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24518

WEB TECHNOLOGIES

Paper-MCA-20-21

Time Allowed : 3 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. Answer the following questions : 5×3=15

- (a) List the main features of HTML5.
- (b) Define object prototype.
- (c) Differentiate cookies and sessions in PHP.
- (d) List the key Web technologies involved in AJAX.
- (e) Describe the concept of break and continue statements.

UNIT-I

2. (a) Describe the various key features of Web optimization.

- (b) Differentiate between Static and Dynamic web pages. 8
3. (a) Explain the border-collapse property in CSS. 7
- (b) What is a linear gradient in CSS? Explain its syntax and usage. 8

UNIT-II

4. Compare if, else if and switch control structures in JavaScript. Give examples for each. 15
5. (a) Describe the use of the window and document objects in JavaScript with examples. 8
- (b) In JavaScript, arrays are a type of object. Explain this statement in detail. 7

UNIT-III

6. Discuss various operators in PHP and their use with examples. 15
7. Write a PHP script to connect to a MySQL database, insert a record into a table and fetch the Data back. 15

UNIT-IV

8. How to process client requests in PHP received via AJAX? Explain using \$_GET or \$_POST methods with examples. 15

9. (a) What are Accessible Rich Internet Applications (ARIA)? 8
- (b) How do they enhance the accessibility of AJAX-based interfaces? 7

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24519

LINUX AND SHELL PROGRAMMING

Paper-MCA-20-22

Time Allowed : 3 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. Answer the following questions :

- (a) Describe the Linux login and logout process. How does user authentication work and what are the different login methods available in Linux? 4
- (b) Define zombie and orphan processes. How are they created and how does the system handle them to maintain stability? 4
- (c) How are file systems mounted and unmounted using mount and umount commands? 4
- (d) What are shell meta characters and how are they used in shell scripting? 3

UNIT-I

2. (a) Describe the history and evolution of Linux. How did it develop from UNIX and what makes it a preferred open-source operating system today? 8
- (b) Explain the structure of a Linux file system, including boot block, super block, inode block and data block. What role does each component play? 7
3. (a) What are file access permissions in Linux? Describe how chmod, umask, chgrp and groups commands are used to manage file and directory permissions? 9
- (b) Discuss the followings using syntax and examples :
(i) ls (ii) find (iii) bc. 6

UNIT-II

4. (a) Describe the system calls used for file handling in Linux. How are open(), create(), read() and write() used to access and modify file data? 8
- (b) How do the system calls fork(), exec(), wait() and exit() contribute to process creation, execution, and termination? 7
5. (a) How do foreground and background jobs work in Linux? Describe how to start, stop and switch between them using shell job control commands? 6

- (b) What is the role of cron, crontab, at, and batch in process scheduling? How do they differ in terms of one-time vs. recurring task scheduling? 9

UNIT-III

6. How super user status can be acquired? Explain the following commands with syntax and example : (i) usermod (ii) groupadd (iii) userdel (iv) telnet (v) fdisk (vi) shutdown (vii) ping. 15
7. (a) What are the commonly used compiler options in gcc? Describe the use of flags such as -o, -Wall, -g, -O, and -c with examples. 7
- (b) Write a simple Makefile to compile a C program with multiple source files. Explain how to use make and make clean with it? 8

UNIT-IV

8. (a) Compare grep, egrep, and fgrep. How do these commands differ in their pattern-matching capabilities and usage scenarios? 7
- (b) What are arrays in shell scripting? How are they defined and accessed? Provide an example of array usage in a script. 8
9. Describe how conditional statements (if, elif, else) and looping constructs (for, while, until) are used in shell scripts? Provide examples to illustrate their usage. 15

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24521

PRINCIPLES OF PROGRAMING LANGUAGES

Paper-MCA-20-24(i)

Time Allowed : 3 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. Answer the following questions in brief :

- (a) Write a BNF grammar to describe a simple arithmetic expression involving + and *.
- (b) Differentiate between implicit and explicit type declaration using suitable examples.
- (c) What is the difference between structured data types and abstract data types?
- (d) Discuss the advantages and disadvantages of using heap storage vs. stack storage.

