Register Number:……..

KUMARAGURU college of technology
character is life

B.E DEGREE EXAMINATIONS: NOV /DEC 2024

(Regulation 2018)

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U18EIE0010**:** Advanced Intelligent Controllers

COURSE OUTCOMES

CO1: Apply Various Soft Computing Frame Works.
CO2: Design of Various Neural Networks.
CO3: Use of Fuzzy Logic.
CO4: Apply Genetic Programming.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Sketch the model of an artificial neuron.	CO1	[K_2]
2.	Mention the role of bias in activation function.	CO1	[K_3]
3.	List the three fundamental classes of ANN Architectures.	CO2	[K_1]
4.	Compare Supervised learning with Unsupervised learning.	CO2	[K_2]
5.	Differentiate between the Fuzzy set and the Crisp set.	CO2	[K_2]
6.	List out the various types of fuzzy membership functions.	CO3	[K_1]
7.	Mention any two important advantages of Fuzzy Logic Control.	CO3	[K_2]
8.	Suppose a genetic algorithm uses chromosomes of form x = a b c d e f g h with a fixed length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of individual X be calculated as: $$F(x) = (a + b) - (c + d) + (e + f) - (g + h)$$ and let the initial population consist of four individuals with the following chromosomes: x1 = 6 5 4 1 3 5 3 2 x2 = 8 7 1 2 6 6 0 1 x3 = 2 3 9 2 1 2 8 5 x4 = 4 1 8 5 2 0 9 4 Evaluate each individual fitness function, showing all your workings, and arrange them in order with the fittest first and the least fit last.	CO4	[K_3]
9.	Define the term mutation in the genetic algorithm.	CO4	[K_1]
10.	Define Neuro-Fuzzy Hybrid Systems.	CO4	[K_1]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Write the expression for binary and bipolar functions activation function.	4	CO1	[K_2]
	b)	Differentiate the features of soft computing and hard computing.	4	CO1	[K_2]
	c)	Using the simple SLFFNN neuron model, design a neural network for 2-input OR & AND functions.	8	CO1	[K_3]
12.	a)	Summarize in detail about the Recurrent Neural Network Architecture & the Dynamic Neural Network Framework.	8	CO2	[K_2]
	b)	Enumerate linear separability. Why can a single layer of perceptron cannot be used to solve linear inseparable problems?	8	CO2	[K_3]
13.	a)	Draw a simple artificial neuron and discuss the calculation of net input.	8	CO2	[K_2]
	b)	Discuss in detail the architecture and algorithm of the standard backpropagation algorithm.	8	CO2	[K_2]
14.	a)	Consider the two fuzzy sets. $A=\left\{\frac{1}{1.0}+\frac{0.75}{1.5}+\frac{0.3}{2.0}+\frac{0.15}{2.5}+\frac{0}{3.0}\right\}$, $B=\left\{\frac{1}{1.0}+\frac{0.6}{1.5}+\frac{0.2}{2.0}+\frac{0.1}{2.5}+\frac{0}{3.0}\right\}$. (i) Perform complement over fuzzy set A and B, Union, Intersection, and Difference. (ii) Verify De Morgan's Principle.	8	CO3	[K_3]
	b)	State and discuss in brief any four properties of Fuzzy set.	8	CO3	[K_2]
15.		Enumerate the architecture of Fuzzy Logic Control (FLC) with a neat sketch and discuss in detail the major components of FLC.	16	CO3	[K_2]
16.	a)	Summarize about the Simplified Fuzzy ARTMAP model with neat diagram	8	CO4	[K_3]
	b)	Discuss the basic concepts of the Genetic Algorithm and the steps involved in it with a simple flowchart.	8	CO4	[K_2]