

Satyug Darshan Institute of Engineering & Technology, Faridabad

Programme: B.TECH (CSE)

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Subject Name : Soft Computing

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Unit -1

Short Questions

S. No.	Questions	Bloom Taxonomy(KL)
1	Difference between hard computing and soft computing?	KL2
2	Describe how does soft computing differ from conventional AI.	KL2
3	Specify the basic premises for Soft Computing.	KL1
4	Define the term Fuzzy in soft computing?	KL1
5	Throws light on the term 'Uncertainty' and 'Approximation'.	KL1
6	Write a brief note on KNN algorithm for machine learning.	KL2

Long Questions

1	Differentiate between supervised and unsupervised learning with the help of suitable examples.	KL4
2	Write short note on Constituents of soft computing.	KL3
3	Differentiate between the conventional and modern approach to problem solving.	KL3
4	Write the different constituents of soft computing?	KL3
5	Write short note on Computational Intelligence and Artificial Intelligence.	KL3
6	Write short note on Machine Learning and knowledge Acquisition.	KL3
7	Discuss the importance of machine learning in soft computing.	KL2
8	Explain how neural network and genetic algorithms contribute in neural network.	KL2

Unit -2

Short Questions

S. No.	Questions	Bloom Taxonomy
1	Using your own intuition and definitions of the universe of discourse, plot fuzzy membership function for "weight of people".	KL1
2	Difference between crisp sets and fuzzy sets.	KL2
3	Comment on the statement: Law of excluded middle is justified for fuzzy sets.	KL1
4	Consider a Fuzzy proposition P defined as: P: Aman is honest having truth value 0.3. find the truth value of opposition Q which defines "Aman is not honest."	KL6
5	Plot a fuzzy membership function for the "temperature of the day" using your own intuitions for its discourse.	KL4
6	State the Law of excluded middle and Law of contradiction for fuzzy sets.	KL1
7	Write the application of fuzzy logic.	KL2
8	Give the difference between core and support of a fuzzy sets in terms of Alpha cut?	KL1
9	What do you understand by the term "FUZZY" in soft computing.	
10	List the properties of fuzzy sets.	KL1
11	State generalized Modus Ponens and Modus Tollens rule for Fuzzy Inference.	KL1
12	Define membership function and Normal Fuzzy set.	KL1

13	Consider a Fuzzy Set $A(X) = \{(x1, 0.1), (x2, 0.2), (x3, 0.3), (x4, 0.4)\}$ $B(X) = \{(x1, 0.2), (x2, 0.3), (x3, 0.4), (x4, 0.5)\}$ Find the Bounded Difference $B(x) \ominus A(x)$.	KL4
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14	Describe membership functions in fuzzy logic.	KL2
15	Define a fuzzy set and provide an example.	KL1

Long Questions

1	Explain Linguistic Variable. How are they different from data variables used in conventional programming techniques?	KL2
2	Consider $X = \{a, b, c, d\}$, $Y = \{1, 2, 3, 4\}$ and $A = \{(a, 0.0), (b, 0.8), (c, 0.6), (d, 1.0)\}$ $A = \{(a, 0.0), (b, 0.8), (c, 0.6), (d, 1.0)\}$ $B = \{(1, 0.2), (2, 1.0), (3, 0.8), (4, 0.8)\}$ $C = \{(1, 0), (2, 0.4), (3, 1.0), (4, 0.8)\}$ implication relation: IF x is A then Y is B else y is C. Determine the	KL6
3	Explain linguistic Variable with suitable examples.	KL2
4	Consider two fuzzy sets are: $\sim A: \mu_A = \{(60-x)/8\} + 1$ (a) union of fuzzy sets A and B fuzzy set $\sim B$ (b) square of (c) Algebraic difference (A- (d) complement of Fuzzy set $\sim A$ (e) bounded difference of two fuzzy sets	KL6
5	Write short note on Defuzzification techniques.	KL3
6	What is an expert system? Discuss the architecture of fuzzy expert system.	KL3
7	What do you understand by normal fuzzy set. Define prototype of the set and convex fuzzy set.	KL3
8	What are the basic elements of fuzzy control system? Give the structure of a fuzzy production rule system.	
9	What is fuzzy relation? Discuss the different operations on fuzzy relations.	
10	Give De Morgan's Laws and Excluded middle Laws for fuzzy sets.	KL1
11	Draw the block diagram of a fuzzy logic system. Explain its working.	KL4
12	What are fuzzy sets typically represented?	

