

NRT/KS/19/2227

Bachelor of Computer Application (B.C.A.) Semester—III Examination

DATA STRUCTURES

Paper—III

Time : Three Hours]

[Maximum Marks : 50

- Note** :— (1) **ALL** questions are compulsory and carry equal marks.
(2) Draw neat and labelled diagrams wherever necessary.

EITHER

1. (a) Write an algorithm to insert a node in the beginning of a single linked list. 5
(b) Explain the memory representation of a linked list. 5

OR

- (c) How will you represent a polynomial in memory ? Explain with example. 5
(d) Write an algorithm to delete a node from the end of doubly linked test. 5

EITHER

2. (a) Write an algorithm to push and pop an item in a stack. 5
(b) Convert the following infix expression into prefix and postfix :

$$\frac{e^{x+y} + e^{x-y}}{e^{x+y} - e^{x-y}} \quad 5$$

OR

- (c) Write an algorithm to evaluate a postfix expression. 5
(d) Write the moves to solve the problem of Tower of Hanoi for three discs. 5

EITHER

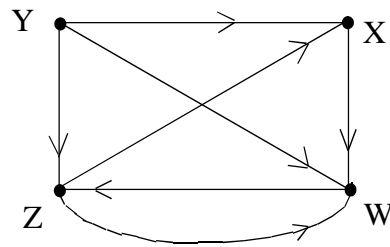
3. (a) Write an algorithm to insert an element in a queue. 5
(b) 25, 20, 30, 15, 10, 5, 22, 24. Sort the above list using insertion sort method. 5

OR

- (c) What is hash function ? Explain hashing methods with example. 5
(d) Write an algorithm to delete an element from a circular queue. 5

EITHER

- 4. (a) Give the adjacency matrix for the following graph — 5



- (b) Write an algorithm for preorder traversal of a binary tree. 5

OR

- (c) For given postorder and inorder traversal :

Inorder n1 n2 n3 n4 n5 n6 n7 n8 n9

Post Order n1 n3 n5 n4 n2 n8 n7 n9 n6

Draw the binary tree. 5

- (d) Write depth first search traversal algorithm. 5

- 5. (a) Write a short note on circular linked list. 2½

- (b) Write recursive procedure for Fibonacci sequence. 2½

- (c) What is priority queue ? Explain its array representation. 2½

- (d) Build a BST for the following elements :

40, 60, 10, 30, 80, 20, 50, 70 2½

Bachelor of Computer Application (B.C.A.) Semester-III (C.B.S.) Examination**DATA STRUCTURES****Paper—III**

Time : Three Hours]

[Maximum Marks : 50

N.B. :— (1) All questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagram wherever necessary.

EITHER

1. (A) Explain two way linked list. What are the advantages of two way linked list over single linked list ? 5

(B) Write an algorithm to delete the last node of single linked list. 5

OR

(C) Write an algorithm to insert the node at the beginning of linked list. 5

(D) Write an algorithm to count the even integers in the linked list of integers. 5

EITHER

2. (A) Write an algorithm to insert and remove the element from stack. 5

(B) Translate the following infix expression into prefix and postfix form :

(i)
$$\frac{A^{B^C D}}{W^{X^Y Z}}$$

(ii) $C * a^x - b^x * d$ 5**OR**

(C) Write an algorithm to evaluate the postfix expression. 5

(D) Let J and K be integers and Q(J, K) is recursively defined by

$$Q(J, K) = \begin{cases} 5 & \text{if } J < K \\ Q(J - K, K + 2) + J & \text{if } J > K \end{cases}$$

Find Q(2, 7), Q(5, 3) and Q(12, 2). 5

EITHER

3. (A) Write an algorithm to insert an element in a linear queue. 5

(B) What is circular queue ? Explain the overflow and underflow condition in array representation of circular queue. 5

OR

(C) Write an algorithm to remove the element from circular queue. 5

(D) Explain selection sort method with suitable example. 5

EITHER

4. (A) Following is the Inorder and Postorder traversal of binary tree :

Inorder : $n_1, n_2, n_3, n_4, n_5, n_6, n_7, n_8, n_9$

Postorder : $n_1, n_3, n_5, n_4, n_2, n_8, n_7, n_9, n_6$.

