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<div align="right">21AI71</div>

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Advanced AI and ML

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   Define AI. Explain the foundation of AI in detail.   **(10 Marks)**
    b.   Explain history of AI in detail.   **(10 Marks)**

OR

2   a.   Briefly explain the properties of task environment.   **(10 Marks)**
    b.   Explain the following with respect to structure of agents:
         i)   Simple reflex agents
         ii) Model based reflex agents
         iii) Utility based agents   **(10 Marks)**

Module-2

3   a.   What is decision theory? Describe the decision theoretic agent that selects rational actions.
                                                                           (10 Marks)
    b.   What is Baye's rule? Explain with a relevant example.   **(10 Marks)**

OR

4   a.   Explain the following with examples:
         i)   Kolmogorov's axioms
         ii) Inclusion – Exclusion principle
         iii) Probability density function
         iv) Joint Probability distribution
         v)   Independence   **(10 Marks)**
    b.   Prove that probabilistic agent can perform better than logical agent by concept of wumpus world.
                                                                           (10 Marks)

Module-3

5   a.   Define perceptrons. How the perceptrons are represented? Explain perceptron training rule.
                                                                           (08 Marks)
    b.   Derive the gradient descent rule.   **(08 Marks)**
    c.   Write the stochastic gradient descent version of the BACKPROPAGATION algorithm for feedforward network containing 2 layers of sigmoid units.
                                                                           (04 Marks)

OR

6   a.   Write the prototypical genetic algorithm.   **(05 Marks)**
    b.   Explain the different operators with relevant bit strings.   **(06 Marks)**
    c.   Illustrate program tree representation in genetic programming. Explain block stacking problem.
                                                                           (09 Marks)

Module-4

7 a. What is association rule mining? Explain support, confidence and lift. **(10 Marks)**
  b. What is collaborative filtering? Explain the types. **(10 Marks)**

OR

8 a. What is BOW model? What are the 3 ways to identify the importance of words in BOW model? **(08 Marks)**
  b. Explain Naïve – Baye's model for sentiment classification. **(08 Marks)**
  c. Brief stemming and lemmatization process. **(04 Marks)**

Module-5

9 a. Define Clustering. What are the different types of clustering? **(06 Marks)**
  b. Explain k-medoids clustering with relevant example. **(08 Marks)**
  c. Write the k-nearest neighbor algorithm using voronoi diagram. **(06 Marks)**

OR

10 a. Explain distance weighted Nearest neighbor algorithm. **(05 Marks)**
   b. Derive and explain locally weighted Linear Regression. **(10 Marks)**
   c. Briefly explain radial basis funciton. **(05 Marks)**

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Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Cloud Computing

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1	a.	With a neat diagram, explain cloud computing and its historical development.	(10 Marks)
	b.	List the characteristics and benefits of cloud computing.	(10 Marks)

OR

2	a.	Explain in brief the services provided by the following cloud service provider:	
		i) Amazon web service	
		ii) Microsoft azure	
		iii) Google AppEngine.	(10 Marks)
	b.	Write a note on challenges in cloud computing.	(10 Marks)

Module-2

3	a.	Define virtualization and explain hardware level virtualization with its advantages.	(10 Marks)
	b.	Discuss the taxonomy of virtualization techniques at different levels.	(10 Marks)

OR

4	a.	What are the characteristics of virtualized environment?	(10 Marks)
	b.	Explain with a neat diagram Type-I and Type-II hypervisor.	(10 Marks)

Module-3

5	a.	Explain the different types of cloud.	(10 Marks)
	b.	What is IaaS? Explain its reference implementation with a neat diagram.	(10 Marks)

OR

6	a.	Explain the economics of the cloud.	(10 Marks)
	b.	What does the acronym SaaS mean? How does it relate to cloud computing?	(10 Marks)

Module-4

7	a.	Analyze the various cloud security risks that organization face when utilizing cloud computing services.	(10 Marks)
	b.	Explain the security risks posed by a management OS.	(10 Marks)

OR

8	a.	Discuss the traditional concept of trust and trust necessary for online activities.	(10 Marks)
	b.	Explain in detail virtual machine security.	(10 Marks)

Module-5

9	a.	Describe Amazon EC2 and its basic features.	(10 Marks)
	b.	Analyze how cloud computing technology can be applied to support remote ECG monitoring.	(10 Marks)

