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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2025 - 2026)

Subject: Programming for Data Analytics

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. 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:-

- | | | |
|-------|--|---|
| (1.1) | Define Series in Pandas.(CO1,K1) | 1 |
| | (a) A two-dimensional labeled data structure | |
| | (b) A one-dimensional labeled array | |
| | (c) A container for holding multiple Series | |
| | (d) A data type used for storing strings | |
| (1.2) | Identify the attribute that reveals column data types.(CO1,K1) | 1 |
| | (a) df.columns | |
| | (b) df.dtypes | |
| | (c) df.shape | |
| | (d) df.describe() | |
| (1.3) | Which of the following is apply function in R?(CO2, K1) | 1 |
| | (a) apply | |
| | (b) tapply | |
| | (c) fapply | |
| | (d) rapply | |
| (1.4) | EDA stands for (CO2,K1) | 1 |
| | (a) Exploratory Data Analysis | |
| | (b) Exploratory Data Animation | |
| | (c) Explanation of Data Analysis | |
| | (d) Exploratory Dplyr Analysis | |
| (1.5) | Which of the following does not come under the basic shell operations on | 1 |

MongoDB? (CO3,K1)

- (a) create
 - (b) write
 - (c) update
 - (d) delete
- (1.6) MongoDB uses the _____ notation to access the elements of an array and to access the fields of an embedded document.(CO3,K1) 1
- (a) Dot
 - (b) Array
 - (c) Nested Sets
 - (d) None of the above
- (1.7) Primary function achieved using Queues and Threads in TensorFlow. (CO4,K1) 1
- (a) To decrease model complexity
 - (b) To increase data processing speed
 - (c) To visualize neural network architectures
 - (d) To compress trained models
- (1.8) TensorFlow component simplifying neural network building and training.(CO4,K1) 1
- (a) TensorFlow Lite
 - (b) TensorFlow Estimators
 - (c) TensorFlow Probability
 - (d) TensorFlow Playground
- (1.9) Main difference between value-based and policy-based methods in reinforcement learning(CO5,K1) 1
- (a) Value-based methods directly optimize the policy, while policy-based methods optimize the value function
 - (b) Value-based methods estimate the value of state-action pairs, while policy-based methods estimate the policy directly
 - (c) Value-based methods update the Q-values, while policy-based methods update the policy parameters
 - (d) None of the above
- (1.10) Term for the function that maps states to actions in reinforcement learning. (CO5,K1) 1
- (a) Policy
 - (b) Reward function
 - (c) Value function
 - (d) State-action function

2. Attempt all parts:-

- (2.1) Describe the steps involved in creating a DataFrame in Pandas.(CO1,K1) 2
- (2.2) Mention the outcome of faceting on a continuous variable in ggplot2. (CO2,K1) 2
- (2.3) Describe the structure and purpose of a document in MongoDB.(CO3,K1) 2
- (2.4) Discuss the benefits of embedding visualization in TensorFlow for understanding 2

- word relationships.(CO4,K1)
- (2.5) Mechanism by which Generative Adversarial Networks (GANs) create new data samples.(CO5,K2) 2

SECTION-B 30

Answer any one of the following:-

- (3.1) Distinguish between a Series and a DataFrame in Pandas.(CO1,K2) 6
- (3.2) Demonstrate the method for matching a specific set of characters using regular expressions.(CO1,K3) 6

Answer any one of the following:-

- (3.3) Construct a 3x3 matrix using a vector in R and demonstrate row-wise and column-wise assignment.(CO2,K3) 6
- (3.4) Name the function used for horizontal merging of data frames in R and show its usage through an example.(CO2,K2) 6

Answer any one of the following:-

- (3.5) Write down the advantages of MongoDB.(CO3,K2) 6
- (3.6) Explain the concept of pipeline in the MongoDB aggregation framework.(CO3,K1) 6

Answer any one of the following:-

- (3.7) Explain the importance of model interpretability and explainability in TensorFlow for building trustworthy AI systems.(CO4,K1) 6
- (3.8) Discuss the process of exporting and serving models with TensorFlow for real-world deployment.(CO4,K2) 6

Answer any one of the following:-

- (3.9) Elaborate on the concept of eligibility traces in temporal difference learning and discuss their role in accelerating the learning process.(CO5,K3) 6
- (3.10) Discuss the challenges associated with handling high-dimensional action spaces in reinforcement learning and explain how Policy Gradient Methods address these challenges.(CO5,K2) 6

SECTION-C 50

4. Answer any one of the following:-

- (4.1) Explain the structure and features of a Pandas Series with examples.(CO1,K1) 10
- (4.2) Illustrate techniques to handle missing data in a DataFrame using Pandas.(CO1, K3) 10

5. Answer any one of the following:-

- (5.1) Explain the function of filter(), arrange() and select() with suitable examples(CO2,K1) 10
- (5.2) Explain the function of filter(), arrange() and mutate() with suitable examples(CO2,K2) 10

6. Answer any one of the following:-

- (6.1) Does MongoDB support ACID Transaction? Define ACID Transaction.(CO3,K2) 10
- (6.2) What are the databases in MongoDB? And explain the procedure of creating or selecting a database in MongoDB.(CO3,K2) 10

7. Answer any one of the following:-

- | | | |
|---|---|----|
| (7.1) | Explain the core workflow for training and deploying a model using TensorFlow from initialization to evaluation.(CO4,K1) | 10 |
| (7.2) | Demonstrate the use of recurrent neural networks (RNNs) for sequence modeling in TensorFlow.(CO4,K4) | 10 |
| 8. Answer any <u>one</u> of the following:- | | |
| (8.1) | Evaluate the design, applications, and challenges of autoencoders, including convolutional and variational autoencoders in representation learning tasks.(CO5,K5) | 10 |
| (8.2) | Analyze key algorithms and strategies underlying Deep Reinforcement Learning (DRL) with examples from game playing.(CO5,K4) | 10 |

REG_JAN_JUNE_2026