Draw the tree.

5

- (B) Explain BFS method of traversing graph with suitable example.

5

OR

- (C) Write an algorithm for the postorder traversal of binary tree.

5

- (D) Draw the graph for the following adjacency matrix :

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

5

5. Attempt **all** :

- (A) Define circular double linked list.

2½

- (B) Explain recursion. What is the base criteria in the recursion ?

2½

- (C) Explain dequeue.

2½

- (D) Define complete graph.

2½

TKN/KS/16-5971

**Third Semester Bachelor of Computer
Application Examination**

DATA STRUCTURES

Paper – III

Time : Three Hours]

[Max. Marks : 50

N. B. : All questions are compulsory and carry equal marks.

1. (a) What is Linked List ? What are the types of linked list ? 5
- (b) How polynomial expression can be represented using linked list ? 5

OR

- (c) Write an algorithm to insert a node at the beginning of linked list. 5
- (d) Write an algorithm to search an element in a linked list. 5
2. (a) Write an algorithm to push an element into a stack. 5
- (b) What is recursion ? Explain in brief. 5

OR

- (c) Write an algorithm to evaluate postfix expression. 5

- (d) Explain Tower of Hanoi problem for 3 disks. 5

3. (a) Write an algorithm to insert an element in a circular queue. 5
- (b) Write a short note on :—
- (i) Dequeue
- (ii) Priority Queue 5

OR

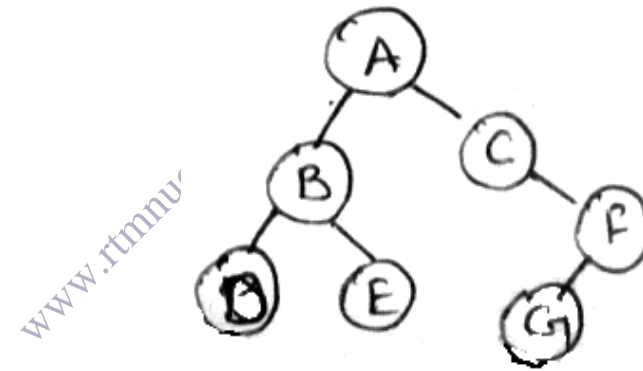
- (c) Explain Hashing technique in brief. 5
- (d) Write an algorithm to sort an array using insertion sort. 5

4. (a) Write an algorithm for preorder traversing of binary tree. 5
- (b) Explain Breadth first search algorithm for graph. 5

OR

- (c) Write a short note on representation of graph using linked list and matrix. 5
- (d) Write an algorithm to search an element in binary search tree. 5
5. (a) Give a diagrammatic representation of circular header linked list. $2\frac{1}{2}$

- (b) Explain POP operation of stack. $2\frac{1}{2}$
- (c) What do you mean by complexity of algorithm? $2\frac{1}{2}$
- (d) Write in order traversing of tree.



$2\frac{1}{2}$

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Bachelor of Computer Application (B.C.A.) Semester–III (C.B.S.) Examination**DATA STRUCTURES****Paper–III**

Time : Three Hours]

[Maximum Marks : 50

N.B. :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagram wherever necessary.

EITHER

1. (a) What is a Linked List ? Explain the representation of single linked lists in memory. 5
 (b) Write an algorithm to find the number of elements in linked list. 5

OR

- (c) Write an algorithm to delete the first node of double linked list. 5
 (d) Write an algorithm to insert the element at the beginning of single linked list. 5

EITHER

2. (a) What is Stack ? What are the different operations that can be performed on stack ? 5
 (b) Write an algorithm for the evaluation of a postfix expression. 5

OR

- (c) Explain Quicksort method with suitable example. 5
 (d) Translate infix expression into its equivalent prefix expression :
 (i) $(A-B) * (D/E)$.
 (ii) $(A+B \uparrow D)/(E-F)*G$. 5

