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MCA/M-23 24518

WEB TECHNOLOGIES

MCA-20-21

Time : Three Hours] [Maximum Marks : 75

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

1. (a) Which element is used to create drop shadow effect ? Explain with example.

(b) Describe the use of <figure> and <figcaption> elements.

(c) What is the difference between MySQLi, MySQL and PDO ?

(d) Describe the placeholder and autofocus attributes.

(e) List out any *three* advantages of AJAX. **5×3=15**

Unit I

2. (a) Describe the various ways of using background property. **10**

(b) Explain SVG stroke property. **5**

3. Differentiate the following : 15

(i) SVG and CANVAS

(ii) Static web Page and Dynamic web page.

Unit II

4. Describe form. Explain action and method attribute of form. Write a script that validate the email data. 15

5. (a) What are the different types of JavaScript operators ? Explain with example. 10

(b) Explain methods and properties of JavaScript array. 5

Unit III

6. (a) Describe session management. Write a PHP script to modify a session variable. 10

(b) How to connect a PHP code with database ? 5

7. (a) Explain the various data types used in PHP. 10

(b) Explain the concept of default argument. 5

Unit IV

8. Differentiate the following : 15

(i) Synchronous and asynchronous requests

(ii) Security issues with AJAX

(iii) XMLHttpRequest Object.

9. Describe the role of the callback function in AJAX ? Explain open() and send() method with example. How is AJAX useful to the developers and users ? **15**

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MCA/M-23 24519

LINUX AND SHELL PROGRAMMING

MCA-20-22

Time : Three Hours] [Maximum Marks : 75

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

Compulsory Question

1. (a) What are the basic features of Linux ? 4

(b) Discuss the role of fork-exec mechanism in process creation. 4

(c) Discuss the write and finger commands using examples. 4

(d) What is I/O redirection ? Discuss. 3

Unit I

2. (a) Discuss the history and architecture of Linux. 6

(b) Discuss the organization of file system and explain different blocks that constitute the file system. 9

3. What do you understand by internal and external commands ? Discuss the following commands in Unix / Linux along with their syntax and examples : 15

(i) script (ii) comm

(iii) ln (iv) split

(v) head (vi) chgrp

(vii) mkdir (viii) date

(ix) cd (x) mv.

Unit II

4. (a) Discuss some important signals used for shell scripts. Also explain the two main functions that are commonly used to send signals. 8

(b) What do you mean by job control ? Which commands are used for one time execution of jobs, running jobs periodically and execution of batch queues ? Explain the commands using examples. 7

5. Discuss the following system calls using suitable examples : 15

(i) open (ii) write

(iii) access (iv) link

(v) exec (vi) fork

(vii) wait (viii) exit.

Unit III

6. (a) Discuss creating, mounting and unmounting of file systems in Linux. 6

   (b) Discuss the following networking commands : 9

   (i) netstat (ii) ping

   (iii) ftp (iv) finger

   (v) route (vi) arp.

7. How can debugging be done using gdb ? Discuss the purpose and use of various gdb debugger commands. 15

Unit IV

8. (a) Discuss the built-in and user-defined shell variables. How can shell variables be exported ? Explain using example. 7.5

   (b) Differentiate between the following using suitable examples : 7.5

   (i) grep & egrep

   (ii) cut & paste

   (iii) tr & pr.

9. Explain the conditional, looping and case statements in bash shell with suitable examples and write a shell script to concatenate two strings and convert it into uppercase. 15

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MCA/M-23 24520

ADVANCED DATABASE SYSTEMS

MCA-20-23

Time : Three Hours] [Maximum Marks : 75

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

(Compulsory Question)

1. (a) Differentiate between entity, entity type and entity sets.

(b) Briefly explain different types of database interfaces.

(c) How views and indexes are created and dropped ?

(d) What is the property of join dependency ?

(e) What are transaction states ?

(f) Write a note on conflict serializability.

(g) What are object structure in OODBMS ?

(h) List the components of multimedia databases. **15**

Unit I

2. (a) What is Mapping ? How mapping in three tier architecture of DBMS achieves data independence ? **8**

(b) What do you mean by Attributes ? Differentiate between multiple and composite attribute. 7

3. (a) What is recursive relationship and role name ? Discuss relationship constraints. 8

(b) Write the similarity and dis-similarity between ER and EER diagrams. Write about overlapping and dis-joint constraint. 7

Unit II

4. (a) Differentiate between SQL and PL/SQL. Write the purpose, syntax and example for the following SQL statements : 8

(i) Alter

(ii) Delete

(iii) Insert.