OR

10	a.	What is a bucket? What type of storage does it provide?	(10 Marks)
	b.	Examine the core components of AppEngine.	(10 Marks)

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21CS735

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Internet of Things

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. In the context of Evolution of IoT, with neat diagram, illustrate the sequence of technological developments leading to the shaping of the modern day IoT. **(06 Marks)**
   b. With diagram, explain enabling IoT and the complex Interdependence of technologies. **(08 Marks)**
   c. Differentiate between the following :
      (i) IoT versus M_2M.
      (ii) IoT versus CPS.
      (iii) IoT versus WoT. **(06 Marks)**

OR

2 a. With respect to the IoT networking components, define the following :
      (i) IoT NODE.
      (ii) IoT Router.
      (iii) IoT LAN
      (iv) IoT Gateway
      (v) IoT Proxy **(10 Marks)**
   b. Discuss the following addressing strategies in IoT:
      (i) Address Management Classes.
      (ii) Adressing during node Mobility. **(10 Marks)**

Module-2

3 a. Define sensors and with diagram, outline the simple sensing operation. **(04 Marks)**
   b. Discuss Scalar and Vector sensors and draw the functional blocks of a typical sensor node in IoT. **(06 Marks)**
   c. With neat diagram, explain the different sensing types commonly encountered in IoT. **(10 Marks)**

OR

4 a. Define Actuator and with diagram, discuss the outline of a simple actuation mechanism. **(04 Marks)**
   b. Explain the various actuators classes any 5 in IoT. **(10 Marks)**
   c. Discuss actuator characteristics that define all actuators. **(06 Marks)**

Module-3

5 a. List and discuss common data types used in IoT applications. **(06 Marks)**
   b. Explain the various processing topologies in IoT with necessary diagrams. **(08 Marks)**
   c. Illustrate the importance of processing in IoT. **(06 Marks)**

OR

6 a. With neat diagram, explain the processing offloading paradigm for the development of IoT-based solutions. **(10 Marks)**

   b. Determine the importance of choosing the right processing topologies and associated considerations while designing IoT applications. **(10 Marks)**

Module-4

7 a. List common connectivity protocols in IoT. **(04 Marks)**

   b. Explain the salient features and application scope of any 5 connectivity protocols. **(10 Marks)**

   c. Differentiate between Wi-Fi and Bluetooth connectivity protocols in IoT. **(06 Marks)**

OR

8 a. With necessary diagrams, explain in detail any four connectivity protocols in IoT. **(10 Marks)**

   b. Determine the requirements associated with any of IoT connectivity protocols in real-world solutions. **(10 Marks)**

Module-5

9 a. Describe in detail, the various Infrastructure protocols in IoT-based communication technologies. **(10 Marks)**

   b. Explain the following discovery protocols :
      (i)   Physical Web
      (ii) mDNS
      (iii) Universal plug and play (UPnP). **(10 Marks)**

OR

10 a. With neat diagram, discuss the illustration of the various facets of the Interoperability in IoT. **(10 Marks)**

   b. Discuss any four IoT Interoperability standards. **(10 Marks)**

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21CS745

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
NOSQL Database

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Discuss the key difference between NOSQL and Relational databases. **(10 Marks)**
   b. Provide strategies for optimizing data models to improve application performance. **(10 Marks)**

OR

2 a. Explain impendence mismatch problem in the context of data storage, and how does it affect application development. **(10 Marks)**
   b. Describe the concept of schemaless databases and their benefits. **(10 Marks)**

Module-2

3 a. Explain the concepts of Master – Slave and Peer- to – peer replication in distributed databases. **(10 Marks)**
   b. Discuss the importance of version stamp in esuring consistency across multiple nodes in a distributed database. **(10 Marks)**

OR

4 a. Discuss the challenges associated with achieving update consistency in a distributed database system. **(10 Marks)**
   b. Discuss read consistency in distributed databases, considering factors such as staleness and isolation levels. **(10 Marks)**

Module-3

5 a. Provide an example of composing Map-Reduce calculations to process and Analyze data. **(10 Marks)**
   b. Discuss the scalability characteristics of key-value databases. **(10 Marks)**

OR

6 a. Discuss key features of key value stores and their advantages. **(10 Marks)**
   b. Describe the basic structure of data in a key value databases. **(10 Marks)**

Module-4

7 a. Explain fundamental principles of document database. **(10 Marks)**
   b. Discuss the importance of SEO (Search Engine Optimization) in the context of blogging platforms. **(10 Marks)**

OR

8 a. Provide examples of common query operations performed on document databases and explain their significance. **(10 Marks)**
   b. Explain the importance of event logging in web applications with examples. **(10 Marks)**

Module-5

9 a. Discuss the key features of graph databases that make them suitable for handling connected data. **(10 Marks)**

   b. Identify scenarios where using a graph database may not be appropriate what are the limitations. **(10 Marks)**

OR

10 a. Describe how transactions are handled in graph database. What are the ACID properties are implemented. **(10 Marks)**

   b. Provide examples of complex queries that can be efficiency executed in graph database.

