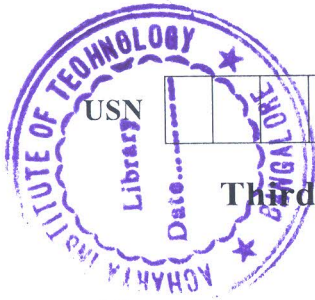


# CBCS SCHEME

15CS33



USN

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Third Semester B.E. Degree Examination, July/August 2021

## Data Structure and Application

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1 a. Classify Data Structure, briefly. (05 Marks)  
b. Explain how to use structure. Write a program to display record of at least 5 student (R No., Name, US No, Marks, Grade) using structure. (08 Marks)  
c. Define pointer. Explain how to declare and use pointer. (03 Marks)
- 2 a. List and explain the function supported by C for Dynamic Memory allocation. (04 Marks)  
b. What is polynomial? Explain how to represent polynomial. (04 Marks)  
c. Write a program to add two polynomials. (08 Marks)
- 3 a. Define stack. Explain the operations performed by stack. (04 Marks)  
b. Implement Push and POP function for stack using arrays with StackFull and StackEmpty conditions. (08 Marks)  
c. Explain and implement Tower of Hanoi. (04 Marks)
- 4 a. Discuss application of stack. (04 Marks)  
b. Define queue, circular queue. Implement enqueue and dequeue function for queues using array. (08 Marks)  
c. Define recursion. Write a program for :  
(i) Factorial of a number  
(ii) Fibonacci sequence (04 Marks)
- 5 a. Define singly linked list and doubly linked list with example. (04 Marks)  
b. Create a singly linked list of integers. Write a function to:  
(i) Create and list with data  
(ii) Insert a node in the list  
(iii) Delete a node from the list  
(iv) Display singly linked list (08 Marks)  
c. What are the advantages of doubly linked list over singly linked list? (04 Marks)
- 6 a. Define Sparse matrix. Express the given sparse matrix in triplets and find its transpose  
$$\begin{bmatrix} 0 & 0 & 4 & 0 & 0 \\ 8 & 5 & 0 & 0 & 0 \\ 0 & 10 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix}$$
 (08 Marks)  
b. Explain circular linked list. (08 Marks)
- 7 a. Define: (i) Tree (ii) Binary tree (iii) Complete Binary Tree (iv) Strictly Binary Tree  
(v) Skewed Tree (vi) Level of tree (08 Marks)  
b. Write the routine to traversal given tree using :  
(i) pre-order traversal (ii) post-order traversal. (08 Marks)

- 8 a. What is Binary Search Tree? Write a program to implement recursive search or iterative search for a Binary Search Tree. (08 Marks)  
 b. Explain threaded binary tree in detail. (08 Marks)
- 9 a. Define graph. Give adjacency matrix and adjacency linked list for the given weighted graph in Fig.Q9(a).

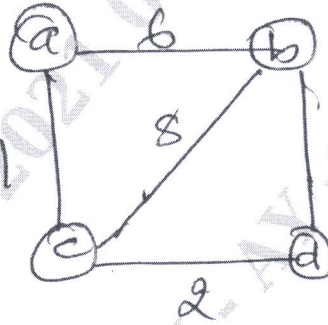


Fig.Q9(a)

- b. Write algorithm for breadth first search and depth first search. (08 Marks)
- 10 a. Explain about Hashing in detail. (06 Marks)  
 b. Write an algorithm (i) Radix sort (ii) Insertion sort. (10 Marks)

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