

UNIT I
Architectures

Part A

1. Define the term 'axon'.
2. Give two examples for the application of ANN.
3. Draw a typical McCulloch-Pitts neuron model.
4. Name two learning rules.
5. Write briefly about supervised learning.
6. Define perceptron.
7. What is meant by multilayer ANN?
8. Define the term "back propagation".
9. Define artificial neural network (ANN)
10. List out the differences between artificial neural network and biological network
11. Define weight.
12. Define Activation Function.
13. What are the classifications of activation function?
14. What are the types of Sigmoidal Function?
15. What are the applications of neural networks?
16. Define bias.
17. What is the function of Synaptic gap?
18. Define threshold.
19. What are Dendrites?
20. What are the different types of training?
21. Define Learning.
22. What are merits and demerits of Back Propagation Algorithm?
23. What are the applications of back propagation algorithm?
24. What is the fundamental building block of the biological neural network? Discuss
25. . Distinguish between supervised and unsupervised learning?
26. Sketch a biological neuron and name their parts
27. Define the term learning of a neural network and name any two learning rules
28. Sketch the structure of artificial neuron
29. Define linear separability condition.

Part B

1. Explain briefly the operation of biological neural network with a simple sketch
2. Discuss supervised learning and unsupervised learning.
3. Describe perceptron learning rule and delta learning rule.
4. Write about Hebbian learning and Widrow-Hoff learning rule.
5. Describe winner-take-all learning rule and outstar learning rule.
6. Describe back propagation and features of back propagation.
7. Describe McCulloch-Pitts neuron model in detail.

8. Write about performance of back propagation learning.
9. What are the limitations of back propagation learning? Explain in detail.
10. Discuss a few tasks that can be performed by a back propagation network.
11. With a schematic diagram discuss the structure of a biological neuron
12. Compare single layer perception classifier and multi layer perception
13. Describe the architecture and derive the algorithm for back propagation neural network
14. Write a note on various drawbacks of back propagation algorithm
15. Discuss the various activation functions used in ANN
16. Elaborate the statement ' Perceptron cannot handle tasks which are not linearly separable'.
With help of suitable example.
17. Derive the back propagation learning rule for a single output MLP.(12)
18. Explain Why an MLP does not learn if the initial weights and biases are all zeros.(10)
19. Explain any one method of speeding up MLP training(6)
20. Design perceptron network for the two input XOR problem.

UNIT II

Neural networks for control

Part A

1. Draw the diagram for boltzman machine.
2. Draw the diagram for hop field networks.
3. What is meant by feedback networks?
4. What do you by transient response?
5. List out any two application of neural networks used for controlling.
6. Explain boltzman machine.
7. List out the uses of hop field networks.
8. Give any two application of boltzman machine.
9. Define discrete Hop field net
10. What is energy function or Lyapunov function?
11. Write the energy function for discrete Hop field network.
12. What is continuous Hop field net?
13. Write the energy function of continuous Hop field network.
14. State the purpose of process identification
15. List the types of plant identification.
16. State some disadvantages of forward plant identification
17. What is the goal of inverted pendulum?
18. State the property of inverted pendulum neurocontroller.
19. State the force required to stabilize the system to be controlled in inverted Pendulum.
20. State how a feedback network can be obtained from a feed forward network
21. What is continuous time network?
22. Give the basic concept of hopfield network
23. Write the objective function for modelling of process using artificial neural network.
24. What do you mean by inverse model identification?
25. Comment on the suitability of ANN for control applications.

Part B

- 1) Distinguish between hop field continuous and discrete models.
- 2) Bring out the salient features of boltzman machine.

- 3) Explain the algorithm of a discrete Hopfield network.
- 5) Explain how the ANN can be used for process identification with neat sketch.
- 6) Explain the concept of energy function and content addressable memory with respect to hop field networks.
- 7) Explain the transient response of continuous time networks.
- 8) Explain the feedback networks of ANN for controlling process.
- 9) Explain how ANN can be used for neuro controller for inverted pendulum.
- 10) Diagrammatically illustrate and discuss discrete time Hopfield network.

UNIT III Fuzzy systems

Part A

1. Name the three types of ambiguities.
2. Define classical set.
3. What is meant by universe of discourse?
4. With a neat sketch write about non-conventional fuzzy set.
5. Name the different fuzzy set operations.
6. Define fuzziness.
7. Write De Morgan's law.
8. Define power set.
9. Define fuzzification.
10. List the operations on classical sets?
11. List the properties of crisp sets?
12. State the excluded middle laws and De Morgan's laws for classical sets.
13. What are Fuzzy sets?
14. List the properties of fuzzy sets?
15. Define Cardinality number.
16. Give the expression for cardinality of power set.
17. Differentiate classical and fuzzy set
18. What are fuzzy relations?
19. List the operations on fuzzy relations.
20. List the properties of fuzzy relations.
21. Define Defuzzification.
22. Differentiate fuzzification and defuzzification?
23. List the defuzzification methods.
24. Explain the defuzzification method of center of sums
25. Do fuzzy sets follow the same crisp sets
26. Compute the scalar and fuzzy cardinality for the fuzzy set given by $\mu_A(x) = x/(x+1)$, x is the element of $(1, 2, \dots, 10)$
27. State the max product composition of two fuzzy relations R1 and R2

Part B

- 1) Differentiate fuzzy set from classical set and name the properties of classical (crisp) sets.
 - 2) $A = \{(1/2) + (0.5/3) + (0.3/4) + (0.2/5)\}$, (8)
 $B = \{(0.5/2) + (0.7/3) + (0.2/4) + (0.4/5)\}$ Calculate the several operation of the fuzzy set.
- (8)
- 3) Discuss various properties and operations on crisp relation.
 - 4) Describe fuzzy relation.

