B.Tech. DEGREE EXAMINATION, MAY 2024
Fifth & Sixth Semester

18CSE388T – ARTIFICIAL NEURAL NETWORKS
(For the candidates admitted during the academic year 2018-2019 to 2021-2022)

Note:
(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO

1. _____ type of organs are responsible for sensing light in organisms.   (1, 1, 1, 2)
   (A) Photo receptor cells   (B) Mechanoreceptor cells
   (C) Chemoreceptor cells   (D) Thermoreceptor cells

2. _____ distinguishes living organism's neurons from technical neurons.   (1, 2, 1, 1)
   (A) Size   (B) Chemical composition
   (C) Complexity   (D) Ability to replicate

3. _____ component of a neuron is responsible for receiving signals from other neurons.   (1, 2, 1, 2)
   (A) Axon   (B) SOMA
   (C) Dendrites   (D) Synapse

4. How do artificial neural networks mimic biological neural networks?   (1, 2, 1, 1)
   (A) By using electrical signals   (B) By implementing mathematical models of neurons
   (C) By incorporating neurotransmitters (D) By relying on hormonal pathways

5. How are neurons typically represented in neural network diagrams?   (1, 3, 2, 2)
   (A) Rectangles   (B) Circles
   (C) Triangles   (D) Squares

6. What is the order of activation, in synchronous activation of neurons in a neural networks?   (1, 2, 2, 2)
   (A) All neurons activate simultaneously (B) Neurons activate in random order
   (C) Neurons activate in sequential order (D) Neurons activate based on input magnitude

7. In asynchronous activation, how do neurons activate?   (1, 2, 2, 1)
   (A) Sequentially, one after another (B) Simultaneously all at once
   (C) Randomly, based on input signals (D) According to predefined activation another

8. _____ is the function of the input layer in a neural network.   (1, 2, 2, 1)
   (A) Processing data for output   (B) Adjusting connection weights
   (C) Receiving external input signals (D) Calculating error

9. _____ type of learning rule involves providing both input and target output to the network during training.   1 2 3 2
   (A) Supervised learning   (B) Unsupervised learning
   (C) Reinforcement learning   (D) Self-organizing learning

10. _____ is the primary purpose of backpropagation in neural networks.   1 2 3 2
    (A) Initializing network parameters (B) Calculating error
    (C) Adjusting connection weights   (D) Activating neurons

11. _____ factor affects the speed and accuracy of propagation in neural networks   1 2 3 2
    (back propagation).
    (A) Learning rate   (B) Network size
    (C) Activation function   (D) Initialization method

12. _____ of the following is a variant of back propagation that adjusts learning rates   1 2 3 2
    for individual weights based on their gradients.
    (A) Resilient backpropagation   (B) Stochastic gradient descent
    (C) Genetic algorithm   (D) Simulated annealing

13. _____ occurs during the growing phase of an RBF network.   1 2 4 2
    (A) New neurons are added to the   (B) Existing neurons are removed
        hidden layer   from the hidden layer
    (C) Connection weights are adjusted (D) The output layer is expanded

14. _____ distinguishes recurrent perceptron-like networks from feedforward   1 2 4 2
    networks.
    (A) Recurrent networks have feedback (B) Feedforward networks have more
        connections   hidden layers
    (C) Recurrent networks use linear   (D) Feedforward networks have faster
        activation functions   training times

15. _____ type of network is a Jordan network.   1 2 4 2
    (A) Feedforward network   (B) Recurrent network
    (C) Radial basis function network   (D) Multilayer perceptron

16. _____ is the process of unfolding in time in recurrent networks.   1 2 4 2
    (A) Adding more hidden layers   (B) Unrolling the network over
                                             multiple time steps
    (C) Adjusting the learning rate   (D) Increasing the number of neurons
                                             in the input layer

17. In an art network, what is resonance?   1 2 5 2
    (A) The process of adjusting connection (B) The state where a neuron becomes
        weights   active
    (C) The calculation error between   (D) The adjustment of the learning
        predicted and actual outputs   rate

18. How does learning occur in an art network?   1 2 5 2
    (A) Through gradient descent   (B) Through competitive learning and
        optimization   weight adjustment
    (C) Through reinforcement learning and (D) Through random initialization of
        reward signals   connection weights

19. The learning process in an art network characterized by _____.
    (A) Increasing learning rate over time
    (B) Decreasing learning rate over time
    (C) Dynamic adjustment of learning rate
    (D) Constant learning rate

20. _____ is the primary function of an art networks structure in its task.
    (A) Clustering input patterns based on similarity
    (B) Adjusting connection weights dynamically
    (C) Classifying input patterns into predefined categories
    (D) Maximizing the number of neurons in the network

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

	Marks	BL	CO	PO
21. Describe the transition from biological neurons to technical neurons in the context of information processing.	4	3	1	2
22. Compare and contrast synchronous and asynchronous activation in neural networks.	4	3	2	2
23. Design a single layer perceptron which perform 3-input "OR" logic function.	4	3	2	3
24. Discuss the gradient optimization procedure in the context of training neural networks.	4	2	3	2
25. How do Radial Basis Function (RBF) differ from traditional neurons in terms of their activation function?	4	3	4	2
26. Explain "Unfolding in Time" in terms of recurrent neural networks training.	4	3	4	3
27. Illustrate the role of topology function in self organizing maps.	4	3	5	2

PART – C (5 × 12 = 60 Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO
28. a. Explore the mechanism of light sensing in the eye, focusing on the function of photo receptor cells. How do these cells contribute to visual perception?	12	4	1	2

(OR)

	Marks	BL	CO	PO
b. Describe the organization and function of the peripheral nervous system and its role in regulating voluntary and involuntary movements. Also explain how it controls the overall functioning of vertebrate nervous system.	12	4	1	2
29. a. Explain the significance of activation functions in artificial neural networks. How do they contribute to the networks ability to learn complex patterns?	12	4	2	2

(OR)

	Marks	BL	CO	PO
b. With a neat sketch and suitable examples explain the feed forward architecture and their respective applications.	12	3	2	2

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30. a. Discuss the concept of learning samples in the context of training artificial neural networks. How are they utilized in different learning paradigms? 12   3   3   2

(OR)

b. Describe the Hebbian learning rule and its significance in neural network training. How does it promote learning based on synaptic activity and input correlations? 12   3   3   2

31. a. Compare and contrast recurrent perceptron-like networks, Jordan networks and Elman networks in terms of their architectures and information processing capabilities. 12   3   4   2

(OR)

b. Explain the role of evolutionary algorithms in training neural networks. How do these algorithms differ from traditional gradient-based optimization techniques? 12   3   4   3

32. a. Explain the concept of unsupervised learning network paradigms. How do they differ from supervised learning paradigms and what are some typical applications of unsupervised learning networks? 12   3   5   2

(OR)

b. Describe the learning process of an Adaptive Resonance Theory (ART) network. How does the network achieve resonance, and what role does the learning mechanism play in stabilizing category representations? 12   3   5   2

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