

Model Questions

PRS/KS/24/2635

Faculty of Science & Technology
Fourth Semester B.Tech. (Information Technology) (C.B.C.S.) Examination
DATA STRUCTURE AND PROGRAM DESIGN

Time : Three Hours]

[Maximum Marks : 70

INSTRUCTIONS TO CANDIDATES

- (1) All questions carry marks as indicated.
 - (2) Solve Question **1** **OR** Question No. **2**.
 - (3) Solve Question **3** **OR** Question No. **4**.
 - (4) Solve Question **5** **OR** Question No. **6**.
 - (5) Solve Question **7** **OR** Question No. **8**.
 - (6) Solve Question **9** **OR** Question No. **10**.
 - (7) Assume suitable data wherever necessary.
 - (8) Illustrate your answers wherever necessary with the help of neat sketches.
1. (a) Define algorithm. State & explain the different properties of algorithm. 7
 - (b) Explain different asymptotic notation by giving behavioural representation of function. 7
- OR**
2. (a) Write recursive function in C for :
 - (i) Factorial of a given no.
 - (ii) Finding Fibonacci series. 8
 - (b) Sort the given list using insertion sort in ascending order :
 List = { 6 7 12 2 16 11 1 }
 Write an algorithm for same. 6
3. (a) Explain following :
 - (i) Generalized List
 - (ii) Sparse matrix. 6
 - (b) Write an algorithm for :
 - (i) Insertion of node at first place.
 - (ii) Insertion of a node at last.
 - (iii) Insertion of a node in sorted list. 8

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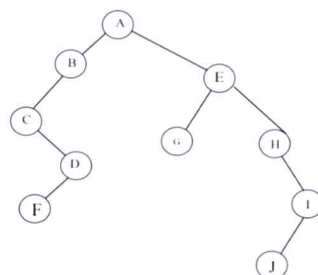
Model Questions

OR

4. (a) Write short notes on following :
 - (i) Circular linked list
 - (ii) Doubly linked list. 8
- (b) Write a 'C' program to count a no. of nodes in a singly linked list. 6
5. (a) Write an algorithm for the following with respect to stack :
 - (i) PUSH
 - (ii) POP
 - (iii) Display
 Also explain concept of stack with example. 8
- (b) Convert an arithmetic expression into its equivalent postfix form. Show the contents of the stack during the conversion process :
 - (i) $a \wedge b \wedge c * d / E + f - g * h$
 - (ii) $P * Q / R \wedge S - T \wedge U / V - w * x$ 6

OR

6. (a) Explain the concept of linear queue with example. Also write algorithm for the following with respect to linear queue :
 - (i) Insert
 - (ii) Delete
 - (iii) Display. 8
- (b) Write difference between simple queue, circular queue & priority queue. 6
7. (a) For the following tree find preorder, inorder & postorder :



6

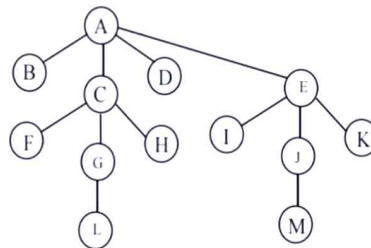


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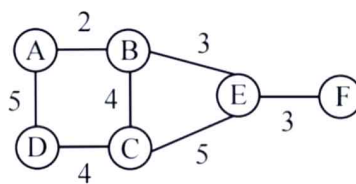
- (b) Define binary search tree. Explain with example how to insert & delete elements in binary search tree. 8

OR

8. (a) Write short notes on :
- Threaded binary tree
 - AVL Tree
 - B⁺ Tree
 - 2-3 Multiway Tree.
- (b) Convert the given general tree into equivalent binary tree : 8



9. (a) Write Prim's algorithm for finding MCST. Also apply algorithm to find MCST for following graph : 6

