| Reg. No. | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Question Paper Code | 13218 |
|---|---|

**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024**

Seventh Semester

**Electronics and Communication Engineering**

**20ECEL710 - DEEP LEARNING PRINCIPLES AND PRACTICES**

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

**PART - A (MCQ) (20 × 1 = 20 Marks)**

Answer ALL Questions

| | | Marks | K – Level | CO |
|---|---|---|---|---|
| 1. | Suppose we have a boolean function that takes 5 inputs x1, x2, x3, x4, x5? We have an MP neuron with parameter θ = 1. For how many inputs will this MP neuron give output y = 1?<br>(a) 21 (b) 31 **(**c) 30 (d) 32 | *1* | *K1* | *CO1* |
| 2. | The theorem that states a neural network with a single hidden layer containing a finite number of neurons can approximate any continuous function?<br>(a) Bayes theorem (b) Central limit theorem<br>(c) Fourier's theorem (d) Universal approximation theorem | *1* | *K1* | *CO1* |
| 3. | Which of the following statements is true about the representation power of a multilayer network of sigmoid neurons?<br>(a) A multilayer network of sigmoid neurons can represent any Boolean function.<br>(b) A multilayer network of sigmoid neurons can represent any continuous function.<br>(c) A multilayer network of sigmoid neurons can represent any function.<br>(d) A multilayer network of sigmoid neurons can represent any linear function. | *1* | *K1* | *CO1* |
| 4. | The following activation functions which can only give positive outputs greater than 0 is ___<br>(a) Sigmoid **(**b) ReLU (c) Tanh (d) Linear | *1* | *K1* | *CO2* |
| 5. | The variant of gradient descent that uses an estimate of the next gradient to update the current position of the parameters is<br>(a) Momentum optimization (b) Stochastic gradient descent<br>(c) Nesterov accelerated gradient descent (d) A dagrad | *1* | *K1* | *CO2* |
| 6. | ----- is a property of eigenvalues of a symmetric matrix.<br>(a) Eigenvalues are always positive<br>(b) Eigenvalues are always real<br>(c) Eigenvalues are always negative<br>(d) Eigenvalues can be complex numbers with imaginary part non zero | *1* | *K1* | *CO2* |
| 7. | The main purpose of a hidden layer in an under-complete autoencoder is _____<br>(a) To increase the number of neurons in the network<br>(b) To reduce the number of neurons in the network<br>(c) To limit the capacity of the network<br>**(**d) None of These | *1* | *K1* | *CO3* |
| 8. | If the dimension of the hidden layer representation is more than the dimension of the input layer, then what kind of autoencoder is used?<br>(a) Complete auto encoder (b) Under-complete autoencoder<br>(c) Over complete autoencoder **(**d) Sparse autoencoder | *1* | *K1* | *CO3* |
| 9. | The primary advantages of Autoencoders over PCA is ____<br>(a) Autoencoders are less prone to over fitting than PCA.<br>(b) Autoencoders are faster and more efficient than PCA.<br>(c) Autoencoders require fewer input data than PCA.<br>(d) Autoencoders can capture nonlinear relationships in the input data. | *1* | *K1* | *CO3* |

