

CBCS SCHEME

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15CS33

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Data Structures and Applications

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Algorithm and discuss the criteria that an algorithm must satisfy with example. Write an ADT for natural numbers. (06 Marks)
- b. Discuss structures and union with example. (04 Marks)
- c. Build 'C' program to sort integers using selection sort algorithm. (06 Marks)

OR

- 2 a. Define pointers with example. (04 Marks)
- b. Write a 'C' program for creating 2D array using dynamic memory allocation. (06 Marks)
- c. Develop 'C' function for pattern matching using Brute-force algorithm and trace the algorithm by considering simple pattern. (06 Marks)

Module-2

- 3 a. Build a 'C' program to implement a stack using dynamic array whose initial capacity is 1 and array doubling is used to increase the stack's capacity whenever an element is added to a full stack. Implement the operation – push, pop and display. (08 Marks)
- b. Build the algorithm to evaluate postfix/suffix expression and trace the algorithm to evaluate $62/3 - 42^* +$ (08 Marks)

OR

- 4 a. Convert the following expression from infix to postfix
i) $x^n y^n z - M + N + P/Q$ ii) $((a/(b - c + d)) * (e - a) * c)$ (04 Marks)
- b. Define the process of recursion. Discuss working of recursion for factorial of 3 using stack. (04 Marks)
- c. Write a program to perform various operations on Queues. (08 Marks)

Module-3

- 5 a. Develop 'C' program for demonstrator of STACK using singly linked list. (08 Marks)
- b. Develop 'C' function to create an ordered list and to search for a key item in the singly linked list. (08 Marks)

OR

- 6 a. What is header node, write a 'C' function to insert at front and to delete at front in circular to singly linked list with header node. (08 Marks)
- b. What is doubly linked list, with a pictorial representation discuss the advantages of doubly linked list over singly linked list, illustrate with an example. (08 Marks)

Module-4

- 7 a. What is binary tree? State its properties. How it is represented using array and linked list, give example. (10 Marks)
- b. Design recursive 'C' function for the given tree traversal (06 Marks)
- Pre-order traversal
 - Post-order traversal
 - In-order traversal.

OR

- 8 a. What is binary search tree? Build 'C' function to delete a node. (08 Marks)
- b. Construct a binary search tree for the following sequence (08 Marks)
- Preorder : ABCDEFGHI
Inorder : BCAEDGFHI

Module-5

- 9 a. Explain Depth First search algorithm and Breadth First search algorithm, with an example. (08 Marks)
- b. Explain Radix sort technique, sort the following element using Radix sort by clearly specifying the content of each pass. (08 Marks)
- 2900, 6072, 5617, 5426, 2780, 1206, 3712, 6655.

OR

- 10 a. Discuss graph and its various representations with example. (06 Marks)
- b. What is hashing? Explain various collision resolving techniques with example along with set of Hash function. (10 Marks)
