Printed Pages: 02 **Sub Code: RCAI-501**

Paper Id: 231741 **Roll No.** | | | | | | | | | | |

MCA (INTEGRATED)
(SEM V) THEORY EXAMINATION 2022-23
DESIGN & ANALYSIS OF ALGORITHMS

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

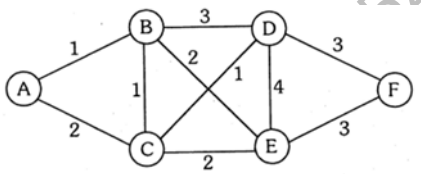
1. Attempt *all* questions in brief. 2 x 7 = 14

(a) Write down all the 3 cases of master method to solve the recurrence of following type T (n)= aT(n /b) + f(n)
(b) Define algorithm and its características.
(c) Discuss the properties of binomial tree.
(d) Differentiate structure of a node of binomial heap and Fibonacci heap with proper diagram.
(e) What do you understand by greedy approach
(f) Discuss Naive algorithm for string matching.
(g) Differentiate backtracking approach in comparison of branch and bound technique.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

(a) Describe Insertion Sort algorithm and analyze its complexity
(b) Explain the B-Tree and differentiate between B-tree and Red Black Tree.
(c) Differentiate between the working of prims and kruskal algorithm for finding the minimum spanning tree. Also give the minimum spanning tree by using Kruskal algorithm of given graph.



(d) Illustrate Breadth First Search and Depth First Search by taking suitable example.
(e) What is the relationship among P, NP and NP complete problems? Show with the help of a diagram.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Illustrate master theorem with all three cases. Apply Master theorem on following recurrence to get their solution.

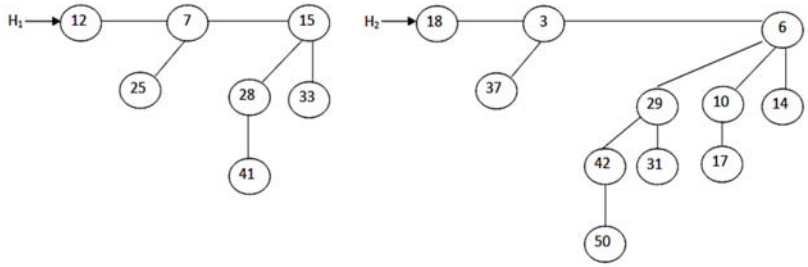
$$T(n) = 4T\left(\frac{n}{2}\right) + \theta(n^3)$$

(b) What do you mean by Asymptotic notation? Define Ω -notation, O- notation and θ-notation with examples.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) Illustrate RB-Tree insertion algorithm on following data. Draw neat and clean diagram after each modified step (10,7,9,8,14,11,13)

(b) What do you understand by Binomial Heap? Merge following Binomial Heaps using Binomial Heap Union Algorithm-



5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Why Strassen's technique better than classical divide and conquer technique of matrix multiplication? Evaluate following matrix multiplication using Strassen's algorithm.

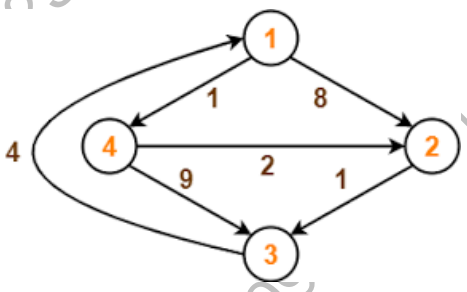
$\begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$ and $\begin{bmatrix} 2 & 2 \\ 2 & 1 \end{bmatrix}$

(b) Differentiate between Greedy and Dynamic Programming Algorithms. Solve the 0-1 knapsack problem by greedy strategy.
Item n=7 Knapsack capacity m=15, (P1, P2, P3, …. P7) = (10, 5, 15, 7, 6, 18, 3) and (w1, w2, ….. w7)= (2,3,5,7,1,4,1).

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Describe Merge Sort algorithm with suitable example and also write its complexities for all three cases

(b) Demonstrate Floyd Warshall's algorithm to solve All Pairs Shortest Path problem for following graph to find the shortest distance between all the pairs of vertices.



7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Write short notes on
(i) Approximation Algorithm
(ii) Backtracking Algorithm

(b) Discuss KMP algorithm for string matching with suitable example

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Paper Id: 231534 **Roll No.** | | | | | | | | | | |

MCA (INTEGRATED)
(SEM V) THEORY EXAMINATION 2022-23
PROGRAMMING WITH MATLAB

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

(a) What are the components of MATLAB desktop?
(b) How comments are written in MATLAB?
(c) Differentiate between one-dimensional and multidimensional array.
(d) How do you declare a single line and multiline string?
(e) What is a sub-function? Briefly explain with example.
(f) What do you mean by mesh grid and mesh plot?
(g) Write a script to solve a linear equation.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

(a) Explain the use of input( ), sprint( ) and disp( ) with proper example.
(b) Write commands to perform the following –
  (i) Create a matrix of size 4X4
  (ii) Print the diagonal elements
  (iii) Change the size of matrix to 8X2
  (iv) Add a row at the end of the matrix
  (v) Delete the first column of the matrix
  (vi) Print transpose of the matrix
  (vii) Flip the matrix from left to right
(c) Discuss various decision making statements with example.
(d) Describe any five graph plotting functions with example.
(e) Define terms - Eigen value and Eigen vector. Write script to find Eigen values and Eigen vectors of a matrix.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Define and compare local, global and persistent variables with example.
(b) Explain the following-
  (i) sign( )
  (ii) round( )
  (iii) abs( )
  (iv) ceil( )
  (v) fix( )
  (vi) real( )
  (vii) angle( )

4. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Write steps to copy contents of one string to another, compare two strings, count the number of characters of a string and find substring of a string.