13	Consider a Fuzzy set that defines membership using trapezoidal membership function as $\{(2,0.0),(4,1),(8,1),(10,0.0)\}$. Find the membership value for $x=8.5$.	KL4
14	Consider 2 sets $X=\{3,2,8,6\}$ and $Y=\{2,1,4,9\}$. Find a relation set R such that $R=\{(x,y) y=x+3\}$.	KL4
15	Let R, S be defined on sets $\{1,3,5\} \times \{1,3,5\}$. Let $R: \{(x,y) y=x+2\}$, $S: \{(x,y) x<y\}$ $R = \{(1,3), (3,5)\}$, $S = \{(1,3), (1,5), (3,5)\}$. Then evaluate max-min composition of relation matrices R and S.	KL4
16	Brief discuss about alpha cut and strong alpha cut with the help of example.	KL1
17	Explain linguistic variable and hedge.	KL2
18	What is an expert system? Discuss the architecture of fuzzy expert system.	
19	Write a short note on FIS.	KL3
20	Consider two fuzzy sets $\{(1,1)(1.5,0.75)(2.0,0.3)(2.5,0.15)(3,0)\}$ $\{(1,1)(1.5,0.6)(2.0,0.2)(2.5,0.1)(3,0)\}$ (i) Union (ii) Intersection (iii) Bounded Sum (iv) Bounded Difference (v) Algebraic Difference (vi) $A \ominus B$	KL4
21	Discuss fuzzy inference system and their role in decision making. Explain fuzzy systems with real world applications.	KL2
22	Describe fuzzy logic in detail. Explain fuzzy sets, operations on fuzzy sets and fuzzy relations with suitable example.	KL2
Unit -3		
Short Questions		
1	Define genetic algorithm.	KL1
2	List some advantages of genetic algorithm.	KL1
3	What two requirements should be a problem satisfying in order to be suitable for solving it by in genetic algorithm.	KL1
4	What do you understand by premature convergence to solution?	
5	Define the need of Mutation. How is it implemented on Genetic Algorithm.	KL1
6	Discuss advantages of genetic algorithm over conventional search techniques like Hill Climbing.	KL2
7	Describe what encoding scheme should be used in ordering problems such as TSP in genetic algorithm.	KL2
8	Write what are the different method of chromosomes selection in Genetic Algorithm.	KL2
9	Highlight the difference between Crossover operation and Mutation operation performed in Genetic algorithm?	KL1
10	Discuss the purpose of Fitness evaluation in GA.	KL2
11	Explain how does a Mutation operator work in GA.	KL2
12	Give name of one popular maximum and minimum optimization problems that can be solved using GA.	KL1
13	Two Parent chromosomes in GA encoding scheme is given as: 10110011; 00111100 A crossover point is selected after 4th location in single point crossover technique. Generate the two possible offsprings.	KL3
14	Define mutation in context of genetic algorithm.	KL1
15	Briefly discuss local maxima and global maxima in context of optimization algorithms.	KL2
Long Questions		
1	Explain the main component of Genetic or Evolutionary computing algorithm.	KL2
2	Show How GA is used to solve the following optimization problems. Maximize $f(x) = x^2 + 1$ for one generation where X can have the values in range [0, 15]	KL1
3	Consider that the genetic algorithm uses chromosomes of the form $c=uvwxyz$ with a fixed length of six genes. Each gene can be any digit between 0 and 9. The fitness of individual c be calculated as: $f(c)=(u+v)-(w+x)+(y+z)$. Consider the initial population as consisting of four individuals with the following chromosomes: $c1=654135$; $c2=871266$; $c3=934216$; $c4=413529$ (i) Evaluate the fitness of each individuals, showing all your workings and arrange them in order with the fittest first and the least fit last. (ii) Cross the fitness two individuals using two point crossover.	KL4
4	Explain different types of crossover operation in binary encoding in genetic algorithm.	KL2
5	Explain Roulette Wheel selection in genetic algorithm.	KL2
6	Use Genetic Algorithm to find the value of a,b,c and d that satisfy the following equation: $a+2b+3c+4d=30$ Consider the values of variables a,b,c and d as integers between 0 and 30.	KL4
7	Write short note on Applications of Genetic Algorithm.	KL3
8	Give reason for choice of high cross over rate and low mutation rate in GA.	KL1
9	Differentiate between crossover and mutation operators used in GA. Why should we select a high cross over rate and low mutation rate in GA.	KL4
10	Write different steps of a GA? Explain each in detail.	KL1
11	Explain in brief the Roulette Wheel technique for traditional genetic algorithm.	KL2
12	Explain genetic algorithms in detail. Discuss their working principles, steps involved and their applications in machine learning.	KL2
Unit -4		
Short Questions		
1	Write the uses of activation function in neural networks?	KL2
2	Bring the contrast between biological neuron and artificial neuron?	KL1
3	Justify the statement: All logic gates can be implemented using a single layer perceptron.	KL1

