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24512

MCA/M-25

WEB TECHNOLOGIES

Paper : MCA-20-21

Time : Three Hours] [Maximum Marks : 75

Note : Question Number 1 is compulsory. Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

Compulsory Question

1. (a) Define web cache poisoning?

(b) Explain the Document Object Model (DOM) in JavaScript.

(c) Define cookies in PHP?

(d) What are superglobals in PHP?

(e) Describe the concept of Cross-Site Scripting (XSS).

(5×3=15)

UNIT–I

2. (a) Describe various web optimization techniques. Explain how these techniques enhance website performance and user experience? (7)

(b) What are static web pages? Discuss the advantages and limitations of using static pages compared to dynamic pages. (8)

3. Explain common canvas elements and attributes used to draw circle and text? Give Example. (15)

UNIT–II

4. List and explain different types of operators in JavaScript with examples. (15)

5. Write a JavaScript program to compute the factorial of a number using both recursion and iteration. Explain which is more efficient? (15)

UNIT–III

6. (a) Describe the steps involved in installing and configuring PHP and MySQL on a local server using XAMPP or WAMP. (8)

   (b) Explain how variables and data types work in PHP? (7)

7. (a) Describe code blocks in PHP and explain how PHP scripts generate browser output? (7)

   (b) Discuss various string processing functions in PHP such as strlen(), strpos(), substr(), str_replace() with examples. (8)

UNIT–IV

8. (a) Define AJAX. How does it improve the user experience compared to traditional web technologies? Give any real world example. (8)

(b) What are the common security issues in AJAX applications? (7)

9. (a) Describe the methods and properties of XMLHttpRequest object with examples. (8)

(b) Explain how AJAX works with PHP to handle client requests and return dynamic content? (7)

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24513

MCA/M-25

LINUX AND SHELL PROGRAMMING

Paper : MCA-20-22

Time : Three Hours] [Maximum Marks : 75

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

Compulsory Question

1. (a) Differentiate between regular files, directories, symbolic links, and device files in Linux. (4)

(b) Compare the du, df, and dfspace commands. How are these used to check disk space usage, and what kind of information do they provide? (4)

(c) Explain how to create a new file system using mkfs, and how to format a partition? (4)

(d) Describe how input, output and error redirection work in Linux? (3)

UNIT–I

2. (a) What are the basic features and architecture of Linux? Explain how Linux distributions differ and give examples of popular distributions? (7)

(b) What is the Linux file system? Describe its organization and how files are managed in Linux? (8)

3. (a) Explain the use of the cat, more, less, and head / tail commands. How do they help in viewing and managing file contents in Linux? (9)

(b) Explain the use of cd, pwd, and ls commands for directory navigation using examples. (6)

UNIT–II

4. (a) Explain how file compression works in Linux. Discuss the usage of compress, uncompress, gzip, and gunzip commands. (6)

(b) Explain the purpose and usage of process-oriented commands such as ps, top, kill, nice, renice, and jobs. How do these commands help manage processes effectively? (9)

5. (a) How do system calls like stat(), fstat(), and lstat() provide file status information? What type of metadata can be retrieved using them? (8)

(b) Discuss the purpose and usage of system calls like link(), unlink(), and access(). (7)

UNIT–III

6. (a) Discuss the mounting process in Linux. How are file systems mounted and unmounted using mount and amount commands? Discuss using steps and common use cases. (7)

(b) Explain group management in Linux. How are groups created, modified, and deleted? What is the importance of primary and secondary groups? (8)

7. (a) Describe the structure and components of a Makefile. How do targets, dependencies, and commands interact to control compilation? (7)

(b) Explain the use and significance of networking tools such as ping, nslookup, telnet, and netstat in diagnosing and troubleshooting network issues. (8)

UNIT–IV

8. (a) What are command line arguments in shell scripting? How are they accessed within a script? Explain the role of commands like expr, basename, and sleep in processing arguments and managing script behavior. (7)

(b) What are filters in Linux? Explain the role of common filters such as sort, uniq, cut, and tr in processing text data from standard input. Provide suitable examples. (8)

9. (a) How are shell variables declared and exported? Discuss the role of the read command, escape characters, and shell meta characters in user input and scripting. (8)

(b) Write a shell script to concatenate two strings & convert it into uppercase. (7)

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24514

MCA/M-25

ADVANCED DATA BASE SYSTEMS

Paper : MCA-20-23

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all. Question No. 1 is compulsory. Attempt four more questions selecting *one* question from each Unit.