EITHER

3. (a) What is a Queue ? Explain array representation of queue in memory. 5
 (b) Explain selection sort method with suitable example. 5

OR

- (c) What is Hashing ? Explain collision resolution technique. 5
 (d) Write an algorithm to insert element in circular queue. 5

EITHER

4. (a) What is Tree ? Explain the concept of Binary Search Tree. 5
- (b) Explain :
- (i) Graphs.
- (ii) Multigraphs. 5

OR

- (c) Explain BSF traversing on graphs. 5
- (d) Write an algorithm for preorder traversal of Binary Tree. 5
5. Attempt **ALL** :
- (a) Explain header linked list. 2½
- (b) Write the definition of recursive factorial function. 2½
- (c) Explain Deques. 2½
- (d) Explain Adjacency matrix. 2½

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Bachelor of Computer Application (B.C.A.) Semester-III (C.B.S.) Examination**DATA STRUCTURES****Paper—III**

Time : Three Hours]

[Maximum Marks : 50

N.B. :— (1) All questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagram wherever necessary.

EITHER

1. (A) Explain two way linked list. What are the advantages of two way linked list over single linked list ? 5

(B) Write an algorithm to delete the last node of single linked list. 5

OR

(C) Write an algorithm to insert the node at the beginning of linked list. 5

(D) Write an algorithm to count the even integers in the linked list of integers. 5

EITHER

2. (A) Write an algorithm to insert and remove the element from stack. 5

(B) Translate the following infix expression into prefix and postfix form :

(i)
$$\frac{A^{B^C D}}{W^{X^Y Z}}$$

(ii) $C * a^x - b^x * d$ 5**OR**

(C) Write an algorithm to evaluate the postfix expression. 5

(D) Let J and K be integers and Q(J, K) is recursively defined by

$$Q(J, K) = \begin{cases} 5 & \text{if } J < K \\ Q(J - K, K + 2) + J & \text{if } J > K \end{cases}$$

Find Q(2, 7), Q(5, 3) and Q(12, 2). 5

EITHER

3. (A) Write an algorithm to insert an element in a linear queue. 5

(B) What is circular queue ? Explain the overflow and underflow condition in array representation of circular queue. 5

OR

(C) Write an algorithm to remove the element from circular queue. 5

(D) Explain selection sort method with suitable example. 5

EITHER

4. (A) Following is the Inorder and Postorder traversal of binary tree :

Inorder : $n_1, n_2, n_3, n_4, n_5, n_6, n_7, n_8, n_9$

Postorder : $n_1, n_3, n_5, n_4, n_2, n_8, n_7, n_9, n_6$.

Draw the tree.

5

- (B) Explain BFS method of traversing graph with suitable example.

5

OR

- (C) Write an algorithm for the postorder traversal of binary tree.

5

- (D) Draw the graph for the following adjacency matrix :

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

5

5. Attempt **all** :

- (A) Define circular double linked list.

2½

- (B) Explain recursion. What is the base criteria in the recursion ?

2½

- (C) Explain dequeue.

2½

- (D) Define complete graph.

2½

Bachelor of Computer Application (B.C.A.) Semester-III (C.B.S.) Examination**DATA STRUCTURES****Paper—III**

Time : Three Hours]

[Maximum Marks : 50

N.B. :— (1) All questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagram wherever necessary.

EITHER

1. (A) Explain two way linked list. What are the advantages of two way linked list over single linked list ? 5

(B) Write an algorithm to delete the last node of single linked list. 5

OR

(C) Write an algorithm to insert the node at the beginning of linked list. 5

(D) Write an algorithm to count the even integers in the linked list of integers. 5

EITHER

2. (A) Write an algorithm to insert and remove the element from stack. 5

(B) Translate the following infix expression into prefix and postfix form :

(i)
$$\frac{A^{B^C D}}{W^{X^Y Z}}$$

(ii) $C * a^x - b^x * d$ 5**OR**

(C) Write an algorithm to evaluate the postfix expression. 5

(D) Let J and K be integers and Q(J, K) is recursively defined by

$$Q(J, K) = \begin{cases} 5 & \text{if } J < K \\ Q(J - K, K + 2) + J & \text{if } J > K \end{cases}$$