   (10 Marks)

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21CS751

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Programming in Python

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain computer Hardware architecture with neat diagram. **(06 Marks)**
   b. Summarize the python terminology interpreter and compiler. **(07 Marks)**
   c. What is a program? Illustrate the building blocks of programs. **(07 Marks)**

OR

2 a. Develop a python program which prompts the user for a Celsius temperature, convert the temperature to fahrenheit and print out the converted temperature. **(07 Marks)**
   b. Demonstrate the python functions int( ), float( ) and str( ) with example. **(06 Marks)**
   c. List and explain the significant features of python programming language. **(07 Marks)**

Module-2

3 a. Explain the different comparison and Boolean operators, along with examples. **(08 Marks)**
   b. Summarize syntax and example of using if-else ladder in python. **(06 Marks)**
   c. Develop a python program to check whether the given number is odd (or) even. **(06 Marks)**

OR

4 a. Experiment with iteration: while and for, give appropriate examples also for the same. **(08 Marks)**
   b. Explain the following with python programme:
      i) break   ii) Continue. **(08 Marks)**
   c. Write a program to find the factorial of a number. **(04 Marks)**

Module-3

5 a. Define function. Explain function calls in python programming with an example. **(08 Marks)**
   b. Explain the local and global scope of the variable with a suitable example. **(06 Marks)**
   c. Analyze following code and write the output of the following code with relevant explanation.

```
def fred( ):
    print("Zap")
def jane( ):
    print("ABC")
jane( )
fred( )
jane( )
```
(06 Marks)

OR

6 a. Define String. Explain getting the length of a string using len.   (06 Marks)
   b. Analyze the following with examples:
      i)   String slicer
      ii) Strings are immutable.   (10 Marks)
   c. Summarize string comparison with example.   (04 Marks)

Module-4

7 a. Explain various list operations with an example.   (08 Marks)
   b. Explain the following with examples:
      i)   Lists and functions
      ii) Lists and strings.   (08 Marks)
   c. Explain tuples are immutable with an example.   (04 Marks)

OR

8 a. Explain Dictionaries operations and methods.   (10 Marks)
   b. Explain the following:
      i)   Tuple or return value
      ii) Tuple comprehension.   (10 Marks)

Module-5

9 a. Explain the following with examples:
      i)   Character matching in regular expressions.
      ii) Extracting data using regular expressions.   (12 Marks)
   b. Illustrate the Escape character.   (08 Marks)

OR

10 a. Explain the concept of file handling. Also explain reading and writing process with suitable example.   (10 Marks)
   b. Explain the following:
      i)   Errors and Exceptions
      ii) Handling Exceptions.   (10 Marks)

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21CS752

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Introduction to AI and ML

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define Artificial Intelligence. Explain the below approaches to Artificial Intelligence with respective definitions.
   i) Acting Humanly   ii) Thinking Humanly   **(10 Marks)**

   b. Define Agent. With a neat diagram, explain how agents interact with environment through sensors and actuators.   **(10 Marks)**

OR

2 a. Explain the structure of an agent program with an example agent program.   **(10 Marks)**

   b. With a neat diagram and agent function, explain the following :
   i) Simple Reflex Agents   ii) Goal Based Agents   **(10 Marks)**

Module-2

3 a. Illustrate with an example, the components of a Well-defined problem.   **(10 Marks)**

   b. What are Toy problems and Real-world problems? Explain the formulation of vacuum world problem with a neat diagram of its state space.   **(10 Marks)**

OR

4 a. Explain Breadth-First search strategy with a pseudocode for BFS on a graph and simple binary tree.   **(10 Marks)**

   b. What is Heuristic search? Explain greedy best-first search with an example.   **(10 Marks)**