Compulsory Question

1. Answer the following questions in brief : (5×3=15)

(a) What is data independence? Differentiate between logical and physical data independence.

(b) Explain the difference between CREATE, ALTER, and DROP statements.

(c) Discuss the role of indexes in query optimization.

(d) What is the difference between a serial and a concurrent schedule?

(e) Differentiate between shared-disk, and shared-memory architectures in parallel databases.

UNIT–I

2. (a) What are the roles of DDL, DML, and DCL in a DBMS? Give examples. (8)

(b) Explain the concept of keys in ER models. What are super key, candidate key, and primary key? (7)

3. (a) What is inheritance in EER modelling? How does it affect attribute sharing among entities? (7)

(b) Differentiate between unary and ternary relationships with suitable examples. What is meant by the role name in ER diagrams? (8)

UNIT–II

4. (a) How do you specify constraints like PRIMARY KEY, FOREIGN KEY, and DEFAULT in SQL? (7)

(b) How are transactions managed in PL/SQL? Explain COMMIT, ROLLBACK, and SAVEPOINT. (8)

5. (a) What are the different types of triggers in PL/SQL? Explain each briefly. (8)

(b) Define join dependency and explain the need for 5NF with an example. (7)

UNIT–III

6. (a) What are join algorithms in query processing? Explain sort-merge join with an example. (8)

(b) What are the ACID properties of a transaction? Explain with examples. (7)

7. (a) What is the Two-Phase Locking (2PL) protocol? Explain its types. (8)

(b) Explain the ARIES recovery algorithm and its three phases. (7)

UNIT–IV

8. (a) What is a temporal database? How is time represented in such databases? (7)

(b) What is a deductive database? Explain the role of logic programming in deductive databases. (8)

9. (a) Explain the role of XML in web databases. How is data structured using XML schema? (7)

(b) What are the typical operations supported by OLAP? (8)

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24515

MCA/M-25

PRINCIPLES OF PROGRAMMING LANGUAGES

Paper : MCA-20-24(I)

Time : Three Hours] [Maximum Marks : 75

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. (a) What is imperative language paradigm?

(b) What is the difference between context free and context sensitive grammars?

(c) Differentiate between implicit and explicit sequence control.

(d) Differentiate between name equivalence and structural equivalence.

UNIT–I

2. (a) Explain the concept of binding and binding time with suitable examples.

(b) What is Backus-Naur Form (BNF)? Write BNF for a simple arithmetic expression grammar.

3. (a) Explain the influence of programming environments on the effectiveness of language usage.

(b) What are the main programming paradigms? Discuss.

UNIT–II

4. (a) Design a finite automaton to recognize binary numbers divisible by 3.

(b) Write a short program snippet in any language and illustrate how type casting and type promotion occur.

5. (a) Show that the language generated by the following grammar is a regular language : $S \rightarrow aSb|a$.

(b) Explain how attribute grammars are used to define the semantics of programming languages.

UNIT–III

6. (a) How does inheritance promote software reuse? Illustrate.

(b) What is subprogram sequence control? Why is it important?

7. (a) Compare and contrast abstract classes and interfaces.

(b) Explain how sequence control is managed between statements in structured programming.

UNIT–IV

8. (a) What is the difference between call by value and call by result parameter passing techniques? Discuss.

   (b) How does static storage allocation differ from dynamic allocation? Discuss.

9. (a) Define exception propagation. How is it handled differently in Java/C++?

   (b) Explain the internal structure of XML and how it supports extensibility and interoperability in web-based applications.

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MCA/M-25 **24520**

SECURITY IN COMPUTING

Paper–MCA-20-25

Option : (iii)

Time : Three Hours] [Maximum Marks : 75

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

Compulsory Question

1. (a) Write the key principles for a secure program.

(b) What are virus? Define Back doors and Trap doors?

(c) What is firewall basing?

(d) Write about the threats in network.

(e) Write note on IPv4 and IPv6 security.

(f) Give the key aspects of Linux hardening.