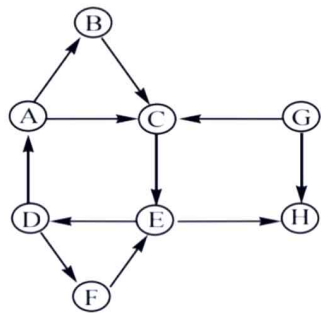


- (b) Define graph. Explain the following terminologies in respect with graph with examples :
- Strongly connected & Weakly connected graph.
 - Indegree & Outdegree of a vertex.
 - A cycle & loop.
- 7

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10. (a) Explain Hamiltonian cycle with graph. 5
- (b) Write down breadth first and depth first search traversal order for the given Graph. Also draw DFS & BFS sequence tree.



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B.Tech. (Information Technology) Fourth Semester (C.B.C.S.)

Data Structure & Program Design

P. Pages : 2

Time : Three Hours



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Max. Marks : 70

- Notes :
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 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Due credit will be given to neatness and adequate dimensions.
 8. Assume suitable data whenever necessary.
 9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Explain bubble sort with example. 6
- b) Explain Asymptotic notation in brief. 6
- c) Explain stability of an algorithm for sorting. 2

OR

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|----|----|---|---|
| 2. | a) | Explain the concept of data structure in detail. Also explain abstract data type. | 7 |
| | b) | Sort the following array using selection sort and also give the time complexity of it 80, 27, 42, 14, 69, 23, 87. | 7 |
| 3. | a) | Explain the methods of dynamic memory allocation. | 4 |
| | b) | Write a program to implement various operation of singly linked list. | 7 |
| | c) | Define circular and doubly linked list. | 3 |

OR

- | | | | |
|----|----|---|---|
| 4. | a) | Write and explain the algorithm for search and modify operation in doubly linked list with example. | 7 |
| | b) | Write a program to delete the node with the largest value from a link list. | 7 |
| 5. | a) | Explain the algorithm for various operations of circular queue. | 7 |
| | b) | Write an algorithm to evaluate a prefix expression using stack with an example. | 7 |

OR

6. a) Write note on.
- i) Priority Queue.
 - ii) Circular Queue.
 - iii) Evaluation of postfix expression.

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- b) Write PUSH and POP algorithm to implement the stack. 8
7. a) Draw the tree represented for the following prefix expression. 7
- i) $*+abc/df$
ii) $*a+b*c-de$
- b) What is binary search tree? Construct a BST for the following sequence and also traverse the tree with all three approaches. 7
- M, Z, C, X, Y, O, K, I, E, H.
- OR**
8. a) What is an AVL tree? Explain with an example, how height is balanced in AVL tree after an insertion operation. 7
- b) Draw a tree from given inorder & preorder traversal of binary tree. 7
- Inorder :- HDIBJEKAFCG
Preorder :- ABDHIEJKCFG
9. a) Define the following. 7
- i) Complete graph.
ii) Degree of graph.
iii) Strongly connected component.
iv) Isolated vertex.
v) Hamiltonian path
vi) Path of graph.
vii) Indegree of graph.
- b) Write depth first search algorithm of graph traversal with an example. 7
- OR**
10. a) Write a non recursive procedure for breadth first search traversal of a graph. 7
- b) Explain topological sort with an example. 7



Model Questions

B.Tech. Fourth Semester (Information Technology) (C.B.C.S.) Summer 2023

Data Structure & Program Design

P. Pages : 2

Time : Three Hours



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Max. Marks : 70

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Assume suitable data whenever necessary.

