BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – M.Tech.(CSE)-AIML-2025
Course Name – Neural Networks and Deep Learning
Course Code - MTA20502
(Semester II)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Learning in ANN occurs through adjustment of
   a) Activation functions b) Weights and biases
   c) Number of layers d) Data source

(ii) Training set consists of
   a) Input only b) Target only
   c) Input-output pairs d) Noise

(iii) BAM stability occurs when energy
   a) Increases b) Decreases to minimum
   c) Constant d) Fluctuates

(iv) In competitive learning, neurons compete based on
   a) Output error b) Activation strength
   c) Learning rate d) Bias value

(v) Counter Propagation Network combines
   a) Hebbian and delta learning b) Supervised and unsupervised learning
   c) Recurrent and feedforward d) Clustering and regression

(vi) Special-purpose neural networks are designed for
   a) General tasks b) Specific applications
   c) Random learning d) Universal approximation

(vii) Hidden units enable neural networks to
   a) Store datasets b) Learn non-linear relationships
   c) Reduce parameters d) Eliminate loss functions

(viii) Reverse-mode automatic differentiation is especially efficient for
   a) Few inputs and many outputs b) Many inputs and one output
   c) Linear models only d) Shallow networks

(ix) Norm penalties can be interpreted as

a) Hard constraints on outputs
b) Constrained optimization problems
c) Probabilistic loss functions
d) Data preprocessing techniques

(x) An under-constrained learning problem typically has

a) Too much data
b) Too many constraints
c) More parameters than data
d) No hidden layers

(xi) Data augmentation is especially useful in

a) Linear regression
b) Image and speech tasks
c) Convex optimization
d) Feature selection

(xii) Sparse representations mean

a) Most parameters are large
b) Most parameters are zero or near zero
c) All features are used equally
d) Dense activations

(xiii) Exploding gradients lead to

a) Very slow learning
b) Weight values growing uncontrollably
c) Zero gradients
d) Perfect convergence

(xiv) He initialization is especially suitable for networks using

a) Sigmoid activation
b) Tanh activation
c) ReLU activation
d) Linear activation

(xv) Bayesian optimization is preferred because it

a) Requires no evaluations
b) Randomly searches space
c) Uses probabilistic models of performance
d) Ignores past results

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain Adam optimizer. (3)
3. Describe the role of the neighborhood function in the SOFM training algorithm. (3)
4. Explain the mechanism of L2 regularization. (3)
5. Explain the effect of the value of learning rate in training of neural network. (3)
6. Distinguish in between McCulloch-Pitts and Adaline. (3)

OR

Distinguish in between McCulloch-Pitts and Perceptron. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain the concept of Boltzman machine. (5)
8. Summarize the structure of a counter propagation network (CPN). (5)
9. Explain the method of improving model robustness and regularization by adding noise to the input data during training. (5)
10. Discuss Autoencoders and its utility in deep learning. (5)
11. Explain the architecture of Madaline. (5)
12. Distinguish Local Minima and Saddle Points. (5)

OR

Differentiate between Xavier (Glorot) and HE Initialization. (5)

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