Module-3

5 a. Discuss different types of Machine Learning with example.   **(10 Marks)**

   b. Explain Machine Learning process with a neat diagram.   **(10 Marks)**

OR

6 a. Write a note on :
   i) Elements of big data   ii) Types of data   **(10 Marks)**

   b. Explain 4-layer architecture of big data analysis framework.   **(04 Marks)**

   c. Write a note on Data Preprocessing step of Big Data processing cycle.   **(06 Marks)**

Module-4

7 a. Explain Bivariate data with an example.   **(03 Marks)**

   b. Define covariance and correlation. Find the covariance and correlation coefficient of data.
   $X = \{1, 2, 3, 4, 5\}$ and $Y = \{1, 4, 9, 16, 25\}$ **(07 Marks)**

   c. Write the procedure for applying Gaussian elimination method. Solve the following set of equations using Gaussian elimination method:
   $$2x_1 + 4x_2 = 6$$
   $$4x_1 + 3x_2 = 7$$
   (10 Marks)

OR

8 a. Write Find-S algorithm. Apply Find-S algorithm on the below dataset that contains details of the performance of students and their likelihood of getting a job offer or not in their final semester.

CGPA	Interactiveness	Practical Knowledge	Communication Skills
≥ 9	Yes	Excellent	Good
≥ 9	Yes	Good	Good
≥ 8	No	Good	Good
≥ 9	Yes	Good	Good
Logical Thinking	Interest	Job Offer	
Fast	Yes	Yes	
Fast	Yes	Yes	
Fast	No	No	
Slow	No	Yes	

(10 Marks)

   b. List the limitations of Find-S algorithm. **(03 Marks)**
   c. Write K-Nearest-Neighbors (K-NN) algorithm. **(07 Marks)**

Module-5

9 a. What are artificial neurons? Describe the structure of a single neuron with a neat diagram.
(04 Marks)
   b. Explain simple model of an artificial neuron. **(08 Marks)**
   c. Write and explain Perceptron algorithm. **(08 Marks)**

OR

10 a. Elaborate on the types of Artificial Neural Networks. **(10 Marks)**
    b. Write and explain the algorithm for Radial Basis Function Neural Network. **(10 Marks)**

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21CS754

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Introduction to Data Science

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1	a.	List the benefits of Data Science.	(05 Marks)
	b.	Explain the categories of data used in data science.	(07 Marks)
	c.	Write a note on NoSQL Databases.	(08 Marks)

OR

2	a.	Define Big data and Data science. List the characteristics of Big data.	(04 Marks)
	b.	Briefly explain the six steps of data science process.	(12 Marks)
	c.	Write a short note on Machine learning framework.	(04 Marks)

Module-2

3	a.	How do you set up a research goal and create a project charter.	(08 Marks)
	b.	Explain the process of Data Cleansing.	(12 Marks)

OR

4	a.	Explain the different ways of combining data.	(08 Marks)
	b.	How do you transform data suitable for data modeling?	(08 Marks)
	c.	Mention and show four different types of graphs used in exploratory analysis.	(04 Marks)

Module-3

5	a.	What is Machine learning? Mention its applications.	(04 Marks)
	b.	Briefly explain the four steps of Modeling Process.	(08 Marks)
	c.	Why is validation important? Explain three validation strategies.	(08 Marks)

OR

6	a.	List the python libraries to work with data in memory.	(06 Marks)
	b.	Mention the two common error measures in machine learning. Explain them with an example.	(06 Marks)
	c.	What do you mean by confusion matrix? Explain with an example.	(08 Marks)

Module-4

7	a.	Explain the different ways of delivering a new insight to end user by data scientists.	(06 Marks)
	b.	Explain the Javascript libraries available to work on visualization tools.	(08 Marks)
	c.	What are the reasons against developing your own application?	(06 Marks)

OR

8	a.	State the reasons for creating own custom reports instead of opting company tools.	(06 Marks)
	b.	Mention the ingredients of a dc.js application and three files created.	(08 Marks)
	c.	Explain three important reduce functions to write MapReduce logic.	(06 Marks)

Module-5

9 a. Explain the components of Hadoop framework. **(10 Marks)**

b. Explain how Hadoop achieves parallelism with an example. **(10 Marks)**

OR

10 a. What is Spark? How does Spark solve the problem of MapReduce. **(10 Marks)**

b. Explain the components of Spark Framework. **(10 Marks)**

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