(b) Discuss the architecture of PL/SQL block. Why %type is used in PL/SQL ? Differentiate between different types of cursors. 7

5. (a) What do you mean by functional dependencies ? Discuss different types of functional dependency with example. 8

(b) Why BCNF is considered to be stronger than 3NF ? Explain BCNF. Give example in support to your answer. 7

Unit III

6. (a) What is query processing and optimization ? How query code is generated ? List and explain cost parameters in semantic cost optimization. 8

   (b) How the problem of concurrency arises ? Discuss incorrect summary problem of concurrency. 7

7. (a) How exclusive locks are implemented ? Why the need for conversion of lock arises ? 8

   (b) What are the causes of database failure ? Why do we need shadow paging ? 7

Unit IV

8. (a) Differentiate between parallel processing, parallel databases and distributed databases. Write a note on client-server DDBMS architecture. 8

   (b) What are ECA rules ? Discuss the role of triggers in active databases. 7

9. Write notes on the following : 3×5=15

   (a) Spatial databases

   (b) XML path and XML query

   (c) OLTP and OLAP.

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MCA/M-23 24521

PRINCIPLES OF PROGRAMMING LANGUAGES

MCA-20-24(i)

Time : Three Hours] [Maximum Marks : 75

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

1. (a) What is the difference between lexical and syntax analysis ?

   (b) Compare implicit and explicit type declarations with their merits and demerits.

   (c) Differentiate between name and structural equivalence.

   (d) What do you understand by scripting language ? Discuss their characteristic features.

Unit I

2. (a) What are the desirable qualities of a good programming language ? Discuss.

   (b) How are the features of languages affected by programming environments ? Discuss.

3. (a) What are the different language paradigms ? Discuss.

(b) What are the different phases in compilation ? What activities are carried out during synthesis ? Discuss.

Unit II

4. (a) What is the difference between context free and regular grammar ? Design the finite state automata for the following :

(11*)*(110V01)

(b) What do you understand by ambiguous grammar ? Explain using suitable example.

5. (a) What do you understand by Chomsky's hierarchy of formal languages ? Discuss.

(b) What do you understand by narrowing and widening type conversions ? Illustrate.

Unit III

6. (a) What is an abstract class ? How is it implemented in C++/Java ? Illustrate.

(b) What do you understand by encapsulation and information hiding ? Explain.

7. (a) What do you understand by overloading and overriding of functions ? Illustrate.

(b) What is the hierarchy of operators ? What are the short circuit operations ? Discuss.

Unit IV

8. (a) What do you understand by concurrent processing ? Write a note on the features required in a language for the synchronization of concurrent tasks.

   (b) What do you understand by coroutine sub-program ? Why do we call them coroutine ?

9. Differentiate between the following :

   (a) Call by value and call by reference

   (b) Heap and stack storage management.

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MCA/M-23 24526

SECURITY IN COMPUTING

MCA-20-25(iii)

Time : Three Hours] [Maximum Marks : 75

Note : Question No. **1** is compulsory and attempt *four* more questions selecting *one* question from each Unit.

(Compulsory Question)

1. Attempt any *five* :

(a) How does the Linux security model provide protection against unauthorized access ?

(b) How can organizations establish a culture of security awareness among employees ?

(c) What are some ethical issues related to computer security ?

(d) How is database security implemented to protect sensitive information ?

(e) What is the role of a firewall in network security ?

(f) What are some important internet protocols and standards related to computer security ?

Unit I

2. What are substitution ciphers and transposition ciphers in cryptography ? How do substitution ciphers replace letters or characters with other symbols based on specific rules or mappings, and how do transposition ciphers rearrange the order of letters or characters ?

3. How can non-malicious program errors lead to security vulnerabilities in software systems ? What are some examples of common programming errors ? How can secure coding practices and rigorous software testing help mitigate these vulnerabilities ?

Unit II

4. What is the purpose and role of an Intrusion Detection System (IDS) in network security ? What are the strengths and limitations of IDS in terms of its ability to detect known attacks, adapt to new attack vectors, and manage false positives and false negatives ?

5. How does database access control play a crucial role in ensuring the security and privacy of data stored in a database ? How can access control mechanisms be implemented to enforce data privacy and prevent unauthorized access or modification of data ?

Unit III

6. What is a Public Key Infrastructure (PKI), and how does it play a crucial role in ensuring secure communication and trust in digital environments ? How does a PKI enable secure authentication, encryption, and integrity validation of data and communications ?

7. What are the key security features and mechanisms in Windows operating systems ? How do these defense mechanisms work together to protect against various threats ?

Unit IV

8. What are the ethical issues surrounding intellectual property in the digital age ? What are the ethical implications of piracy, plagiarism, and unauthorized use or distribution of intellectual property ?