Find Q(2, 7), Q(5, 3) and Q(12, 2). 5

EITHER

3. (A) Write an algorithm to insert an element in a linear queue. 5

(B) What is circular queue ? Explain the overflow and underflow condition in array representation of circular queue. 5

OR

(C) Write an algorithm to remove the element from circular queue. 5

(D) Explain selection sort method with suitable example. 5

EITHER

4. (A) Following is the Inorder and Postorder traversal of binary tree :

Inorder : $n_1, n_2, n_3, n_4, n_5, n_6, n_7, n_8, n_9$

Postorder : $n_1, n_3, n_5, n_4, n_2, n_8, n_7, n_9, n_6$.

Draw the tree.

5

- (B) Explain BFS method of traversing graph with suitable example.

5

OR

- (C) Write an algorithm for the postorder traversal of binary tree.

5

- (D) Draw the graph for the following adjacency matrix :

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

5

5. Attempt **all** :

- (A) Define circular double linked list.

2½

- (B) Explain recursion. What is the base criteria in the recursion ?

2½

- (C) Explain dequeue.

2½

- (D) Define complete graph.

2½

Bachelor of Computer Application (B.C.A.) Semester—III (C.B.S.) Examination

DATA STRUCTURES

Paper—III

Time : Three Hours]

[Maximum Marks : 50

Note :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagram wherever necessary.

EITHER

1. (a) Write an algorithm to insert the element at the end of single linked list. 5
- (b) What is header linked list ? Write an algorithm to search specific item from circular linked list. 5

OR

- (c) Write an algorithm to delete the last node of double linked list. 5
- (d) Write an algorithm to insert element at the beginning of single linked list. 5

EITHER

2. (a) Write an algorithm to convert Infix expression to Postfix expression. 5
- (b) Let A and B be non-negative integers. Suppose a function GCD is recursively defined as follows :

$$\text{GCD}(A, B) = \begin{cases} \text{GCD}(B, A) & \text{if } A < B \\ A & \text{if } B = 0 \\ \text{GCD}(B, \text{MOD}(A, B)) & \text{Otherwise} \end{cases}$$

find GCD (12, 24)

GCD (32, 8). 5

OR

- (c) Write a recursive algorithm for Tower of Hanoi Problem. 5
- (d) Evaluate the Postfix Notation. (Using Application of STACK)

5, 12, 4, -, *, 8, 2, |, +. 5

EITHER

3. (a) Define Priority Queue. Explain Array representation of priority Queue in Memory. 5
 (b) Explain Insertion Sort method with a suitable example. 5

OR

- (c) What is hashing ? Explain different hashing functions. 5
 (d) Write an algorithm to delete an element from Queue. 5

EITHER

4. (a) Explain the representation of Graph in Memory. 5
 (b) Write an algorithm for traversing the binary tree in inorder. 5

OR

- (c) Write and explain BFS method of traversing graph with a suitable example. 5
 (d) Write a procedure to Insert an element in heap. 5

5. Attempt **ALL** :

- (a) What are the advantages of two way linked list ? 2½
 (b) What do you mean by base criteria in Recursion ? 2½
 (c) What is collision ? Explain. 2½
 (d) Explain weighted graph. 2½

Bachelor of Computer Application (B.C.A.) Semester-III Examination

DATA STRUCTURES

Paper—III

Time : Three Hours]

[Maximum Marks : 50

N.B. :— (1) All questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagrams wherever necessary.