(g) How do you access the security risks?

(h) What do you understand by IT security plan? 15

UNIT–I

2. (a) Differentiate between threats, attacks and assets. Explore the functional requirements for security.

(b) Outline the scope and explain computer security architecture. Describe computer security strategies.

(8+7=15)

3. (a) Write a detailed note on cryptography. Differentiate between linear cryptanalysis and differential cryptanalysis.

(b) Discuss Non-malicious program error, Malicious code and targeted malicious code. (8+7=15)

UNIT–II

4. How does database access control system works? Explain database security requirements and attribute based access control. Write the precautions for accessing sensitive data.

15

5. (a) What is the need for firewall? Explain how does screened host architectures for firewalls differ from screened subnet firewall architectures?

(b) What is Intrusion Detection System (IDS)? Write the goal and type of IDS with its strength and limitations.

(8+7=15)

UNIT–III

6. (a) Write note on Secure Socket Layer (SSL) and Transport Layer Security (TLS)? How does TLS works and how it affects web application performance?

(b) What is Kerberos used for? Elaborate the main components of Kerberos. Explore the working of X.509 Authentication Service Certificate. (8+7=15)

7. (a) What are the components of Linux system? Discuss Linux vulnerability.

(b) Write a detailed note on Windows security architecture. How do you ensure Window and Browser security? (8+7=15)

UNIT–IV

8. (a) What are the threats to physical security. Write the prevention and mitigation measures.

(b) What are the functions of security auditing? Discuss security audit architecture and alarms model. (8+7=15)

9. Explain the followings :

(a) Cybercrime and Computer Crime

(b) Different types of Intellectual Property Right (IPR). (8+7=15)

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24521

MCA/M-25

BIG DATA AND PATTERN RECOGNITION

Paper : MCA-20-41

Time : Three Hours] [Maximum Marks : 75

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 marks.

Compulsory Question

1. (a) What do you mean by big data velocity and veracity?

(b) Differentiate between traditional BI and Big data BI.

(c) What is data repurposing? Compare amongst Correct *versus* Correction.

(d) Write a note on Heartbeat Communication & FS image.

(e) What is training data set and test data set in pattern recognition?

(f) Briefly explain two broad pattern recognition paradigms.

(g) What are NoSQL BASE properties coined by Eric Brewer?

(h) Write note on Amazon DynamoDB and Apache Hbase. (15)

UNIT–I

2. (a) What are the different types of data? How do you identify different data characteristics for big data analytics? Differentiate between Data analysis and data analytics.

(b) Elaborate the ICT developments that have accelerated the pace of Big Data adoption in businesses. (8+7=15)

3. What are the important stages of big data analytics life cycle? Outline and explore. (15)

UNIT–II

4. (a) Write the objectives of data governance. Why does data governance matter? Discuss the key concepts for data practitioners and business process owners to adopt big data approach.

(b) Write the potential reasons for big data project failure. Discuss failure standards and legalities. (8+7=15)

5. (a) Differentiate between Map reduce and Apache PIG.

(b) Write the features and potential applications of Mahout. (8+7=15)

UNIT–III

6. (a) Differentiate between Quantitative and Qualitative Analysis.

   (b) How Does Pattern Recognition Works? Outline and explain components of typical pattern recognition system. (8+7=15)

7. (a) Differentiate between filter, wrapper and embedded methods of feature selection. How feature selection is different from feature extraction?

   (b) Discuss Neural Network approach, Fourier analysis and template matching approach of pattern matching. (8+7=15)

UNIT–V

8. Discuss the key features, pros, cons, examples, and use case for following NoSQL storage types and draw a comparison amongst them. (i) Key Value Store (ii) Column Oriented databases. (15)

9. (a) Differentiate between Schema and Schema-less Databases. How does a schema less database work?

   (b) What are CRUD operations? Write the key features of document databases. When should NoSQL be used? (8+7=15)

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24522

MCA/M-25

COMPUTER GRAPHICS AND ANIMATION

Paper : MCA-20-42

Time : Three Hours] [Maximum Marks : 75

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

Compulsory Question

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

(i) What is the role of display processors in graphics rendering?

(ii) What is the resolution and aspect ratio in display systems?