4	Discuss the structure of Biological neuron.	KL1
5	What are the basic building block in ANN.	KL2
6	Draw and explain the architecture of a simple neural network.	KL1
7	Describe the analogy between an artificial and biological neuron.	KL2
8	Describe why perceptron cannot solve non linear problem?	KL2
9	Define feedforward neural network.	KL1
10	Define dendrites and synapse in neural network.	KL1
Long Questions		
1	Discuss the Principle of Linear separability.	KL2
2	Give reason for choice of high cross over rate and low mutation rate in GA.	KL1
3	Implement logical AND function with binary inputs and target using ADALINE network.	KL4
4	Define activation function in an artificial neuron model. Describe the various activation functions that are employed.	KL2
5	Explain Hebbian learning.	KL2
7	Explain the back propagation algorithm in detail.	KL2
8	Explain the back propagation algorithm and derive the expressions for weight update relations.	KL2
7	Differentiate supervised and unsupervised learning with the help of suitable example.	KL4
8	Describe training set and how is it used to train neural network.	KL2
9	Write different application areas of Artificial Neural Networks?	KL2
10	Write Short note on any 3 : (a) Adaptive	KL3
11	Classify the different Learning Methods of Neural Networks.	KL1
12	Discuss the different Activation functions typically used in an ANN.	KL2
13	Given the weight $w_1=0.4$ and $w_2=0.3$, what should be the threshold value for neural network to function as AND gate.	KL2
14	Explain Non-linearity and Radial basis functions.	KL2
15	Differentiate between artificial neural network and biological neural network in details. Explain various applications of neural networks.	KL4
16	Explain perceptron learning rule.	KL2
17	Explain Widrow-Hoff learning Rule (Delta Learning Rule) Or LMS (Least Mean Square)	KL2
18	Explain multilayer feedforward network.	KL2
19	Differentiate between feedforward and feedback network.	KL4
20	Describe the concept of McCulloch Pitts neuron model.	KL2
21	Describe the concept of adaptive resonance architecture in neural network.	KL2
22	Explain how do they differ from other types of neural networks	KL2
23	Compare and contrast supervised, unsupervised, reinforcement learning in neural networks with appropriate example.	KL4
Unit -5		
1	Write the features of MATLAB that make it suitable for implementing soft computing application.	KL2
2	Name two toolboxes in MATLAB relevant to soft computing.	KL1
3	Write standard toolboxes present in MATLAB and how these toolboxes can be accessed.	KL2
4	Explain how can we implement neural network in MATLAB using standard toolbox. What are the advantages and disadvantages of doing so in MATLAB.	KL2
5	Write a note on rule editor of FIS in MATLAB.	KL2
6	Explain how do you create a fuzzy object in MATLAB.	KL2