R1057

Sub. Code
557201

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Second Semester

Artificial Intelligence and Data Science

DATA MINING AND WAREHOUSING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. ———————— describes the data contained in the data warehouse. (CO1, K1)

   (a) Relational data (b) Operational data

   (c) Metadata (d) Informational data

2. Which of the following statements about OLAP (Online Analytical Processing) is true? (CO1, K1)

   (a) OLAP is primarily used for online transaction processing

   (b) OLAP databases are optimized for complex query and analysis operations

   (c) OLAP databases are designed for high-speed transaction processing

   (d) OLAP is mainly used for storing unstructured data

3. Which of the following is a challenge in data mining and data warehousing? (CO2, K2)

(a) Lack of data security measures

(b) Difficulty in integrating data from multiple sources

(c) Limited availability of data visualization tools

(d) Inability to store large volumes of data

4. Which of the following is NOT a data mining technique? (CO2, K2)

(a) Clustering

(b) Regression analysis

(c) Data warehousing

(d) Association rule mining

5. What is classification in machine learning? (CO3, K3)

(a) Grouping similar data points together

(b) Predicting numeric values based on input features

(c) Predicting categorical labels or classes for new data points

(d) Discovering associations among items in a dataset

6. Which of the following algorithms is commonly used for classification? (CO3, K3)

(a) K-means clustering

(b) Apriori algorithm

(c) Decision trees

(d) Hierarchical clustering

7. What is the main limitation of K-means clustering? (CO4, K5)

(a) It cannot handle non-linearly separable data

(b) It is sensitive to the initial selection of centroids

(c) It cannot handle categorical data

(d) It is computationally expensive for large datasets

8. What is the basic building block of a neural network? (CO4, K5)

(a) Neuron

(b) Decision tree

(c) Support vector machine

(d) Random forest

9. What is web mining? (CO5, K4)

(a) Extracting data from the dark web

(b) Extracting useful patterns and knowledge from web data

(c) Encrypting web data for secure transmission

(d) Blocking access to certain websites

10. What is the primary goal of big data analytics? (CO5, K4)

(a) To store data efficiently

(b) To visualize data for better understanding

(c) To uncover hidden patterns and insights in large datasets

(d) To create complex machine learning models

Section B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) How is a data warehouse different from a database? How are they similar? (CO1, K1)

Or

(b) List out the functions of OLAP servers in the data warehouse architecture. (CO1, K1)

12. (a) What are the major issues in data mining? Explain. (CO2, K2)

Or

(b) Explain Visualization. (CO2, K2)

13. (a) Summarize in detail about various kinds of association rules. (CO3, K3)

Or

(b) Compare the advantages of FP growth algorithm over apriori algorithm. (CO3, K3)

14. (a) Mention the advantages of hierarchical clustering. (CO4, K5)

Or

(b) Write down the working principles of DBSCAN. (CO4, K5)

15. (a) Explain the functionality of web content mining. (CO5, K4)

Or

(b) Write a short note on analytics types. (CO5, K4)

Section C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Write about case study of Data Warehousing in the Tourism department. (CO1, K1)

Or

(b) Discuss the following. (CO1, K1)

(i) Star schema

(ii) Snow Flake schema

17. (a) Discuss data mining application areas. (CO2, K2)

Or

(b) Describe the Data Mining techniques. (CO2, K2)

18. (a) Explain the algorithm for constructing a decision tree from training samples. (CO3, K3)

Or

(b) Explain about the Apriori algorithm for finding frequent item sets with an example. (CO3, K3)

19. (a) Discuss the following clustering algorithm using examples. (CO4, K5)

(i) K. means

(ii) K-medoid

Or

(b) Discuss the different types of learning. (CO4, K5)

20. (a) Write about mining the web link structures to identify authoritative web pages. (CO5, K4)

Or

(b) Discuss the types of tools and techniques for mining the data sets. (CO5, K4)

———————

R1058	Sub. Code
	557202

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Second Semester

Artificial Intelligence and Data Science

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. What is Artificial intelligence? (CO1, K4)