9. What is a security audit trail, and how does it contribute to the overall security of an organization ? How can organizations leverage security audit trails to identify potential security breaches, perform forensic analysis, and comply with regulatory requirements ?

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CMCA/M-23 24527

BIG DATA AND PATTERN RECOGNITION

MCA-20-41

Time : Three Hours] [Maximum Marks : 75

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

Compulsory Question

1. (a) What are categorical and numerical data in big data environment ?

(b) How phishing, spamming and spoofing is a threat to big data ?

(c) What is meant by big datasets ? List the name of few publically available big datasets.

(d) Write a note on Mahout.

(e) What are the types of pattern recognition in data analytics ?

(f) How does nearest neighbour classifiers work ?

(g) Differentiate between NoSQL and RDBMS.

(h) List NoSQL products. **15**

Unit I

2. What are the essential properties of Big data ? Discuss the role of marketplace dynamics and innovation in ICT for the adoption of big data. **15**

3. Explain the stages of Big data life cycle. Differentiate between traditional business intelligence and Big data business intelligence. **15**

Unit II

4. (a) What are the pillars of data governance ? Elaborate the best practices of data governance for big data. **8**

   (b) Discuss how big data tools supports for data governance. Write a detailed note on MapReduce and YARN. **7**

5. (a) How developing big data applications are helpful in IoT and traffic system ? Give examples. **8**

   (b) How can we prevent a big data project from failure ? Elaborate failure standards and legalities. **7**

Unit III

6. What are the design principles and fundamental problems in pattern recognition system ? Discuss different types of data reduction methods. **15**

7. What is data domain and sub-domain for pattern recognition ? Write an overview of neural approach on pattern recognition. How do you model a neural net using AND gate ? 15

Unit IV

8. What are the characteristics of NoSQL ? Discuss NoSQL storage types. Explain misconceptions about NoSQL. 15

9. Discuss the following : 8+7
   (a) Schema less model
   (b) Graph databases.

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CMCA/M-23 24528

COMPUTER GRAPHICS AND ANIMATION

MCA-20-42

Time : Three Hours] [Maximum Marks : 75

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

(Compulsory Question)

1. Attempt any *five* questions :

(a) What are the key components of interactive graphics ?

(b) How is a parametric curve defined and represented mathematically ?

(c) What are the main clipping operations used in computer graphics ?

(d) Write note on Zooming.

(e) Write various area filling techniques.

(f) What is Gouraud shading ?

Unit I

2. What are the differences between raster scan and random scan systems, and how do they affect the way images are

displayed on a screen ? How is a frame buffer used in these systems to store and manipulate image data, and what are some common coordinate systems used to represent points and shapes in interactive graphics ?

3. What are Color CRTs ? How colors are focused in colored CRT ? Is the refreshing is necessary in CRT ? Explain.

Unit II

4. How does scan conversion work and what are some common techniques for drawing geometric shapes and lines in computer graphics ? What is the DDA line drawing algorithm and compare it with the Bresenham's line algorithm ?

5. What is the concept of a "Filled Area Primitive" in computer graphics and how does it contribute to rendering realistic images ? Explain about Flood Fill and Boundary Fill algorithm with suitable example.

Unit III

6. How are two-dimensional transformations represented using matrices ? Discuss the matrix representations for translation, rotation, scaling, shearing, and reflections. Explain how these matrices are applied to transform the coordinates of objects in computer graphics.

7. What are the fundamental principles and techniques behind "Clipping Operations" in computer graphics, and how do

they impact the rendering and display of complex images and animations ? Explain Liang-Barsky Line Clipping algorithm and also explain with suitable example.

Unit IV

8. Discuss Z-buffer algorithm for hidden surfaces problem. What happens when two polygons have the same *z*-value and the Z-buffer algorithm is used ?

9. (a) Discuss subdivision algorithm in detail.

   (b) What is parallel projection in computer graphics ? How does parallel projection work ? What are its advantages and limitations compared to other projection techniques ?

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CMCA/M-23 24529

MOBILE APPLICATION DEVELOPMENT

MCA-20-43

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all. Q. No. **1** is compulsory. In addition to compulsory question, attempt *four* more questions, selecting *one* question from each Unit.

(Compulsory Question)

1. (a) List the features of Android Operating System.

(b) Write the directory path where images are stored while developing Android application.

(c) Enlist the steps to publish the Android application.

(d) What are the benefits of intents ?

(e) Distinguish between Sqlite and Mysql. **5×3=15**

Unit I

2. (a) What are characteristics and benefits of mobile application ? **10**

(b) Write short notes on the following : 5

(i) DDMS

(ii) LogCat.