- 5) Explain the operation of fuzzy sets with a suitable example.
- 6) Write about conditional fuzzy proposition and unconditional fuzzy proposition. Explain fuzzy associate memory (FAM) with a suitable example.
- 7) Define defuzzification and explain the different defuzzification methods.
- 8) Explain fuzzy Cartesian and composition with a suitable example.
- 9) Explain the concept of fuzzy set with suitable examples.
- 10) Explain the terms
 - i) Fuzziness ii) Power set.
 - iii) Union of two sets. iv) Complement of two sets. v) Difference of two sets.
- 11) i. Define the term fuzzy relation what is the cardinality of a fuzzy relation?
 ii. List and discuss operation on fuzzy relation
 iii. List and discuss properties of fuzzy relation
- 12) i. Tabulate and discuss the canonical form of fuzzy rule based system.
 ii. List and discuss the two simple extreme cases that exist in determining aggregation strategy of fuzzy rule

UNIT IV

Fuzzy logic control

Part A

1. Define membership function.
2. Mention the properties of λ cut .
3. What is meant by implication?
4. What is the role of membership function in fuzzy logic?
5. Define Lambda-cuts for fuzzy set.
6. Write about classical predicate logic.
7. Define tautologies.
8. List down common tautologies.
9. What for genetic algorithm is used?
10. Define core of a membership function.
11. Define boundaries of a membership function.
12. What is a normal fuzzy set.
13. Define prototype of the set.
14. Define a convex fuzzy set.
15. Define cross over points of a membership function.
16. Define height of a fuzzy set.
17. List the three operators in GA
18. Define Reproduction.
19. Define Mutation.
20. Define crisp ordering.
21. Define degree of consensus.
22. What are the two common measures of preference.
23. Define a convex fuzzy set.
24. Define prototype of the set.
25. Define degree of consensus.
26. Define height of a fuzzy set.
27. List the three basic operators of all genetic algorithm contain
28. State how the fuzzy sets mapped into the universe of member ship functions
29. What is the need for adaptive fuzzy system?

30. List the various steps involved in optimization using genetic algorithm
31. Define mutation and cross over
32. Write the typical fuzzy rule in a Sugeno fuzzy model

Part B

- 1) Write the components of a fuzzy logic system and explain them.
- 2) Explain min-max method of implication with a suitable example.
- 3) Explain monotonic (proportional) reasoning.
- 4) Who is a knowledge engineer? Write about extracting information from knowledge engineer.
- 5) Explain the various ways by which membership values can be assigned to fuzzy variables.
- 6) Discuss the various special features of the membership function.
- 7) With a neat sketch discuss the major components of fuzzy controller.
- 8) Write about genetic algorithm and its application.
- 9) Write the different deterministic form of classical decision-making theories and explain any two.
- 10) Write short notes on a) Lambda-cut. b) Knowledge base. c) Adaptive fuzzy system.
- 11) a) Determine the term membership function. Discuss how neural networks can be used in optimization of membership function.
b) What is knowledge base? What are its contents? Discuss
- 12) Write short notes on a) Genetic algorithm b) Adaptive fuzzy system

UNIT V **Application of FLC**

Part A

1. What are the rules based format used to represent the fuzzy information?
2. What is image processing?
3. Define image and pixel.
4. State two assumptions in fuzzy control system design.
5. Name the principal design elements in a general fuzzy logic control system.
6. Draw a schematic diagram of a typical closed-loop fuzzy control situation.
7. Name the two control system.
8. A simple fuzzy logic control system has some features: Name any two.
9. Write two sentences about neuro fuzzy controller.
10. What are the basic elements of a fuzzy logic control system.
11. Give the structure of a fuzzy production rule system.
12. Define approximate reasoning
13. What is the purpose of Knowledge base module.
14. Explain the steps in designing a fuzzy control system.
15. List the features of fuzzy control system.
16. Give the differential equation in Inverted pendulum.
17. What is the automating the control of depth of anaesthesia.
18. Why modeling of the process, blood pressure control difficult?
19. How the depth of anaesthesia is controlled.
20. What are the gases inhaled during anaesthesia?
21. What are the two different types of disturbances?
22. What is the purpose of a large sensor image chip.
23. What is the purpose of fuzzy control system in a TV.
24. Define an adaptive fuzzy system.

25. Define approximate reasoning
26. Explain the steps in designing a fuzzy control system.
27. What are the assumptions to be made in a fuzzy control system design.
28. List some of the applications of fuzzy logic control system.
29. List the two different forms most fuzzy logic control system models can be expressed
30. List the two kinds of disturbance in the control loop for the control of depth of anesthesia
31. What is neuro fuzzy technique?
32. For what kind applications, FLC is required?
33. Mention the benefits of neuro fuzzy controller over FLC

Part B

- 1) Explain the importance of fuzzy logic control in various fields.
- 2) Explain the fuzzy logic is being implemented for image processing.
- 3) Discuss the home heating system with fuzzy logic control.
- 4) Explain the technique “fuzzy logic blood pressure during anesthesia” in a brief manner.
- 5) What are the components of fuzzy logic control and explain them in detail with block diagram?
- 6) What do you mean by neuro fuzzy controller and explain in detail.
- 7) List out the importance of the neuro fuzzy controller in other fields.
- 8) Explain in detail any one application of neuro fuzzy techniques in power systems.
- 9) a) Diagrammatically illustrate and discuss the major models involved in fuzzy logic control system?
b) What is neuro- fuzzy controller? Discuss
10. Discuss the application of fuzzy logic control in image processing