UNIT-I

2. (a) What are the essential characteristics of a good programming language? Discuss.
- (b) What is the difference between static and dynamic type binding? Discuss.
3. (a) What is parsing? What is the difference between top-down and bottom-up parsing? Discuss.
- (b) What are the main characteristics of the imperative programming paradigm? Discuss.

UNIT-II

4. (a) Construct a regular expression for identifiers in programming languages (e.g., starting with a letter, followed by letters or digits).
- (b) Differentiate between type casting and type promotion with examples.
5. (a) Compare static type checking with dynamic type checking. Mention their pros and cons.
- (b) Give the finite state automaton and the regular grammar for the following: $(11^*)^*(110V01)$.

UNIT-III

6. (a) Define abstract classes. How are they different from concrete classes?

- (b) How is sequence control maintained within arithmetic expressions? Illustrate.
- 7. (a) What are the different types of Polymorphism? Explain each with an example.
- (b) Explain how recursion provides an alternative sequence control mechanism compared to traditional looping constructs?

UNIT-IV

- 8. (a) Compare static scoping vs. dynamic scoping with code examples. How do they affect variable resolution?
- (b) Explain the concept of co-routines. How are they implemented in Python using generators?
- 9. (a) Define static scoping and dynamic scoping. How do they differ?
- (b) What is the difference between call by reference and call by value-result parameter passing techniques? Discuss.

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BIG DATA AND PATTERN RECOGNITION

Paper-MCA-20-41

Time Allowed : 3 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. Write short notes on the following : 15
 - (a) What is meant by structured and unstructured data?
 - (b) State an Industrial example of Big data.
 - (c) What are the reasons for Big Data failures?
 - (d) Brief about Big Datasets.
 - (e) Differentiate between quantitative and qualitative analysis.
 - (f) What is nearest neighbour classifier?
 - (g) What is a schema-less model?
 - (h) Provide an overview of major NoSQL products.

UNIT-I

2. Discuss the characteristics of Big Data (5 V's) with suitable examples. Explain the business motivations and drivers for Big Data adoption. 15
3. Outline and brief about the Big Data Analytics Lifecycle. Explain the importance of Information and Communication Technology (ICT) in Big Data. 15

UNIT-II

4. Explain the evolution of Data Governance and its importance in Big Data Analytics. Discuss the relationship between Big Data and Data Governance. 15
5. What is the need of Big Data tools and techniques? Describe Hadoop ecosystem tools including Hive, Pig, Zookeeper, and Mahout. 15

UNIT-III

6. (a) Explain feature extraction and feature reduction techniques. 8
- (b) Describe different paradigms and approaches used in pattern recognition. 7
7. (a) Discuss the importance and applications of pattern recognition in real-world scenarios. 8

- (b) What is Neural networks? Explain modelling of AND gate using Neural networks. 7

UNIT-IV

- 8 What are different NoSQL storage types? Explain various NoSQL data management models such as key-value, document and tabular stores. 15
9. Compare NoSQL databases with RDBMS, highlighting advantages and limitations. Explain the role of NoSQL databases in Big Data management. 15

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COMPUTER GRAPHICS & ANIMATION

Paper-MCA-20-42

Time allowed : 3 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.

UNIT-I

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

- (i) How is loading of frame buffer carried out?
- (ii) Define Resolution and Aspect ratio.
- (iii) Name and describe any one input device used in graphics.
- (iv) List different output primitives used in graphics systems.
- (v) Apply Bresenham's Circle Algorithm for a circle of radius = 4 to show the decision parameter for first two steps.
- (vi) Apply composite transformation: first scale ($S_x = 2$, $S_y = 2$), then translate ($T_x = 3$, $T_y = 1$) on point (2, 2).
- (vii) What is fractal modeling?

- (viii) Given a pixel with depth values $Z_1 = 5$ and $Z_2 = 3$, determine visible surface using Z-buffer method if viewpoint is at $Z = 0$.

UNIT-I

2. What is computer graphics? Describe the components of an interactive graphics system. How do these components work together to produce visual output? Also, explain the concept of a Look-up Table (LUT) in graphics systems.
3. (a) Explain any three different coordinate systems used in computer graphics. Why are they important for graphical transformations?
(b) Compare CRT displays and flat panel displays and describe the anatomy of LCD display.

