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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: IV - THEORY EXAMINATION (2021 - 2022)
Subject: Machine Learning

Time: 3 Hours
Max. Marks: 100

General Instructions:
1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 mark each & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 6 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.
5. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A   20

1. Attempt all parts:-

1-a.   Identify the kind of learning algorithm for "facial identities for facial expressions". (CO1)   1
                (a) Prediction
                (b) Recognition Patterns
                (c) Recognizing anomalies
                (d) Generating patterns

1-b.   Machine Learning algorithms build a model based on sample data, known as - (CO1)   1
                (a) Training Data
                (b) Transfer Data
                (c) Data Training
                (d) None

1-c.   What is overfitting? (CO2)   1
                (a) Great result in training and great result in testing
                (b) Poor result in training and poor result in test
                (c) Great result in training and poor result in test
                (d) Poor result in training and poor result in testing

1-d.   Which Regression technique uses F-test or T-test? (CO2)   1
                (a) Ridge Regression
                (b) Stepwise Regression
                (c) Elastic Net Regression
                (d) Linear Regression

1-e.   Decision Tree is the most powerful for ……….. (CO3)   1
                (a) Classification
                (b) Prediction
                (c) Classification & Prediction
                (d) None of thses

1-f.   Formula for conditional probability P(A/B) is _____ (CO3)   1
                (a) $P(A|B) = \frac{P(A \cap B)}{P(B)}$
                (b) $P(A|B) = \frac{P(A \cap B)}{P(A)}$
                (c) $P(A|B) = \frac{P(A)}{P(B)}$
                (d) $P(A|B) = \frac{P(B)}{P(A)}$

1-g.   Why is the XOR problem exceptionally interesting to Neural Network researchers? (CO4)   1

(a) Because it can be expressed in a way that allows you to use a neural network

(b) Because it is complex binary operation that cannot be solved using neural networks

(c) Because it can be solved by a single layer perceptron

(d) Because it is the simplest linearly inseparable problem that exists.

1-h.   What is a dead unit in a neural network? (CO4)   1

(a) A unit which doesn't update during training by any of its neighbour

(b) A unit which does not respond completely to any of the training patterns

(c) The unit which produces the biggest sum-squared error

(d) None of these

1-i.   Which of the following is an application of reinforcement learning? (CO5)   1

(a) Topic modeling

(b) Recommendation system

(c) Pattern recognition

(d) Image classification

1-j.   Where does the additional variables are added in HMM? (CO5)   1

(a) Temporal model

(b) Reality model

(c) Probability model

(d) All of the mentioned

2. Attempt all parts:-

2.a.	Differentiate between inductive learning and deductive learning. (CO1)	2
2.b.	Explain the Difference between Classification and Regression. (CO2)	2
2.c.	What are Bayesian Belief nets? (CO3)	2
2.d.	Explain the different types of Gradient Descent.(CO4)	2
2.e.	What is Hebb Learning? (CO5)	2

<div align="center">SECTION B   30</div>

3. Answer any <u>five</u> of the following:-

3-a.	Explain how some areas/disciplines that influenced the machine learning. (CO1)	6
3-b.	Explain The Candidate Elimination Algorithm with positive and negative examples. (CO1)	6
3-c.	Explain the Gradient Descent algorithm with respect to linear regression. (CO2)	6
3-d.	Develop an expression to compute R2 value in the linear regression model. (CO2)	6
3.e.	Discuss in detail about working of KNN classifier algorithm with suitable example. (CO3)	6
3.f.	Mention the linear and nonlinear activation functions used in Artificial Neural Networks(ANN). (CO4)	6
3.g.	Write short note on Deep Reinforcement Learning and Autoencoder Architecture. (CO5)	6

<div align="center">SECTION C   50</div>

4. Answer any <u>one</u> of the following:-

4-a.	How is Candidate Elimination algorithm different from Find-S Algorithm? Explain in detail. (CO1)	10
4-b.	Describe in detail all the steps involved in designing a learning system. (CO1)	10

5. Answer any <u>one</u> of the following:-

5-a.	Explain all the types of Regression in detail. (CO2)	10
5-b.	What's the confusion matrix? Is it used for both supervised and unsupervised learning? What are Type 1 and Type 2 errors? (CO2)	10

6. Answer any <u>one</u> of the following:-

6-a.	Explain Naïve Bayes Classifier with an example. (CO3)	10

6-b.   What is linearly in separable problem? Design a two-layer network of perceptron to   10
          implement a) X OR Y b) X AND Y (CO3)

7. Answer any <u>one</u> of the following:-

7-a.   Explain how to learn Multilayer Networks using Backpropagation Algorithm. (CO4)   10

7-b.   Write short note on Feed-forward neural network and Convolutional neural network. (CO4)   10

8. Answer any <u>one</u> of the following:-

8-a.   Does Q-learning fails at environment with multiple terminal states? Explain. (CO5)   10

8-b.   Consider a system with two states and two actions. You perform actions and observe the   10
          rewards and transitions listed below. Each step lists the current state, reward, action and
          resulting transition as Si; R = r; ak : Si → Sj . Perform Q-learning using a learning
          rate of α = 0.5 and a discount factor of γ = 0.5 for each step. The Q-table entries are
          initialized to zero. (CO5)