   (a) Putting your intelligence into Computer

   (b) Programming with your own intelligence

   (c) Making a Machine intelligent

   (d) Playing a Game

2. State Space is a ———————— (CO1, K4)

   (a) representing your problem with variable and parameter

   (b) Problem you design

   (c) Your definition to a problem

   (d) The whole problem

3. What is the correct symbolization for the English sentence "All cats are mammals" in predicate logic? (CO2, K2)

(a) $\forall_x(Cat(x) \rightarrow \text{Mammal } (x))$

(b) $\exists_x (Cat(x) \wedge \text{Mammal } (x))$

(c) $\forall_x (Cat(x) \wedge \text{Mammal } (x))$

(d) $\exists_x (Cat(x) \rightarrow \text{Mammal } (x))$

4. ———————— produces proofs by refutation. (CO2, K2)

(a) Resolution

(b) Predicate

(c) Natural Deduction

(d) None

5. The Q-learning algorithm is a (CO3, K2)

(a) Supervised learning algorithm

(b) Unsupervised learning algorithm

(c) Semi-supervised learning algorithm

(d) Reinforcement learning algorithm

6. Which of the following is a performance measure for regression? (CO3, K4)

(a) Accuracy (b) Recall

(c) RMSE (d) Error rate

7. ———————— is the approach of combining different models with diverse strengths (CO4, K3)

(a) Ensemble (b) Reinforcement

(c) Evolutionary (d) None

8. The probability that a particular hypothesis holds for a data set based on the Prior is called (CO4, K3)

(a) Independent probabilities

(b) Posterior probabilities

(c) Interior probabilities

(d) Dependent probabilities

9. ———————— can tell how bad the model (CO5, K5)

(a) Cost function (b) Loss function

(c) Objective function (d) All

10. The probabilistic approach used in machine learning is closely related to (CO5, K5)

(a) Statistics (b) Physics

(c) Mathematics (d) Psychology

Part B ($5 \times 5 = 25$)

Answer **all** questions not more than 500 words each.

11. (a) How to define a problem as state space search? Discuss it with the help of an example. (CO1, K4)

Or

(b) What is production system? Explain it with an example. (CO1, K4)

12. (a) How predicate logic is helpful in knowledge representation. (CO2, K2)

Or

(b) Briefly explain about ISA and Instance classes. (CO2, K2)

13. (a) What is machine learning? What are key tasks of machine learning? (CO3, K4)

Or

(b) Explain the concept of penalty and reward in reinforcement learning. (CO3, K4)

14. (a) Explain the bootstrap sampling. Why is it needed? (CO4, K3)

Or

(b) What is the main purpose of a descriptive model? State some real-world problems solved using descriptive models. (CO4, K3)

15. (a) What is posterior probability? Give an example. (CO5, K5)

Or

(b) Explain how Naïve Bayes classifier is used for Text classification. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Describe briefly the various problem characteristics. (CO1, K4)

Or

(b) Explain the algorithm for steepest hill climbing. (CO1, K4)

17. (a) Describe how will you represent facts in prepositional and predicate logic with an example. (CO2, K2)

Or

(b) Give the steps involved in converting wff predicates into clause form. Give an example in each step. (CO2, K2)

18. (a) What are different tools and technologies available for solving problems in machine learning? Give details about any two of them. (CO3, K4)

Or

(b) What are the different types of supervised learning? Explain them with a sample application in each area. (CO3, K4)

19. (a) Explain, in details, the process of evaluating the performance of a classification model. (CO4, K3)

Or

(b) What are the different techniques for data pre-processing? Explain, in brief, dimensionality reduction and feature selection. (CO4, K3)

20. (a) What are Bayesian Belief networks? Where are they used? Can they solve all types of problems? (CO5, K5)

Or

(b) In an exam, there were 20 multiple-choice questions. Each question had 44 possible options. A student knew the answer to 10 questions, but the other 10 questions were unknown to him and he chose answers randomly. If the score of the student X is equal to the total number of correct answers, then find out the PMF of X. What is $P(X>15)$? (CO5, K5)

