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B.Tech DEGREE EXAMINATION, NOVEMBER 2023

Fifth Semester

18CSE388T - ARTIFICIAL NEURAL NETWORKS

(For the candidates admitted during the academic year 2020 - 2021 & 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** and **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
1.	Interbrain is also called as _____ (A) Cerebrum (B) Cerebellum (C) Spinal cord (D) Diencephalon	1	1	1
2.	The processing unit of the brain is _____ (A) cortex (B) dendrites (C) cells (D) neuron	1	1	1
3.	The calculations are carried out in brain and computer as _____ and _____ respectively (A) serial, serial (B) serial, parallel (C) parallel, serial (D) parallel, parallel	1	2	1
4.	The membrane potential of the neuron in the resting state is _____ (A) -70mV (B) 70mV (C) 85mV (D) -85mV	1	2	1
5.	The strength of connecting weight between two neurons i and j is referred to as _____. (A) wi,i (B) wj,i (C) wj,j (D) wi,j	1	1	2
6.	The _____ function decides whether a neuron should be activated or not. (A) propagation (B) activation (C) input (D) output	1	2	2
7.	The current time (present time) is referred to as (t) and the next time step as _____. (A) t (B) (t-1) (C) (t+t) (D) (t+1)	1	2	2
8.	Neurons get activated if the network input exceeds their _____ value. (A) output (B) error (C) threshold (D) weighted sum	1	2	2
9.	A learning whose features have no label is called _____. (A) Supervised learning (B) Unsupervised learning (C) Reinforcement learning (D) Semi-supervised Learning	1	1	3
10.	Hebbian rule implies that the connection between two neurons is strengthened when both neurons are (A) active at the same time (B) Active at different time (C) Inactive (D) Proactive	1	2	3

11. When the training error is less, and the test error is high, then the model is 1 2 3

(A) Overfitting model (B) Underfitting model
(C) Best fitting model (D) Worst fitting model

12. The overall notation of the gradient g of the point (x, y) of a two-dimensional function f being _____. 1 2 3

(A) $g(x, y) = \nabla f(x, y)$ (B) $g(x, y) = f(x, y)$
(C) $f(x, y) = \nabla g(x, y)$ (D) $g(x, y) = \nabla x(x, y)$

13. RBF networks provide a global approximation to the target function, represented by _____ many local kernel functions. 1 2 3

(A) a parallel combination (B) a linear combination
(C) a series combination (D) a non-linear combination

14. Select the function which is not linearly separable. 1 3 3

(A) AND (B) OR
(C) XOR (D) NOT

15. Which technique is least suitable to determine cluster centers and widths in RBFNN? 1 2 3

(A) SOM (B) k-means clustering
(C) gradient descent (D) fixed selection of centers and widths with even spacing

16. Which is not true about recurrent backpropagation? 1 2 3

(A) also called backpropagation through time (B) uses unfolding
(C) uses teacher forcing (D) uses many epochs

17. Select all the disadvantages of unfolding in time. 1 2 4

i. Networks may become too large and unwieldy with the increase in time steps and context layers.
ii. Training such an extensive network would take time.
iii. The weight adjustments for an unfolded network would quickly go down to zero for layers further from the output.

(A) i, ii and iii (B) i and iii only
(C) i and ii only (D) ii and iii only

18. In SOM, How many output nodes can fire simultaneously? 1 2 4

(A) Many (B) One
(C) Two (D) Zero

19. Consider a neural network with 2 input neurons, 2 hidden neurons, and one output neuron. The maximum number of neurons that are active at a time instant in the case of (a) feedforward neural network and (b) recurrent neural network, respectively are: 1 3 4

(A) 2 and 2 (B) 2 and 5
(C) 5 and 5 (D) 5 and 2

20. What is ART in neural networks? 1 1 4

(A) automatic resonance theory (B) artificial resonance theory
(C) adaptive resonance theory (D) Adaptive resistance theory

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Draw the structure of a biological neuron and label its parts.	4	1	1
22.	Compare and contrast the working of the brain with the computer.	4	2	1
23.	State a few activation functions used in single and multilayer networks to calculate the output.	4	1	2
24.	Discuss the significance of bias neurons.	4	3	2

25.	Explain how Completely linked network topology is used to construct a neural network.	4	2	3
26.	Compare RBF networks and multilayer perceptron's in all possible ways.	4	3	3
27.	State the main benefit of adaptive resonance theory over self-organizing maps. Justify the reason for this benefit.	4	3	4

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL	CO
28.	(a) Explain in detail the central nervous system and peripheral nervous system with a neat sketch.	12	2	1
	(OR)			
	(b) Briefly discuss the different steps involved in light signals processing by the retina with a neat sketch.			
29.	(a) Identify the use of topology and explain how FeedForward network and Recurrent network topology are used to construct a neural network.	12	1	2
	(OR)			
	(b) Illustrate the different orders of asynchronous activation in a neural network and explain it.			
30.	(a) Relate the concept of Gradient Optimization Procedures and its problems.	12	2	3
	(OR)			
	(b) With a neat sketch, explain the Single Layer Perceptron and write the perceptron learning algorithm with binary neuron activation function.			
31.	(a) (i) Illustrate the benefit of training a neural network using teacher forcing over unfolding with an example. (ii) How can the genetic algorithms be used to train recurrent neural networks?	12	3	3
	(OR)			
	(b) With a neat diagram, illustrate the working principle of the Recurrent back propagation neural network.			
32.	(a) Briefly discuss all the variations of SOM with a neat sketch.	12	2	4
	(OR)			
	(b) Explain the structure and learning process of an ART network in detail with a neat sketch			

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