Name: …………………………………………………. Roll No.: ………………………………………..

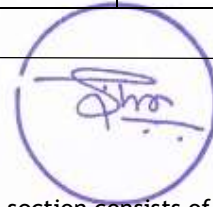Branch: …………………………………………………. Signature of Invigilator: ……………………

Semester: VIth   Date: 29/04/2022 (MORNING)

Subject with Code: **CS473 DEEP LEARNING**

Marks Obtained	Section A (30)	Section B (20)	Total Marks (50)

INSTRUCTION TO CANDIDATE

1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.

2. The booklet will be distributed to the candidates before 05 minutes of the examination. **Candidates should write their roll no. in each page of the booklet.**

3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.

4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.

5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.

6. Write on both side of the leaf and use pens with same ink.

7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.

8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.

9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.

10. Always maintain the highest level of integrity. Remember you are a BITian.

11. Candidates need to **submit the question paper cum answer sheets before leaving the examination hall**.

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI

END TERM EXAMINATION SP-2022

SUBJECT: CS473, DEEP LEARNING   **CLASS/SESSION: B.Tech. VI CSE, SP-2022**

MAX. MARKS: 50   **DURATION: 2 HRS**

Note:

- ➢ **This question paper has two sections (SECTION 'A' & SECTION 'B').**
- ➢ **Attempt all questions from section 'A'.**
- ➢ **Each question of SECTION 'A' is of 01 mark.**
- ➢ **Attempt any FIVE questions from section 'B'.**
- ➢ **Be precise in answer writing.**

SECTION 'A'

Q1. Among the following option identify the one which is not a type of learning

a) Supervised learning
b) Semi unsupervised learning
c) Reinforcement learning
d) Unsupervised learning

Q2. What is unsupervised learning?

a) The number of groups may be known
b) Features of groups explicitly stated
c) Neither feature nor number of groups is known
d) None of these

Q3. The ability to perform well on previously observed input is called:

Training
Generalization
Testing
All of the above

Q4. The factors determining how well a machine learning algorithm will perform are its the ability to:

    a) the training error is small
    b) Make the gap between training and test error small
    c) Both (a) and (b)
    d) None of these

Q5. When the model is not able to obtain a sufficiently low error value on the training set it is called

    a) Capacity
    b) Under fitting
    c) Entropy
    d) Over fitting

Q6. What is an activation value?

a) weighted sum of inputs
b) threshold value
c) main input to neuron
d) none of the mentioned

Q7. What is the objective of perceptron learning?

a) class identification
b) weight adjustment
c) adjust weight along with class identification
d) none of the mentioned

Q8. Any boolean function of n inputs can be represented exactly by a network of perceptrons containing 1 hidden layer with _____ perceptrons and one output layer containing 1 perceptron

    a) $2^{(n-1)}$
    b) $(2^n)+1$
    c) 2^n
    d) none of the mentioned

Q9. A perceptron is:

a) a single layer feed-forward neural network with pre-processing

b) an auto-associative neural network

c) a double layer auto-associative neural network

d) a neural network that contains feedback

Q10. The input to the network is an n-dimensional vector then the network contains L − 1 hidden layer having _____ neurons each.

a) n-1
b) 2n

c) n

d) 2n-1

Q11. Which algorithm implements the processing of entire dataset for every epoch of gradient descent?
    a) Batch Gradient Descent
    b) Mini-Batch Gradient Descent
    c) Stochastic Gradient Descent
    d) All of these

Q12. The momentum term in the momentum based gradient descent _____ for hyperplanes whose gradients point in the same direction and _____ for hyperplanes whose gradients are in opposite direction.
    a) Increase, decreases
    b) Decreases, increases
    c) Increases, increases
    d) Decreases, decreases

Q13. The update parameter in the case of RMSprop for the weight and bias is:
    a) $\theta_{t+1} = \theta_t - \dfrac{\eta}{\sqrt{E[g]_t - \epsilon}} g_{t-1}$
    b) $\theta_{t+1} = \theta_t - \dfrac{\eta}{\sqrt{E[g]_t - \epsilon}} g_{t-1}$
    c) $\theta_{t+1} = \theta_t - \dfrac{\eta}{\sqrt{E[g^2]_t + \epsilon}} g_t$
    d) $\theta_{t+1} = \theta_t - \dfrac{\eta}{\sqrt{E[g^2]_t - \epsilon}} g_t$

Q14. Selection of the number of principal component 'p' can be done by:
    a) Using the elbow method
    b) Choosing 'p' to be the largest value so that 99% of the variance is retained.
    c) Choosing 'p' to be the smallest value so that 99% of the variance is retained.
    d) Choosing 'p' to be the largest value so that 99% of the bias is retained.

Q15. Which of the following is the application of principal component analysis?
    a) To obtain more features for feeding into a learning algorithm.

b) Prevention of over fitting – Reduce the number of features in supervised learning so that there are fewer parameters to learn.
c) Data compression: Reduce the dimension of data so it takes us less memory
d) Enhance the data set by increasing the number of features.

Q16. Which of the following are types of regularization.

a) L1
b) L2
c) Both A and B
d) None of the above

Q17. L1 regularization adds _____ in the loss function.

a) Summation of absolute values of weights
b) Lambda times summation of absolute values of weights
c) Summation of squares of weights
d) Lambda times summation of square of weights

Q18. L2 regularization adds _____ in the loss function.

a) Summation of absolute values of weights
b) Lambda times summation of absolute values of weights
c) Summation of squares of weights
d) Lambda times summation of square of weights

Q19. Which of the following statements best describes "Bias" in ML:

a) Condition of the hypothesis to become biased toward some data points
b) The difference between the prediction of the values and the correct value
c) The variance of the dataset.
d) None of the above

Q20. An ideal ML model should have:

a) Low bias & low variance
b) Low bias & high variance
c) High bias & low variance.
d) High bias & high variance

SECTION 'B'

Question 1: Derive the formulae of biasness, variance, and standard error for Bernoulli distribution. *(4 marks)*

Question 2: Describe the perceptron learning algorithm and representation power of perceptron with suitable examples and diagrams. *(4 marks)*

Question 3: Develop the multi-level perceptron model for X-NOR operation. *(4 marks)*

Question 4: Compute the values of Eigen values, Eigen vectors, and Singular values for the following matrix: *(4 marks)*

A = { *(5, 2, 1, 4)*; *(6, 8, 5, 9)*; *(8, 4, 6, 9)*; *(3, 2, 7, 4)*}

Question 5: How can we inject noise in the inputs? How can we identify an object with noise using deep learning approaches? Justify your answer. *(4 marks)*

Question 6: Differentiate between L1, and L2 regularization. When and why we need to switch to L2 regularization? Justify your answer. *(4 marks)*

Question 7: Explain the role of vanishing and exploding gradients in deep learning approaches with suitable example. *(4 marks)*