———————

R1059	Sub. Code 557203

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Second Semester

Artificial Intelligence and Data Science

WEB TECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. Which tag us used to create a numbered list in HTML? (CO1, K1)

   (a) (b)

   (c) (d) <dl>

2. Which of the following is the correct way to link an external CSS file to an HTML document? (CO1, K1)

   (a) <link src="styles.css">

   (b) <style src="styles.css">

   (c) <link href="styles.css">

   (d) <style href="styles.css">

3. Java Bean is a ———— technology (CO2, K2)

   (a) Component (b) Scripting

   (c) Middle tier (d) None

4. Which component in EJB is responsible for managing transactions? (CO2, K2)

(a) Session Bean

(b) Entity Bean

(c) Message-Driven Bean

(d) Container

5. What does HTTP stand for? (CO3, K4)

(a) Hypertext Transfer Program

(b) Hypertext Transfer Protocol

(c) Hyperlink Text Protocol

(d) Hyper Transfer Program

6. Which HTTP method is used to request data from a server? (CO3, K4)

(a) GET (b) POST

(c) PUT (d) DELETE

7. Which of the following statements is true about JSP? (CO4, K3)

(a) JSP is a client-side scripting language

(b) JSP files arc compiled into servlets before execution

(c) JSP can only generate static web content

(d) JSP is primarily used for database management

8. In JSP, which tag is used to insert Java code into the page? (CO4, K3)

(a) <%! %> (b) <%@%>

(c) <% %> (d) <%=%>

9. Select the packages in which JDBC classes are defined? (CO5, K5)

(a) jdbc and javax.jdbc

(b) rdb and javax.rdb

(c) jdbc and java.jdbc.sql

(d) sql and javax.sql

10. What does JDBC stand for? (CO5, K5)

(a) Java Database Connectivity

(b) Java Data Binding Connection

(c) Java Database Control

(d) Java Data Business connector

Part B ($5 \times 5 = 25$)

Answer **all** questions not more than 500 words each.

11. (a) Explain about different elements to design a table. (CO1, K1)

Or

(b) Discuss the JavaScript's string functions. (CO1, K1)

12. (a) Explain the difference between bound and constrained properties in Java Beans. (CO2, K2)

Or

(b) Briefly explain beans API. (CO2, K2)

13. (a) What is a cookie? How will you maintain session using cookies? (CO3, K4)

Or

(b) Write a short note on Servlet API. (CO3, K4)

14. (a) Write a note on need for JSP. (CO4, K3)

Or

(b) Explain how JSP works? (CO4, K3)

15. (a) Explain Java Beans API. (CO5, K5)

Or

(b) Write down the advantages of Java Beans. (CO5, K5)

Part C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) Explain different properties and values used in CSS. (CO1, K1)

Or

(b) Describe the XML schema. (CO1, K1)

17. (a) Explain the concept of properties in JavaBeans. Discuss how properties are defined, accessed, and manipulated within Java Bans. (CO2, K2)

Or

(b) Explain what a Javabean is and its significance in Java development. Discuss its characteristics and how it differs from regular Java classes. (CO2, K2)

18. (a) Explain the lifecycle of a servlet. (CO3, K4)

Or

(b) Explain the different session tracking techniques in detail. (CO3, K4)

19. (a) What are the various java script objects? Explain each with an example. (CO4, K3)

Or

(b) Describe the anatomy of JSP. (CO4, K3)

20. (a) Discuss about retrieving data from JDBC Database Connectivity. (CO5, K5)

Or

(b) Demonstrate about Javax.sql package in detail. (CO5, K5)

———————

R1060	Sub. Code
	557204

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Second Semester

Artificial Intelligence and Data Science

DESIGN AND ANALYSIS OF ALGORITHM

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. An algorithm is ————————? (CO1, K2)

   (a) A problem

   (b) A procedure for solving a problem

   (c) A real-life mathematical problem

   (d) None of the above

2. ———————— is the first step in solving the problem (CO1, K1)

