO4	U
vi)	Explain different operations on fuzzy sets.	2	CO5	U
vii)	Explain the process of defuzzification and list the defuzzification methods.	2	CO5	U
viii)	Explain the need of Hybrid Systems.	2	CO6	U
Q2.	Solve any four questions out of six:	16		
i)	Explain Artificial Intelligence and formulate problem statement of any real-world application that can be solved using Artificial Intelligence.	4	CO1	U
ii)	Differentiate Soft Computing and Hard Computing techniques with examples.	4	CO2	U
iii)	Design a Neural Network for Handwritten Digit (0 – 9) recognition.	4	CO3	A
iv)	Identify suitable Genetic Algorithm components for Travelling Salesman Problem.	4	CO4	A
v)	Illustrate mathematical and graphical formulation of Triangular Fuzzy Membership Function.	4	CO5	A
vi)	Explain the types of Hybrid Systems.	4	CO6	U
Q3.	Solve any two questions out of three:	16		
i)	<p>Consider the following graph available with a user:</p> <pre> graph TD D((D)) --> A((A)) D --> B((B)) D --> C((C)) D --> E((E)) D --> F((F)) D --> G((G)) D --> H((H)) A --> B B --> C C --> F E --> G G --> H </pre> <p>Apply Depth-First Search algorithm to obtain the Graph's traversal sequence with node D as the source. Show all steps.</p>	8	CO1	A

ii)	<p>For the below use cases, analyze whether to use supervised or unsupervised learning algorithm and justify it:</p> <ol style="list-style-type: none"> Recommend books to read based on the preferences of other customers with the same attributes. Segment banking customers on whether or not they will default on a loan based on the records of previous customers. Predict whether a person is pre-diabetic or not based on some criteria. Understand consumer behaviour on your website that leads to a product getting purchases. 	8	CO2	AN
iii)	<p>Consider the following multilayer feed-forward neural network shown below. Let the learning rate be 0.9. The initial weight and bias values of the network can be assumed randomly. Consider the first training tuple, $X = (1, 0, 1)$, 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.</p> 	8	CO3	A
Q4. Solve any two questions out of three:				
i)	<p>Consider the problem of maximizing the function $f(x) = x^2$, where x is permitted to vary between 0 to 31. Apply Genetic Algorithm and demonstrate the best offspring after the first generation.</p>	8	CO4	A
ii)	<p>For fuzzy relations \tilde{A} and \tilde{B} defined below, compute the max-min composition:</p> $\tilde{A} = \begin{bmatrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix} \quad \tilde{B} = \begin{bmatrix} 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{bmatrix}$	8	CO5	A
iii)	<p>Analyze the amalgamation of Neural Networks and Genetic Algorithms as a Hybrid approach.</p>	8	CO6	AN
