Roll No. ..... MCA NEP

Total Pages : 3

**24657**

**MCA/M-25**

ARTIFICIAL INTELLIGENCE

Paper : M24-CAP-204

Time : Three Hours] [Maximum Marks : 70

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. Question No. 1 is compulsory. All questions carry equal marks.

**Compulsory Question**

**1.** (a) What is the difference between modus ponen and modus tollen?

(b) What is the difference between uninformed and informed searches?

(c) What is a fitness function in GAs?

(d) What is a perceptron? Describe its structure and functionality.

**UNIT–I**

**2.** (a) Define Artificial Intelligence and differentiate between strong AI and weak AI.

(b) What is proof by refutation? Illustrate.

3. (a) What is Most General Unifier (MGU)? Write the algorithm to fin MGU.

(b) Define membership function in fuzzy logic. Give examples of different types of membership functions.

## UNIT–II

4. (a) Write the algorithm of Breadth first search and discuss its properties.

(b) What do you understand by state space representation? Illustrate.

5. (a) What is iterative deepening depth first search? Discuss its merits and demerits.

(b) What is an admissible heuristic? Why is it important in A*?

## UNIT–III

6. (a) What is a production system? Explain the components of a production system.

(b) What are the selection techniques used in GAs? Explain.

7. (a) Describe the general architecture of an expert system.

(b) What is mutation? Why is mutation necessary in genetic algorithms?



## UNIT–IV

8. (a) Explain the concept of least squares method in linear regression.

(b) Explain the role of activation functions in neural networks.

9. (a) Explain how the k-Nearest Neighbours (k-NN) algorithm works.

(b) How does PCA help in dimensionality reduction?

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9. (a) A card is drawn from a well-shuffled pack of 52 cards. What is the probability that it is : (i) a red card, (ii) a king, (iii) not a spade? 7

(b) Define and differentiate classical, statistical, and axiomatic definition of probability. 7



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MCA/M-25 **24658**

MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE

Paper–M24-CAP-207

Time : Three Hours] [Maximum Marks : 70

**Note :** Attempt *five* questions in all. Question Number 1 is compulsory. In addition to compulsory question, attempt *four* more questions selecting exactly *one* question from each unit. All questions carry equal marks.

## Compulsory Question

1. (a) Define a set. Give one example.

(b) State the difference between reflexive and irreflexive relations.

(c) What are eigenvalues?

(d) What is the difference between population and sample?

(e) What is the purpose of calculating Kurtosis?

(f) Define bivariate data with an example.

(g) Write the formula for simple linear regression line.

(7×2=14)

## UNIT–I

2. (a) Prove or disprove : If a relation is symmetric and transitive, it must be reflexive. 7

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**24656**

**MCA/M-25**

DATABASE MANAGEMENT SYSTEMS

Paper : M24-CAP-203

Time : Three Hours] [Maximum Marks : 70

**Note :** Students will be required to attempt five questions in all selecting one question each from Unit- I to Unit- IV. Question No. 1 is compulsory. All questions carry equal.

**Compulsory Question**

**1.** (a) Differentiate between primary key and unique key.

(b) What is entity, entity type and entity sets?

(c) Differentiate between alter and update SQL statement.

(d) How do you implement group by and order by clause in SQL?

(e) What is multivalued and join functional dependency?

(f) How do we design query tree? State an example.

(g) What do you mean by schedules?

(h) What is ACID properties of transaction? 14

**UNIT–I**

**2.** (a) Discuss the role of mapping in 3-tier architecture of DBMS as proposed by ANSI-SPARC. How this architecture achieves different types of data independence?

(b) What are relational model constraints? Elaborate the design issues of relational data model. 7+7=14

3. (a) What are attribute? Differentiate amongst different types of attribute along with their symbolic notations.

(b) What is relationship role name and recursive relationship? With the help of an example, explain degree and cardinality ratios of relationship. 7+7=14

## UNIT–II

4. (a) What join operations does in SQL? How do you implement different types of join in SQL?

(b) Write SQL query to implement constraints in SQL. 7+7=14

5. (a) Write SQL query to implement aggregate functions.

(b) Differentiate between SQL and PL/SQL. Write the syntax to implement different types of cursors in PL/SQL. 7+7=14

## UNIT–III

6. (a) Illustrate Union, Select, Cross Product and Join operations in Relational algebra with an example.