3. (a) Explain the *four* components of Android Architecture. 10

(b) Describe the attributes of Table Layout. 5

Unit II

4. (a) Explain Time picker with its methods. 10

(b) List the steps to publish application in Android market. 5

5. Differentiate implicit and explicit intent. Write a Java file to dial a number using Intent. 15

Unit III

6. (a) Write a short note on GeoCoder class and NFC. 10

(b) Describe the use of FragmentTransaction and Fragment Manager class. 5

7. (a) Write an android application with use of Fragments. 10

(b) What are the components of location-based services in Android ? 5

Unit IV

8. (a) Discuss in detail about storing and retrieving data. **10**

   (b) How are shared preferences created ? **5**

9. (a) Explain various types of gradients in android. **10**

   (b) Describe the significance of SQLite database in Android. **5**

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CMCA/M-23 24531

MACHINE LEARNING

MCA-20-44(ii)

Time : Three Hours] [Maximum Marks : 75

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

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

(a) Explain why overfitting occurs.

(b) Differentiate between supervised and unsupervised machine learning.

(c) Why do you need machine learning for anomaly detection ?

(d) Write some applications of Machine Learning.

(e) When should you use classification over regression ?

Unit I

2. (a) What do you understand about Information Gain ? Also, explain the mathematical formulation associated with it. **6**

(b) Write ID3 algorithm. Explain, how does ID3 algorithm select the best feature in detail. **9**

3. (a) Define Accuracy, Precision and Recall. 6

(b) Calculate Accuracy, Precision and Recall for the following Confusion Matrix on Heart Attack Risk. Also suggest which metric would not be a good evaluation parameter here and why ? 9

	Reality : 1	Reality : 0
Prediction : 1	50	20
Prediction : 0	10	20

Unit II

4. You toss a fair coin three times : 15

(a) What is the probability of three heads, HHH ?

(b) What is the probability that you observe exactly one heads ?

(c) Given that you have observed at least one head, what is the probability that you observe at least two heads ?

5. (a) Why is naïve Bayesian classification called "naïve" ? Explain. 6

(b) Explain Linear Regression in detail with example. 9

Unit III

6. (a) Explain advantages and disadvantages of EM algorithm. 6

   (b) Define clustering. What are the different types of clustering explain in detail ? 9

7. (a) Can you use logistic regression for classification between more than two classes ? Explain your answer. 6

   (b) Draw and Explain flowchart of EM algorithm. 9

Unit IV

8. Write short notes on the following : 15

   (a) Principal component analysis

   (b) Recommender Systems.

9. (a) Explain the concept of Hyperplane in a Support Vector Machine. 6

   (b) What is Reinforcement Learning ? Explain different types of Reinforcement Learning. 9

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CMCA/M-23 24535

BLOCKCHAIN TECHNOLOGY

MCA-20-45(iii)

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all. Q. No. **1** is compulsory. Attempt *Four* more questions selecting *one* question from each UNIT.

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

(a) What are blocks in Blockchain ? Explain.

(b) Distinguish between Blockchain and shared databases.

(c) Explain the concept of proof-of-work.

(d) What is Bitcoin network ? Explain.

(e) Explain EOS.

Unit I

2. (a) What is decentralization ? Illustrate the procedure for decentralization. How does decentralization vary from business to business ? **8**

(b) What are the various types of Blockchain ? Differentiate between a public and a private Blockchain. **7**

3. Write short notes on the following :

(a) Ecosystem of decentralization 7

(b) Platforms of decentralization. 8

Unit II

4. (a) What is Bitcoin ? Discuss the emergence of Bitcoin. Also explain digital keys in Bitcoin. 7

(b) Explain the Blockchain architecture with suitable diagram and with life use cases. 8

5. (a) What is Cryptocurrency ? How can you use them ? Explain different types of cryptocurrency. 7

(b) What are limitations of Bitcoins ? Discuss alternative coins. 8

Unit III

6. (a) How are payments made in Bitcoin ? Explain the transaction life cycle with an appropriate example. 8

(b) What is Crypto wallet ? Explain various types of wallets with examples. 7

7. (a) Explain use of Hashing and Double Spending in Blockchain. 8

(b) Write short note on Bitcoin Clients and API's. 7

Unit IV

8. (a) What is hyper ledger ? How is it different from traditional ledger ? Differentiate it with distributed ledger. 7

(b) What are multichain and bigchain ? Discuss their advantages and disadvantages. 8

9. Explain the following :

(a) Ethereum 5

(b) Potential disruption in Blockchain 5

(c) Designing a Blockchain. 5