| | | | | | |
|---|---|---|---|---|---|
| 10. | How can over fitting be prevented in deep learning?<br>(a) By increasing the complexity of the model.<br>(b) By decreasing the size of the training data.<br>(c) By adding more layers to the model.<br>(d) By using regularization techniques such as dropout. | *1* | *K1* | *CO4* |
| 11. | ---- is the regularization techniques is likely to produce a sparse weight vector.<br>(a) L1 regularization (b) L2 regularization **(**c) Dropout (d) Data augmentation | *1* | *K1* | *CO4* |
| 12. | The main cause of the Dead ReLU problem in deep learning is _____<br>(a) High variance (b) High negative bias **(**c) Over fitting (d) Under fitting | *1* | *K1* | *CO4* |
| 13. | What is the computational complexity of computing the softmax function in the output layer of a neural network?<br>(a) O(n) **(**b) O(n2) (c) O(nlogn) (d) O(logn) | *1* | *K1* | *CO5* |
| 14. | Which of the following is an advantage of the CBOW model compared to the Skip-gram model?<br>**(**a) It is faster to train (b) It requires less memory<br>**(**c) It performs better on rare words (d) All of the above | *1* | *K1* | *CO5* |
| 15. | The architectures which has the highest no of layers----<br>(a) AlexNet (b) GoogleNet (c) VGG (d) ResNet | *1* | *K1* | *CO5* |
| 16. | Which of the following is an advantage of using the skip-gram method over the bag-of-words approach?<br>(a) The skip-gram method is faster to train<br>(b) The skip-gram method performs better on rare words<br>(c) The bag-of-words approach is more accurate<br>(d) The bag-of-words approach is better for short text | *1* | *K1* | *CO5* |
| 17. | What is the purpose of the cell state in an LSTM network?<br>(a) To store long-term dependencies in the input sequence<br>(b) To adjust the learning rate during training<br>(c) To compute the gradients for backpropagation<br>(d) None of the above | *1* | *K1* | *CO6* |
| 18. | Which of the following is a common variant of the attention mechanism?<br>(a) Self-attention (b) Multi-task attention<br>(c) Adversarial attention (d) Transfer learning attention | *1* | *K1* | *CO6* |
| 19. | Which of the following is a common architecture used for sequence learning in deep learning?<br>(a) Convolutional Neural Networks (b) Autoencoders<br>(c) Recurrent Neural Networks (d) Generative Adversarial Networks | *1* | *K1* | *CO6* |
| 20. | Which of the following is the main disadvantage of using BPTT?<br>(a) It is computationally expensive**.** **(**b) It is difficult to implement.<br>(c) It requires a large amount of data. (d) It is prone to overfitting. | *1* | *K1* | *CO6* |

**PART - B (10 × 2 = 20 Marks)**

Answer ALL Questions

| | | | | |
|---|---|---|---|---|
| 21. | Define Thresholding Logic in Deep Learning. | *2* | *K1* | *CO1* |
| 22. | Define 'winter of AI' referring to in the history of artificial intelligence. | *2* | *K1* | *CO1* |
| 23. | List out the different types of Gradient Descent. | *2* | *K1* | *CO2* |
| 24. | Define Adam. | *2* | *K1* | *CO2* |
| 25. | What is the primary reason for adding corruption to the input data in a denoising autoencoder? | *2* | *K1* | *CO3* |
| 26. | Compare sparse and denoising autoencoders. | *2* | *K2* | *CO3* |
| 27. | What is Greedy Layerwise Pretraining? | *2* | *K1* | *CO4* |
| 28. | Define L2 regularization. | *2* | *K1* | *CO4* |
| 29. | List the disadvantage of using Hierarchical Softmax. | *2* | *K1* | *CO5* |
| 30. | List out the main advantage of using GRUs over traditional RNNs. | *2* | *K1* | *CO6* |

**PART - C (6 × 10 = 60 Marks)**

Answer ALL Questions

| | | | | | |
|---|---|---|---|---|---|
| 31. | a) | Explain about backpropagation. Also Illustrate the working of forward and backward pass. | *10* | *K2* | *CO1* |
| | | **OR** | | | |
| | b) | Explain the Representation Power of MLPs. | *10* | *K2* | *CO1* |
| 32. | a) | Explain about Adagrad Optimizer in detail with its advantages and limitations. | *10* | *K2* | *CO2* |
| | | **OR** | | | |
| | b) | Compare stochastic gradient descent and gradient descent. | *10* | *K2* | *CO2* |
| 33. | a) | Explain Principal Component Analysis (PCA) and list the advantages and disadvantages of PCA. | *10* | *K2* | *CO3* |
| | | **OR** | | | |
| | b) | Compare different types of autoencoders. | *10* | *K2* | *CO3* |
| 34. | a) | What is the some common data augmentation techniques used in Natural Language Processing (NLP)? Summarize on each technique. | *10* | *K2* | *CO4* |
| | | **OR** | | | |
| | b) | Explain better weight initialization method. | *10* | *K2* | *CO4* |
| 35. | a) | Explain how visualization techniques help in understanding CNN behavior. | *10* | *K2* | *CO5* |
| | | **OR** | | | |
| | b) | Explain the features of ResNet and VGGNet. | *10* | *K2* | *CO5* |
| 36. | a) | What is an encoder-decoder model? Summarize the advantage of using an encoder-decoder model for sequence-to-sequence tasks. | *10* | *K2* | *CO6* |
| | | **OR** | | | |
| | b) | Explain the different types of Attention Mechanisms for Images and application. | *10* | *K2* | *CO6* |