(b) Differentiate between query processing and query optimization. Discuss the phases of query processing. 7+7=14



7. (a) What do you mean by functional dependency? Discuss the following functional dependencies :

(i) Full and partial functional dependency.

(ii) Join dependency.

(iii) Transitive functional dependency.

(b) Explain the following normal forms with the help of an example.

(i) BCNF

(ii) DKNF. 7+7=14

## UNIT–IV

8. (a) Why and how problem of concurrency arises? Illustrate lost-update problem of concurrency.

(b) Write the potential reasons for transaction failure? Discuss immediate update and deferred update recovery technique. 7+7=14

9. Discuss the followings :

(i) Serializability of schedules.

(ii) Timestamp ordering. 7+7=14

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**24654**

**MCA/M-25**

SERVER-SIDE WEB TECHNOLOGY

Paper : M24-CAP-201

Time : Three Hours]

[Maximum Marks : 70

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. Question No. 1 is compulsory. All questions carry equal marks.

## Compulsory Question

**1.** (a) Compare static and dynamic web content with examples.

(b) How can you check if a file or directory exists before accessing it in Node.js?

(c) What is a template engine in Express.js?

(d) What are the advantages of using MongoDB over relational databases?

## UNIT–I

**2.** (a) Describe the Request-Response Cycle in a web application.

(b) What are callback functions in Node.js? How are they used?

3. (a) What are core modules in Node.js? How do you import and use a core module in your Node.js application?

(b) What is the purpose of Node Package Manager (npm)? How do you create and manage a package using npm?

## UNIT–II

4. (a) Explain how asynchronous file handling improves performance in Node.js.

(b) What are the main differences between GET and POST request handling?

5. (a) How do you handle synchronous errors using try-catch blocks?

(b) What are headers and how can you set custom headers in a Node.js response?

## UNIT–III

6. (a) What is Express.js and why is it popular for building web applications in Node.js?

(b) Define CRUD operations and explain how each corresponds to HTTP methods.

7. (a) What is the difference between authentication using sessions and JWTs?

(b) What is middleware in Express.js? Explain the flow of middleware functions.



## UNIT–IV

8. (a) What are collections in MongoDB and how are they similar or different from tables in SQL?

(b) How do you perform a conditional query in MongoDB? Illustrate.

9. (a) How do you retrieve documents from a MongoDB collection? Illustrate.

(b) What is the purpose of indexes in MongoDB? How do indexes improve query performance in MongoDB?

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**24655**

**MCA/M-25**

COMPUTER NETWORK

Paper : M24-CAP-202

Time : Three Hours] [Maximum Marks : 70

**Note :** Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

**Compulsory Question**

**1.** Answer any *five* of the following questions in brief :

(a) What is Computer Network? Write its Application Area.

(b) What are the various transmission impairments that can introduce errors in the Data Communication?

(c) What is Wavelength Division Multiple Access (WDMA)?

(d) What is Shortest Path Routing? Explain with a short example.

**UNIT–I**

**2.** Bring out a distinctive specification of the following :

(a) Transport layer, Network layer and Data Link layer of OSI reference model.

(b) Explain in brief about Connection-Oriented Networks : X.25, Frame Relay.

3. List and describe the purpose of various protocols of TCP/IP architecture and depict, how Data Transmission is carried out using TCP/IP.

## UNIT–II

4. Give a brief overview of various connecting devices transmission media used for Data Communication. And write short notes on Digital and Analog Data and Signals, Asynchronous and Synchronous transmission.

5. Distinguish between the following using suitable diagrams:
   (a) Virtual Circuit and Datagram Networks.
   (b) Pulse Code Modulation and Delta Modulation.
   (c) ADSL and Cable Broadband.

## UNIT–III

6. Describe one Error detection method followed in the Data link layer. Also describe the Hamming code method for correcting Errors.

7. What is the role of the Medium Access Control (MAC) sublayer in the data link layer? Explain with a diagram. Explain the working of the ALOHA protocol. What is the difference between Pure ALOHA and Slotted ALOHA?



## UNIT–IV

8. (a) Describe, how routing is carried out for Mobile hosts.
   (b) Describe the addressing hierarchy and frame format of IPv4.

9. (a) Compare TCP and UDP protocols with their services and header formats.
   (b) Describe IPv4 addressing and explain the need and structure of IPv6.

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