   (a) Understanding the Problem

   (b) Identify the Problem

   (c) Evaluate the Solution

   (d) None of these

3. What is "divide and conquer" as a problem-solving technique? (CO2, K3)

(a) A strategy that avoids breaking problems into smaller subproblems

(b) A strategy that involves solving the largest subproblem first

(c) A strategy that breaks a problem into smaller subproblems and solves them independently

(d) A strategy that only works for small-scale problems

4. Which of the following algorithms does not use the divide and conquer approach? (CO2, K3)

(a) Binary search

(b) Merge sort

(c) Breadth-first search

(d) Karatsuba multiplication

5. Which of the following best describes the key idea behind dynamic programming? (CO3, K3)

(a) Iteratively solving subproblems and storing their solutions to avoid redundant computations

(b) Solving problems by recursively dividing them into smaller subproblems and combining their solutions

(c) Generating random solutions and selecting the best one based on certain criteria

(d) Breaking down problems into simpler steps and solving them simultaneously

6. Which of the following algorithms is based on the greedy technique? (CO3, K3)

(a) Dijkstra's shortest path algorithm

(b) Depth-first search (DFS)

(c) Merge sort

(d) Floyd-Warshall algorithm

7. ———— technique is based on exploiting the relationship between a solution to a given instance of a problem and a solution to its smaller instance (CO4, K3)

(a) DFS

(b) BFS

(c) Decrease-and-conquer

(d) None

8. ———— is a graph with directions specified for all its edges (CO4, K3)

(a) Digraph (b) Tree

(c) Edge (d) None

9. Which of the following algorithms is commonly used to tackle NP-complete problems? (CO5, K5)

(a) Greedy algorithms

(b) Dynamic programming

(c) Backtracking

(d) Binary search

10. Which of the following is a characteristic of the "branch and bound" technique? (CO5, K5)

(a) It requires exhaustive enumeration of all possible solutions

(b) It involves dynamic programming principles for optimal solution finding

(c) It explores the solution space by incrementally building a solution tree

(d) It relies on random sampling to efficiently search the solution space

Part B ($5 \times 5 = 25$)

Answer **all** the questions not more than 500 words each.

11. (a) Write down the general Plan for Analyzing the Time Efficiency of Recursive Algorithms. (CO1, K1)

Or

(b) Define best, worst and average case efficiency. (CO1, K1)

12. (a) Write short notes on Strassen's Matrix Multiplication. (CO2, K3)

Or

(b) List the general plan in divide and conquer algorithm. (CO2, K3)

13. (a) Define optimal binary search tree with example. (CO3, K4)

Or

(b) Briefly explain prims algorithm. (CO3, K3)

14. (a) Prove that the topological sorting problem has a solution if and only if it is a dag. (CO4, K3)

Or

(b) Narrate the properties of heaps. (CO4, K3)

15. (a) Explain the method of reduction to solve TSP problem using branch and bound. (CO5, K5)

Or

(b) Explain the strategy to prove that a problem is NP-hard. (CO5, K5)

Part C ($5 \times 8 = 40$)

Answer **all** questions not more than 1000 words each.

16. (a) Discuss in detail about fundamentals of algorithmic problem solving. (CO1, K1)

Or

(b) Write an algorithm for Fibonacci numbers generation and compute the following (CO1, K1)

(i) How many times is the basic operation executed?

(ii) What is the efficiency class of this algorithm.

17. (a) Explain in detail quick sorting method. Provide a complete analysis of quick sort with example. (CO2, K3)

Or

(b) Explain the following in detail. (CO2, K3)

(i) Closest pair problem

(ii) Convex hull problem.

18. (a) Describe the Warshall's algorithm with example and analyze its efficiency. (CO3, K3)

Or

(b) Describe Knapsack problem and Memory functions with example. (CO3, K3)

19. (a) Outline an algorithm for checking whether an array $H[1...n]$ is a heap and determine its time efficiency. (CO4, K3)

Or

(b) Elaborate on the principal varieties of the transform-and-conquer strategy. (CO4, K3)

20. (a) Briefly explain the classes NP-hard and NP-complete. (CO5, K5)

Or

(b) Write backtracking algorithm for: (CO5, K5)

(i) Hamiltonian problem

(ii) The subset-Sum problem.

