

CHOICE BASED CREDIT SYSTEM
MCA FIRST SEMESTER DEGREE EXAMINATION JUNE 2024
MASTER OF COMPUTER APPLICATIONS
Software Engineering

Duration:3 Hours

Max Marks:70

Part A

I. Answer any THREE of the following :**3×4= 12**

1. List the four related issues that affect different types of software.
2. List the advantages and disadvantages of waterfall model.
3. List the advantages of scrum approach.
4. Define interaction model. Explain the two approaches used to support interaction model.

Part B

II. Answer any FOUR of the following :**4×7= 28**

5. What are the key principles and practices of Extreme Programming (XP)?
6. Explain the role of use cases, interview and scenarios in requirement elicitation and analysis.
7. Explain the working of event driven modeling with the help of state diagram of a microwave oven.
8. Illustrate the high-level architectural design of the weather station.
9. Explain "pricing to win" approach in software pricing with example.

Part C

III. Answer any THREE of the following :**3×10= 30**

10. Explain the process of prototype development in detail.
11. Explain the most important non-functional requirements that need to be considered when designing a high-availability system. Justify the statement "Non-functional requirements may affect the overall architecture".

12. Explain the issues faced during configuration management and host target development in detail.
13. Analyze the importance of software testing in the context of agile software development. How does testing fit into the agile development process, and what are some of the key challenges and strategies for successful testing in agile?

CHOICE BASED CREDIT SYSTEM
MCA FIRST SEMESTER DEGREE EXAMINATION JUNE 2024
MASTER OF COMPUTER APPLICATIONS
Advanced Database Management Systems

Duration:3 Hours

Max Marks:70

Part A

I. Answer any THREE of the following :**3×4= 12**

1. Explain the three schema architecture with a neat diagram.
2. Explain the working of Knowledge databases with example.
3. Explain the difference between centralized DBMS and Distributed DBMS.
4. Explain the concept of stemming in text preprocessing.

Part B

II. Answer any FOUR of the following :**4×7= 28**

5. Describe the working of spatial databases.
6. Explain the concept of fragmentation in Data storage in DDBMS with examples of your own.
7. Justify the statement that more than 80% of data available for processing is unstructured in nature.
8. Explain the concept of working with ADT in ORDBMS.
9. Illustrate the characteristics of IR systems at different levels.

Part C

III. Answer any THREE of the following :**3×10= 30**

10. Illustrate the working of Lock based concurrency protocol.
11. Identify the differences and similarities of RDBMS and ORDBMS.
12. Explain the categories of DDBMS available along with their features.
13. Explain the concept of inverted text in IR systems with an example of your own.

CHOICE BASED CREDIT SYSTEM
MCA FIRST SEMESTER DEGREE EXAMINATION JUNE 2024
MASTER OF COMPUTER APPLICATIONS
Data Structures and Algorithms

Duration:3 Hours

Max Marks:70

Part A

I. Answer any THREE of the following :**3×4= 12**

1. Convert the infix expression $A + B * C - D / E$ into postfix expression.
2. How do you delete a new node from the end of a linked list?
3. Explain adjacency matrix representation of graph data structure.
4. Explain the working of insertion sort with an example.

Part B

II. Answer any FOUR of the following :**4×7= 28**

5. Explain the working principle of a queue data structure and provide a C++ program to implement queue using arrays.
6. Differentiate between binary tree and binary search tree with example. Write an algorithm to insert an element into binary search tree.
7. Explain the array implementation of heap data structure. Write an algorithm to insert an element to minimum heap.
8. Explain the merge sort algorithm in detail, including its time and space complexities. Also, discuss the best, worst, and average-case scenarios for merge sort.
9. Explain the working of quick sort with algorithm.

Part C

III. Answer any THREE of the following :**3×10= 30**

10. Distinguish between push and pop operation of stack with algorithm.
11. Construct AVL Tree for the following sequence of numbers - 50 , 20 , 60 , 10 , 8 , 15 , 32 , 46 , 11 , 48.

12. Explain the working of double hashing. Consider a hash table of size 13 with the hash function $h(x) = x \bmod 13$ and the secondary hash function $h_2(x) = x \bmod 7$. Suppose we insert the keys 6, 14, 22, 30, 38, and 46 in that order using double hashing. What is the resulting hash table after all the insertions? How many collisions occur during the insertion process?
13. What is a minimum spanning tree in graph theory? How is the Prim's algorithm used to find the minimum spanning tree in a graph?