(iii) Explain the working principle of the polynomial method for circle drawing.

(iv) What will be the x-increment if a line is drawn from (3,4) to (12,8) using the simple DDA algorithm?

(v) Write the matrix for scaling a 2D object by 2 along the x-axis and 3 along the y-axis.

(vi) What is primitive instancing?

(vii) Write the equations for tweening.

UNIT–I

2. Explain in detail the components and functional pipeline of a modern interactive graphics system.

3. Discuss the principles of display technology in CRTs and LCDs, along with suitable diagrams.

UNIT–II

4. Explain and derive Bresenham's circle algorithm to draw a circle with center (0,0) and radius 5. Tabulate each decision step.

5. Compare flood fill and boundary fill algorithms, with suitable diagrams. Also, describe how neighbourhood pixels of the seed pixel are computed.

UNIT–III

6. (a) Derive the matrix for shearing in the x-direction by 2 and apply it to a rectangle with vertices (0,0), (2,0), (2,1), (0,1).

   (b) Reflect the point (4,9) about the line $y = 7$. Provide reflection matrices and results.

7. Compare Mid-point subdivision and Liang-Barsky line clipping algorithms.

UNIT–IV

8. Differentiate between :

   (a) Shape Grammars and Fractals.

   (b) Orthographic parallel projection and Oblique parallel projection.

9. Compare Depth-sorting and Binary Space Partitioning (BSP) tree methods for visible surface detection with a brief explanation of each.

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24523

MCA/M-25

MOBILE APPLICATION DEVELOPMENT

Paper : MCA-20-43

Time : Three Hours] [Maximum Marks : 75

Note : Question Number 1 is compulsory. Attempt *five* questions in all selecting at least *one* question from each unit. All questions carry equal marks.

Compulsory Question

1. (a) What is Android? Describe its importance and scope in the mobile app development industry.

(b) Describe the use of CheckBox in Android. List its main properties.

(c) Describe the process of signing an Android application.

(d) Name any three types of hardware sensors available in Android.

(e) List any two methods used to draw shapes on a Canvas. (3×5=15)

UNIT–I

2. (a) Explain the Android file structure in detail. 10

(b) Explain the evolution of Android through its versions. 5

3. (a) Explain the Relative Layout and how it differs from Linear Layout with an example. 10

(b) What is the Android Emulator? List its main features. 5

UNIT–II

4. What is SpinnerView and how does it differ from List-View in terms of usability and interface? 15

5. What is an Intent in Android? Discuss the difference between Explicit and Implicit Intents with examples. 15

UNIT–III

6. (a) Explain the lifecycle of a Fragment. How is it different from an Activity's lifecycle? 10

(b) What are Location-Based Services (LBS)? 5

7. (a) Explain the process of playing an audio in an Android application using MediaPlayer. 10

(b) How can NFC be used for communication between Android devices? 5

UNIT–IV

8. (a) Explain how gradients are implemented in Android graphics. Describe LinearGradient. 10

(b) Differentiate between internal and external storage in Android. 5

9. (a) How do you create and manage an SQLite database in Android using SQLiteOpenHelper? Explain with example. 10

(b) What is a Content Provider in Android? Describe its purpose and common use cases. 5

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24525

MCA/M-25

MACHINE LEARNING

Paper : MCA-20-44(ii)

Time : Three Hours] [Maximum Marks : 75

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

Compulsory Question

1. Answer the following questions in brief :

(a) How does Machine Learning differ from traditional programming?

(b) What are the three main types of Machine Learning?

(c) How do you evaluate the performance of a linear regression model?

(d) Describe the role of the sigmoid function in logistic regression.