EITHER

1. (a) What is data structure ? Explain different types of data structures. 5
 (b) Write an algorithm to insert an element in a linked list at the end. 5

OR

- (c) Explain two way linked list and circular linked list. 5
 (d) Write an algorithm to search a specific item of information in a given circular header list. 5

EITHER

2. (a) Write an algorithm to convert infix expression to postfix expression. 5
 (b) Write a recursive procedure for Tower of Hanoi problem. 5

OR

- (c) Evaluate the following postfix expression
 $2 \uparrow 3 + 5 * 2 \uparrow - 12 / 6.$ 5
 (d) What is stack ? Write an algorithm for PUSH and POP operations on STACK. 5

EITHER

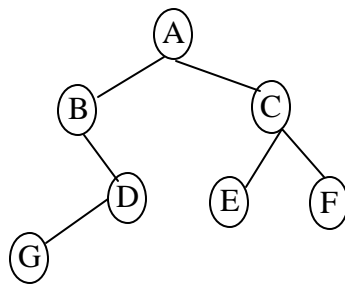
3. (a) Explain Dequeue and Priority Queue. 5
 (b) Write an algorithm for insertion sort with its complexity. 5

OR

- (c) What is Hashing ? Explain four different methods of Hashing. 5
 (d) Write an algorithm for removing element from queue which is represented as linked list. 5

EITHER

4. (a) Explain linked representation of graph. 5
 (b) Define Binary tree. Traverse the Binary tree in pre-order and post-order



5

OR

- (c) Write an algorithm for Inorder traversal. 5
 (d) What is Heap ? Explain different types of Heaps with suitable example. 5

5. Attempt all :

- (a) Explain advantages of linked list over an array. 2½
 (b) Convert the following infix expression into prefix :
 $((A + B) * C - (D - E)) * (F + G)$ 2½
 (c) Explain Quicksort with an example. 2½
 (d) What is directed graph ? Write two differences of DFS and BFS traversing method. 2½

Bachelor of Computer Application (B.C.A.) Semester–III Examination**DATA STRUCTURES****Paper–III**

Time : Three Hours]

[Maximum Marks : 50

N.B. :— (1) All questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagram wherever necessary.

EITHER

1. (a) What is a single linked list ? Explain how it is represented in memory. 5
 (b) Write an algorithm to traverse a circular linked list. 5

OR

- (c) Write an algorithm to delete a node from the front of a linked list. 5
 (d) How polynomial expression can be represented using linked list ? Explain. 5

EITHER

2. (a) Translate the following infix expression in prefix and postfix notation :
 (i) $a + (b - c) * d / (e * f)$
 (ii) $(a + b * c) / ((a + b) * c)$ 5
 (b) Explain Quick sort using example. 5

OR

- (c) Create a stack for performing the following operations :
 (i) Push A
 (ii) Push B
 (iii) Pop
 (iv) Push C
 (v) Pop. 5
 (d) What is recursion ? How Tower of Hanoi problem can be solved using recursion ? 5

EITHER

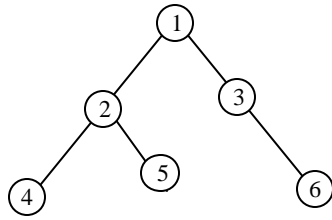
3. (a) What is a queue ? What are the two ways in which a queue can be represented ? 5
 (b) Sort the following data using selection sort :
 6, 1, 4, 3, 5, 2, 7 5

OR

- (c) Write an algorithm to insert an element in a circular queue. 5
 (d) What is collision ? Explain collision resolution techniques. 5

EITHER

4. (a) Write preorder, inorder and postorder traversal of the following binary tree.



5

- (b) Explain BFS method of graph traversal.

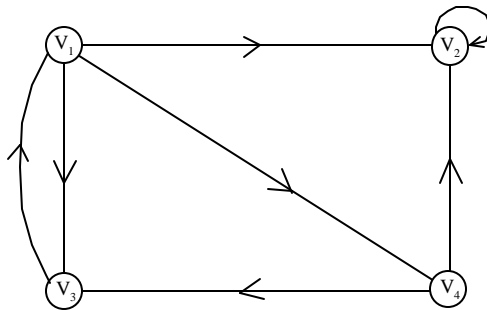
5

OR

- (c) What is binary search tree ? Also give its sequential representation.

5

- (d) Represent the following graph in adjacency matrix.



5

5. (a) Differentiate between single and double linked list.

2½

- (b) Write an algorithm to insert an element into stack.

2½

- (c) What is hashing ? Explain any one method of hashing with example.

2½

- (d) What do you mean by heap tree ? Explain with example.

2½