22MCAH104

Reg No :

CHOICE BASED CREDIT SYSTEM
MCA FIRST SEMESTER DEGREE EXAMINATION JUNE 2024
MASTER OF COMPUTER APPLICATIONS
Java Programming

Duration:3 Hours

Max Marks:70

Part A

I. Answer any THREE of the following :

3×4= 12

1. How final keyword is used to declare a constant in Java? Write a Java program to calculate the area of a circle using a final variable to store the value of PI.
2. Describe the concept of the default package in Java and explain the significance of the java.lang package.
3. Explain the use of finally block in Java along with an example.
4. Differentiate between AWT and Swing in Java.

Part B

II. Answer any FOUR of the following :

4×7= 28

5. Explain the working of JDK in Java in detail.
6. Explain why Abstract classes cannot be instantiated in Java with an example.
7. Explain character streams in Java and write a program to read the student data from user and store it in a file.
8. What are the different types of directives and their purpose in JSP.
9. Explain with example how super keyword is used to invoke immediate parent class constructor.

Part C

III. Answer any THREE of the following :

3×10= 30

10. What is constructor overloading in Java? Write a program to add two complex numbers using the concept of constructor overloading.

11. What is Object class in Java? Discuss along with an example the methods provided by the Object class and how they can be overridden to customize behavior in user-defined classes.
12. Explain the concept of inter-thread communication in Java with an example .
13. Develop a Swing-based quiz application with multiple-choice questions. Display questions and options using labels and radio buttons. Include a button to submit answers and display the result.

CHOICE BASED CREDIT SYSTEM

MCA FIRST SEMESTER DEGREE EXAMINATION JUNE 2024

MASTER OF COMPUTER APPLICATIONS

Mathematical and Statistical Foundations

Duration:3 Hours

Max Marks:70

Part A

I. Answer any THREE of the following :

3×4= 12

1. Given matrices A and B respectively, Determine whether the given matrices are singular or not.

$$\begin{bmatrix} 8 & 16 \\ 12 & 24 \end{bmatrix} \quad \begin{bmatrix} 2 & 4 \\ 3 & 6 \end{bmatrix}$$

2. Let $A = \{ 1,2,3,4,5,6\}$ and R be a relation from A to A. R is a relation defined as $R=\{(x,y): x \text{ is a factor of } y\}$. Draw a graph for the relation.
3. Write the following statement in symbolic form and construct the truth table for the same.
If either Tom takes big data or Jerry takes block chain then Larry will take Social Analytics
4. Calculate the median for the following class distribution

Class	0-10	10-20	20-30	30-40	40-50
Frequency	3	10	6	4	2

Part B

II. Answer any FOUR of the following :

4×7= 28

5. Solve the following equations using Gauss Elimination Method.

$$2x + 3y + z = 9$$

$$x + 2y + 3z = 6$$

$$3x + y + 2z = 8$$

6. Determine the rank of the matrix by reducing it to row echelon form

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 3 & 4 & 5 & 2 \\ 2 & 3 & 4 & 0 \end{bmatrix}$$

7. Given that $A=\{1,2,3,4,5,6,7,8,9\}$ $B=\{1,3,5,7,9,10\}$ $C=\{2,4,6,7,9,10\}$ Prove the following.

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

8. Consider the following statements

p : Today is Sunday , q : It is raining, r : It is cold.

Write statements for the following and construct truth tables for the same.

$$p \rightarrow q$$

$$\neg q \rightarrow (r \wedge p)$$

$$\neg p \rightarrow (q \vee r)$$

9. Explain deterministic and random experiment. A bag contains 3 white, 4 red and 2 green balls. One ball is selected at random from the bag. Find the probability that the selected ball is (i) White (ii) Non White (iii) white or green.

Part C

III. Answer any THREE of the following :

3×10= 30

10. Determine the inverse of the following matrix using Cayley Hamilton Theorem.

$$\begin{bmatrix} 4 & -4 & -1 \\ 1 & 1 & -1 \\ -1 & 2 & 4 \end{bmatrix}$$

11. If f, g, h are functions from R to R defined by

$$f(x) = x^2$$

$$g(x) = 5x - 3$$

$$h(x) = x + 4$$

Justify whether the composition of functions is associative.

12. Determine whether the following expression is a tautology.

$$(p \rightarrow (q \rightarrow r)) \rightarrow ((p \rightarrow q) \rightarrow (p \rightarrow r))$$

13. Find the variance and standard deviation for the following data.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Students	7	10	20	40	30	28	10	5