1. a) Write a algorithm for Bubble sort, Trace path of sorting process using bubble sort for the following array of integers: 44, 55, 33, 88, 77, 11, 66 7
b) What is algorithm. Explain about the essential characteristics of an algorithm. 7

OR

2. a) Explain Array and types of Array. 7
b) Explain ADT with example. 7
3. a) Explain a Linked List and define the representation of Linked list in memory. 7
b) Write a C program on Insertion of node at beginning and delete the node N from end of a singly linked list. 7

OR

4. a) What is Generalized list? Write difference between singly linked list and doubly linked list. 7
b) Write a program in C to count number of nodes present in a linked list. 7
5. a) Explain concept of stack. Write a C program to convert expression in infix to postfix using stack. 8
b) Explain following queue 6
 - i) Priority Queue
 - ii) Dequeue

OR

6. a) Translate the following expression as: 6
i) $A + (B * C - D / E \wedge F) * G) * H$: To Postfix

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- ii) $A + (B + C * D) / E * F$: To Postfix
- iii) $A + (B + C * D) / E * F$: To Prefix
- iv) $A + B + C / D - E * F$: To Postfix
- b) What are the advantages of circular Queue over simple queue? Write algorithm for addition and deletion of simple Queue. 8
7. a) Explain following tree terminologies- 7
- i) Forest ii) Node
- iii) Siblings iv) Degree of Node
- v) Terminal Node vi) Parent and Child
- vii) Rout and Leaf node
- b) What do you mean by hashing? What is collision of hashing? How it is avoided? 7
- OR**
8. a) Construct a binary tree whose inorder and preorder is given below: 7
INORDER: - B C A E D G H F I
PREORDER: - A B C D E F G H I
What is binary tree?
- b) Define threaded binary tree. Write a function to find the inorder successor of tree in threaded binary tree. 7
9. a) Write an algorithm for Depth First Search (DFS). Also discuss its complexity. 7
- b) Explain Dijkstra algorithm in detail. 7
- OR**
10. a) Explain a Graph and representation of Graph in data structure with example? 7
- b) Write an algorithm for BFS. What is difference between BFS and DFS? 7



Model Questions

B.Tech. (Information Technology) Fourth Semester (C.B.C.S.) Winter 2022
Data Structure & Program Design

P. Pages : 3

Time : Three Hours



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Max. Marks : 70

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Due credit will be given to neatness and adequate dimensions.
 8. Assume suitable data whenever necessary.
 9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) What are asymptotic notations? Also explain the following: 7
 - i) Big – oh notation
 - ii) Theta notation
 - iii) Big omega notation
- b) Write down algorithm for bubble sort and illustrate various steps with an example. 7

OR

2. a) Write a recursive function for 8
 - i) Computation of Fibonacci series
 - ii) Finding no. is prime or not.
- b) Sort the given list using insertion sort 6
 42 25 101 96 201 162 198
3. a) Explain sparse matrix with suitable example. 6
- b) Write short note on following: 8
 - i) Circular Linked List
 - ii) Doubly Linked List

OR

4. a) Write an algorithm to calculate length of the linked list. 4

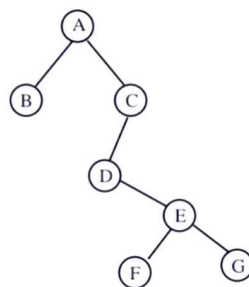


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- b) Write a C program to create a linked list. The user inputs the number of nodes in the list and values for information content of each node. You must also show the contents of the singly linked linear list after creation. **10**
5. a) Differentiate between stack and a queue ADT. Give at least 5 points of difference. **4**
- b) Explain the concept of linear queue with example. Also write algorithm for the following with respect to linear queue. **7**
- insert
 - delete
 - display
- c) Convert the following infix expression into prefix using stack **3**
- $$a + b / c * d + f \wedge g$$

OR

6. a) Write difference between simple and circular queue. **4**
- b) Explain concept of stack. Write procedure to perform various operation on stack. **6**
- c) Explain the concept of multistack and priority queue. **4**
7. a) Find preorder, post-order and in order traversing sequence for the following tree. **6**



- b) Write short note on **any three**. **8**
- threaded binary tree
 - AVL tree
 - B+ tree
 - 2 – 3 multiway tree

OR

