22MCAH101   Reg No   :   ....

Duration:3 Hours   **Max Marks:70**

Part A

Answer any THREE of the following :   (3×4= 12)

1. Explain the process of prototype development in detail.

2. What is incremental development model? List any three benefits of incremental development model over waterfall model.

3. What is sprint cycle in scrum approach and what are the benefits of using this iterative approach?

4. Explain Object Oriented Design in software engineering.

Part B

Answer any FOUR of the following :   (4×7= 28)

5. What are the key principles and practices of Extreme Programming (XP) ?

6. Discuss the key differences between functional and non-functional requirements, and why it is essential to consider both types of requirements when developing software systems.

7. Explain the working of event driven modeling with the help of state diagram of a microwave oven.

8. Explain configuration management and its activities in detail.

9. Differentiate between component testing and system testing.

Part C

Answer any THREE of the following : (3×10= 30)

10. Explain the different stages of waterfall model with a neat diagram. Summarize the advantages and disadvantages of waterfall model.

11. Explain how ethnography is different from other requirement elicitation and analysis techniques.

12. Illustrate two approaches of interaction model using mental health care patient management system.

13. Explain the workflow of project planning process with UML activity diagram.

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CHOICE BASED CREDIT SYSTEM

M.C.A FIRST SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

Advanced Database Management Systems

Duration:3 Hours   **Max Marks:70**

Part A

Answer any THREE of the following :   **(3×4= 12)**

1. Explain the advantages of DBMS over File systems.

2. Illustrate the features of object identifiers in ORDBMS.

3. Illustrate the concept of Data Replication in Distributed Data Storage.

4. Compare and contrast the concepts of Proximity queries and Natural Language queries in IR systems.

Part B

Answer any FOUR of the following :   **(4×7= 28)**

5. Justify the statement - "Deductive databases are called Logic Databases".

6. Explain the different categories of Distributed Databases.

7. Demonstrate the working model of peer-to-peer architecture with a neat diagram.

8. Describe the working of spatial databases.

9. Illustrate the various statistical models used in Information Retrieval.

Part C

Answer any THREE of the following :   **(3×10= 30)**

10. Explain the various control structures used in PL/SQL with appropriate examples.

11. Demonstrate the working model of Active Databases with suitable example.

12. Explain the various tools used to execute and transform a query in XML.

13. Describe the various text pre-processing techniques used in IR systems.

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CHOICE BASED CREDIT SYSTEM

M.C.A FIRST SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

Data Structures and Algorithms

Duration:3 Hours   **Max Marks:70**

Part A

Answer any THREE of the following :   **(3×4= 12)**

1. Give an example of how stack data structure is used in real-world applications?

2. Convert the infix expression A + B * C - D / E into postfix expression.

3. Explain adjacency list representation of graph data structure.

4. Compare and contrast between quick sort and merge sort.

Part B

Answer any FOUR of the following :   **(4×7= 28)**

5. Describe the process of deleting a node from the beginning and from the end of a linked list.

6. Differentiate between binary tree and binary search tree with example. Write an algorithm to insert an element into binary search tree.

7. What is a Splay Tree, and how does it differ from other self-balancing binary search trees? Discuss the different rotations of splay tree.

8. Illustrate the working of merge sort algorithm with C++ program.

9. Explain the working of bubble sort with algorithm.

Part C

Answer any THREE of the following :   **(3×10= 30)**

10. Explain the working of simple queue with algorithms to insert and delete an element. Explain how circular queue overcome the limitation of queues?

11. Construct AVL tree for the following data 14, 17, 11, 7, 53, 4, 13, 12, 8, 60, 19,16, 20.

12. 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?

13. Consider a hash table of size 11 with the hash function $h(x) = x \mod 11$. Suppose we insert the keys 5, 16, 22, 29, 35, and 44 in that order using quadratic probing. What is the resulting hash table after all the insertions? How many collisions occur during the insertion process?

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22MCAH104   Reg No   :   ....

Duration:3 Hours   **Max Marks:70**

Part A

Answer any THREE of the following :   **(3×4= 12)**

1. Explain the differences between C, C++ and Java in detail.

2. Explain the concept of streams in Java and write a program for copying the contents of one file to another file by using Byte streams.

3. Explain the use of throw keyword in Java along with an example.

4. Explain the features of Java swing and explain any one control of swing in detail.

Part B

Answer any FOUR of the following :   **(4×7= 28)**

5. Discuss the concept of packages in Java with suitable example.

6. Explain the concept of nested class in Java and also write a Java program for anonymous inner class.

7. Explain the concept of single and hierarchical inheritance in Java along with a suitable example.

8. Explain the features of Java servlet and design a servlet application for calculating simple interest.

9. Explain the various event classes and event listener interfaces in Java.

Part C

Answer any THREE of the following :   **(3×10= 30)**

10. Illustrate with an example how constructors are used in Java along with its types and properties.

11. Explain the differences between overloading and overriding. Write a Java program to implement method overloading.

12. Explain how threads are grouped in Java along with an example.

13. Design a Java AWT application to accept book information and display the same.

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CHOICE BASED CREDIT SYSTEM

M.C.A FIRST SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

Mathematical and Statistical Foundations

Duration:3 Hours   **Max Marks:70**

Part A

Answer any THREE of the following :   (3×4= 12)

1. Given the matrix A. Prove that $A^3 = A^{-1}$

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

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): y=x+1 }. Draw a graph for the relation and represent the relation with a matrix.

3. Determine whether the following expression is a tautology.
$$\neg(P \wedge Q) \iff (\neg P \vee \neg Q)$$

4. Illustrate the concept of normal probability distribution.

Part B

Answer any FOUR of the following :   (4×7= 28)

5. Determine the characteristic equation and eigen values for the following matrix.

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

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

$$\begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & -4 \\ 5 & 3 & 3 & 11 \end{bmatrix}$$

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. Construct truth table for the following proposition

$$(p \wedge q) \vee (\neg p \wedge q) \vee (\neg p \wedge q)$$

9. A football team of 11 players are adjudged by two judges. Find the rank correlation between the two judgements.

Players	A	B	C	D	E	F	G	H	I	J	K
Judge 1	11	9	4	3	1	6	2	5	7	8	10
Judge 2	10	11	5	3	2	7	1	4	6	8	9

Part C

Answer any THREE of the following : (3×10= 30)

10. Prove Cayley Hamilton theorem for the following Matrix

$$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 1 \\ 0 & 0 & 2 \end{bmatrix}$$

11. If f, g are two functions from R to R, given by

$$f(x) = 3x^2 - 4$$
$$g(x) = x - 1$$

Find the inverse of f and g.

Determine whether the composition of functions is commutative.

12. Construct truth table to determine

$$\neg((p \wedge \neg q) \vee (\neg p \wedge \neg q)) \vee (p \wedge q) \equiv p$$

13. Calculate the missing frequency in the data given that median is 46.75. Compute the mean using assumed mean method.

Marks obtained	20-30	30-40	40-50	50-60	60-70
Students	3	5	20	X	5

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