———————

R1061

Sub. Code
557556

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Second Semester

Artificial Intelligence and Data Science

Elective : BLOCKCHAIN TECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. ———— is refers to a digital database of information that is immutable. (CO1, K1)

   (a) ledger (b) Bitcoin

   (c) Node (d) Blockchain

2. ———— is a number generated randomly that can be used in the cryptographic communication. (CO1, K1)

   (a) Nonce (b) Bitcoin

   (c) Blockchain (d) Node

3. ———— algorithm governance mechanisms to guarantee that the data/records are legitimate and not tampered with. (CO2, K2)

   (a) Consensus

   (b) BFS

   (c) Crypto

   (d) Symmetric

4. The value of the bitcoin is dependent only on (CO2, K2)

(a) Government regulation

(b) Market supply and demand

(c) Miners

(d) Inflation

5. ———— are a type of' attack in which an attacker creates a typical transaction to be included in a block. (CO3, K3)

(a) Bribery attacks

(b) Collusion attack

(c) Finney attack

(d) None

6. In blockchain security, CIAR stands for (CO3, K3)

(a) Concurrency, Identity, Authorization and Repudiation

(b) Concurrency, Integrity, Authorization and Non-repudiation

(c) Confidentiality, Integrity, Availability and Non-repudiation

(d) Confidentiality, Identity, Authorization and Non-repudiation

7. Which of the following is not a purpose of using private blockchain? (CO4, K5)

(a) Organizations prefer to control the overall blockchain

(b) Organizations would like to control who can use the system

(c) No audit for the system ensuring privacy

(d) Users are added via defined, authorized process

8. Which fault is difficult to handle in a distributed environment in general? (CO4, K5)

(a) Crash fault

(b) Byzantine fault

(c) Network fault

(d) Software fault

9. This refers to the reliability and trustworthiness of data. (CO5, K4)

(a) Non-repudiation (b) Confidentiality

(c) Integrity (d) Availability

10. An important strategy when looking to improve data security is developing a ———————— policy. (CO5, K4)

(a) Data security

(b) Data protection

(c) Data improvement

(d) Data identification

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Write notes on public key cryptography. (CO1, K1)

Or

(b) Differentiate between traditional and blockchain transactions using an example. (CO1, K1)

12. (a) Discuss the concept of mining in blockchain in detail. (CO2, K2)

Or

(b) Discuss the potential application of blockchains in the industry. (CO2, K2)

13. (a) What is Zero, One and Six confirmation Transaction? (CO3, K3)

Or

(b) What is HashCash? How it can be used to identify email spam? (CO3, K3)

14. (a) Explain CAP theorem. (CO4, K5)

Or

(b) Write notes on RAFT consensus algorithm. (CO4, K5)

15. (a) Compare traditional security model vs blockchain security model. (CO5, K4)

Or

(b) Discuss the applications of blockchain in banking sector. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1,000 words each.

16. (a) What is public blockchain? What are the features and drawbacks of public blockchain? (CO1, K1)

Or

(b) Write an essay on the different players who constitute the blockchain ecosystem. (CO1, K1)

17. (a) Compare Public, Private, Consortium and Hybrid blockchain. (CO2, K2)

Or

(b) What are the safety measures followed while storing and transacting in cryptocurrencies? (CO2, K2)

18. (a) Compare and contrast Bitcoin with Ethereum. (CO3, K3)

Or

(b) Explain the architecture of Ethereum. (CO3, K3)

19. (a) How failure of the follower is handled in RAFT? Explain. (CO4, K5)

Or

(b) What are the various controls over transactions in multichain? Explain. (CO4, K5)

20. (a) Explain the security aspects in bitcoin in detail. (CO5, K4)

Or

(b) How blockchain can help in clinical trials and medical research management? Explain. (CO5, K4)

———————