UNIT-II

4. Explain the Digital Differential Analyzer (DDA) line drawing algorithm and analyze its advantages and limitations. Using the DDA algorithm, draw a line from point (2, 3) to (10, 7). Calculate all intermediate pixel positions.
5. (a) Discuss the procedure for generating bar charts and pie charts using graphics primitives.
(b) Describe the scan-line polygon fill algorithm. Discuss its computational structure and efficiency.

UNIT-III

6. Describe translation, rotation and scaling transformations. Compare their effects on graphical objects. Also, perform scaling on a rectangle with vertices (1, 1), (5, 1), (5, 4), (1, 4) with $S_x = 2$ keeping vertex (1, 1) fixed.
7. Define window and viewport and explain window-to-viewport transformation with diagram and equations. Perform window-to-viewport transformation where:
 - (a) Window: (0, 0) to (10, 10), Viewport: (0, 0) to (200, 200),
 - (b) Map point (5, 5) defined in window onto the viewport.

UNIT-IV

8. Describe Constructive Solid Geometry (CSG) and Boundary Representation (B-rep) for solid model representation with suitable diagrams. Also, discuss spatial-partitioning techniques.
9.
 - (a) Compare parallel projection and perspective projection with suitable diagrams.
 - (b) Explain the working of BSP-tree method for hidden surface removal.

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MOBILE APPLICATION DEVELOPMENT

Paper-MCA-20-43

Time Allowed : 3 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. Answer the following questions in brief : $5 \times 3 = 15$

- (a) List any three characteristics of Mobile Application.
- (b) Define Dalvik Virtual Machine (DVM).
- (c) Describe MapView and MapActivity.
- (d) Differentiate implicit and explicit Intent.
- (e) Describe Override in Android application.

UNIT-I

2. What is Android? Explain their versions and applications?
Write down the steps to install and configure Android studio. 15

3. Explain android application architecture in detail. 15

UNIT-II

4. (a) Explain editable and non-editable Text Views in Android. 10
- (b) What are Native Actions in Android? 5
5. What is an Intent in Android? Explain the concept of Explicit Intent and write an example for starting a new Activity. 15

UNIT-III

6. Describe the different methods for adding, removing and replacing fragments within an activity using fragment transactions. 15
7. Write short notes on the following : 15
- (a) Location based services.
- (b) Native libraries and headers.
- (c) Sensors.

UNIT-IV

8. (a) How to store data locally in an Android app? Explain with example (java code only). 10

- (b) How to publish an app in Android market? 5
- 9.
 - (a) What are Content Providers in Android? Explain their purpose and advantages in data sharing between applications. 10
 - (b) What are Gradients in Android? 5

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MACHINE LEARNING

Paper-MCA-20-44(ii)

Time Allowed : 3 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. Answer the following questions :
 - (a) Discuss advantages and limitations of decision trees.
 - (b) What are the assumptions of linear regression?
 - (c) What is dimensionality reduction? Why is it needed?
 - (d) Discuss advantages and limitations of SVM.

UNIT-I

2. (a) What is hypothesis space search in decision trees? Explain.
 - (b) Explain entropy and information gain in the context of decision trees.

3. (a) Provide an overview of Machine Learning and its different types.
- (b) Explain overfitting in decision trees and how it can be controlled?

UNIT-II

4. (a) Explain Naive Bayes classifier and its assumptions.
- (b) Discuss advantages and limitations of Naive Bayes.
5. (a) Explain Regression Trees and their working.
- (b) Compare Linear Regression and Regression Trees.

UNIT-III

6. (a) Describe how logistic regression performs binary classification?
- (b) Explain the concept of decision boundary in Logistic regression.
7. (a) What is the Expectation-Maximization (EM) algorithm? Explain its steps.
- (b) Explain Gaussian Mixture Models in context of EM algorithm.

UNIT-IV

8. (a) Explain the concept of hyperplane and margin in SVM.

- (b) Explain collaborative and content-based filtering in recommender systems.
- 9. (a) Explain the concepts of reward, agent and environment in Reinforcement learning.
- (b) What are kernel functions in SVM? Explain with examples.