(e) Differentiate between exploitation and exploration. (5×3=15)

UNIT–I

2. Write ID3 algorithm and implement it on following dataset to make decision tree by showing all steps.

Dataset : Whether India will win a cricket match

Weather	Toss	Ground	India Wins
Sunny	Yes	Home	Yes
Sunny	No	Away	No
Overcast	Yes	Home	Yes
Rainy	Yes	Neutral	Yes
Rainy	No	Home	No
Overcast	No	Away	Yes
Sunny	Yes	Neutral	No
Rainy	Yes	Home	Yes

15

3. (a) Define supervised learning. Explain how classification works in supervised learning with a suitable example. 10

(b) What is meant by 'hyperspace search' in the context of decision trees? 5

UNIT–II

4. Explain Bayes Theorem and its significance in probabilistic learning. How is the Naive Bayes classifier derived from Bayes Theorem? Discuss the assumptions made by the Naive Bayes algorithm and their implications. 15

5. (a) You are given a dataset containing the number of study hours and marks scored by students. Describe the steps involved in using linear regression to build a predictive model that estimates marks based on study hours. 10

(b) What is a Bayesian Belief Network? Describe its structure and components. 5

UNIT–III

6. What is single linkage clustering? Use the distance matrix in given Table to perform single linkage hierarchical clustering. Show your results by drawing a dendrogram.

Table : Distance matrix

	P1	P2	P3	P4	P5
P1	0.00	0.10	0.41	0.55	0.35
P2	0.10	0.00	0.64	0.47	0.98
P3	0.41	0.64	0.00	0.44	0.85
P4	0.55	0.47	0.44	0.00	0.76
P5	0.35	0.98	0.85	0.76	0.00

15

7. What is clustering in machine learning? Write the K mean clustering algorithm and for the given data, compute two clusters using K-means algorithm for clustering where initial cluster centres are (1.0, 1.0) and (5.0, 7.0). Execute for two iterations.

Record Number	A	B
R1	1.0	1.0
R2	1.5	2.0
R3	3.0	4.0
R4	5.0	7.0
R5	3.5	5.0
R6	4.5	5.0
R7	3.5	4.5

15

UNIT–IV

8. What is dimensionality reduction? Why is it important in machine learning? Discuss different dimensionality reduction techniques in detail. 15

9. (a) What is Reinforcement Learning? Explain different components of Reinforcement Learning. 10

   (b) Explain the concept of optimal hyperplane in a Support Vector Machine. 5

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MCA/M-25

BLOCKCHAIN TECHNOLOGY

Paper : MCA-20-45 (iii)

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all. Question No. 1 is compulsory. Attempt *four* more questions selecting *one* question from each Unit.

Compulsory Question

1. Answer the following questions in brief :

(a) What is Blockchain technology, and how does it work?

(b) What are decentralized organization? What are their advantages?

(c) What are the fundamental concepts behind Bitcoin, and how does it function as a decentralized digital currency?

(d) Compare and contrast Blockchain and Shared databases.

(e) What is Proof of Work (PoW), and how does it function as a consensus mechanism in the Bitcoin network? (5×3=15)

UNIT–I

2. (a) How do distributed systems contribute to the functioning of Blockchain technology? Explain. (7)

   (b) What are the various routes through which decentralization can be achieved in a Blockchain ecosystem? (8)

3. (a) What are smart contracts, and how do they operate within decentralized networks? Explain. (8)

   (b) Discuss historical evolution of Blockchain and Bitcoins. (7)

UNIT–II

4. (a) What are the key components of Blockchain architecture, and how do they contribute to its decentralized nature? Explain. (8)

   (b) Describe any two life use cases of Blockchain technology in different sectors. (7)

5. (a) Explain the role of digital keys and addresses in Bitcoin transactions. How they ensure security and ownership of assets on the Blockchain? Explain. (8)

   (b) How do transactions occur on the Bitcoin network, and what is the role of miners in validating and adding transactions to the Blockchain? (7)

UNIT–III

6. (a) How have different versions and variants of Blockchain technology evolved over time, and what are the distinguishing features of each? (8)

   (b) What is hashing? Explain use of hashing in Blockchain. (7)

7. (a) What are the different types of Bitcoin wallets available, and how do they vary in terms of security and convenience? (8)

   (b) What are Bitcoin clients, and how do they allow users to interact with the Bitcoin network to send and receive transactions? (7)

UNIT–IV

8. Explain the following Blockchain platforms along with their advantages and disadvantages :
   Hyperledger, IOTA, and Multichain. 15

9. (a) What are the key components and considerations involved in designing a distributed application (DApp) on a Blockchain platform like Ethereum? Explain. (7)

   (b) What are some real-world applications of Blockchain technology beyond cryptocurrencies, and how do they leverage the unique features of Blockchain for enhanced efficiency and transparency? (8)