(b) Write script to print the following of a 3X3 matrix-

(i) Print sum of all elements

(ii) Lower triangular matrix

(iii) Upper triangular matrix

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Explain the steps to create and use a function file with proper example.

(b) Differentiate between for loop and while loop with example. Also write a script to print sum of all prime numbers from 1 to 50.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss steps to draw a two-dimensional plot with example. Also write steps to draw a pie chart.

(b) Write a script to demonstrate the use of multiple plots with example.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Explain steps to solve a polynomial equation with proper example.

(b) What is MATLAB ODE suite? Why is it used? Explain ODE suite solvers.

Printed Pages:02 **Sub Code: RCAI-503**

Paper Id: 231157 **Roll No.** | | | | | | | | | | |

MCA (INTEGRATED)
(SEM V) THEORY EXAMINATION 2022-23
JAVA PROGRAMMING

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

(a) Explain the different way of using thread?
(b) Discuss with Socket.
(c) What is Enterprise Java Bean?
(d) Discuss FTP, HTTP and POP protocols.
(e) What is Object Oriented Programming?
(f) Why we use Layout Manager in AWT?
(g) What is String in Java?

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

(a) What are the requirements in participating in audio video conferencing?
(b) What is an instance variable? Explain how an instance variable of a class can have different value for each object of that class.
(c) Write short notes on the following:
  (i) JLabel
  (ii) JButton
  (iii)Inner frame
(d) Explain the principles of Remote Method Invocation with block diagram.
(e) Write a Java Program to create an employ class and calculate a employ Grouse salary using inheritance.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Define cookies? How they are used in retrieving the information from clients?
(b) In Java only a single class can be extends. If there is a need to extend more than one class, how can this be achieved?

4. Attempt any *one* part of the following: **7 x 1 = 7**

(a) What is Java Bean? Discuss the advantages of Java Bean?
(b) What constitutes an internet? Explain in brief the role of Domain Name System (DNS) over internet with suitable block diagram.

5. Attempt any *one* part of the following: **7 x 1 = 7**

(a) What is meant by package? How it is created and implemented in Java?
(b) Explain in detail the concepts of Applet in java.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Write a Java Program Draw the line, Rectangle, oval, text using the graphics method.

(b) Explain life cycle of Servlet with neat diagram.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) What are the components of BDK? Give any five beans available in BDK? Discuss the steps required for creating user defines beans.

(b) Write short notes on the following:

(i) charAt()

(ii) equals()

(iii) toString()

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Paper Id: 2 3 1 3 2 4 Roll No. | | | | | | | | | | |

MCA (INTEGRATED)

(SEM V) THEORY EXAMINATION 2022-23

SYSTEM ANALYSIS & DESIGN

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

(a) What do you understand by DFD?

(b) Define System and its characteristics.

(c) Give the difference between Structured Interview and Unstructured Interview.

(d) Define IPC.

(e) What do you understand by Pair Programming?

(f) Define System Analyst.

(g) What do you meant by SRS? Why it is needed?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

(a) What do you mean by System Design? Explain the various types of System Design.

(b) Define CBIS? Explain SDLC with suitable diagram.

(c) Define system testing and its characteristics? Explain the role of system testing in IT Sector.

(d) What do you mean by Information? Explain its types?

(e) Define Planning? Explain the various steps for developing system.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss the various types of system.

(b) What do you meant by Information System? Explain various types of Information System.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) What do you meant by System Analyst? Explain the role of system analyst in IT professional.

(b) Write short notes on (any two) :

(i) Decision Table

(ii) Data Dictionary

(iii) Decision Tree

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Compare and Contrast Performance Analysis and Fact Analysis.

(b) What do you mean by System Review? Explain the various types of System Review?

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Write short notes on (any two) :

(i) Questionnaires (ii) Interview (iii) SQA

(b) Discuss the concept of clean room process.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Explain Feasibility Study? Discuss the various types of Feasibility Study?

(b) Discuss the criteria for selection of software?

Printed Pages:01 **Sub Code:RCAI-505**

Paper Id: 2 3 1 0 6 0 **Roll No.** | | | | | | | | | | |

MCA(INTEGRATED)
(SEM V) THEORY EXAMINATION 2022-23
CYBER SECURITY

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

(a) What are the various types of Information Systems?
(b) Explain Archival Storage.
(c) Define Macro viruses.
(d) Explain Access Control.
(e) Explain E-Cash.
(f) Why security policy should be developed.
(g) Define Software License.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

(a) What are the various threats to Information Systems?
(b) Explain various Security Threats to E-Commerce.
(c) Explain Digital Signature.
(d) Explain Security Architecture issues in Hardware.
(e) Explain Semiconductor law in detail.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) What do you understand by Cyber Bullies and Cyber Predators?
(b) What are the basic principles of Information Systems?

4. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Explain Data Backup.
(b) What do you understand by Firewall ?What is the Packet filter?

5. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Explain the concept of EDI .Discuss the benefits of EDI.
(b) What is Smart Card? Differentiate between debit card and credit card.

6. Attempt any *one* part of the following: **7 x 1 = 7**

(a) What are the process of application development security?
(b) What is Information Security Governance?

7. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Explain Provisions in IT Act,2000
(b) Explain IPR(Intellectual Property Rights) and its types.