CBCS SCHEME

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5CS33

Third Semester B.E. Degree Examination, Dec.2020

Data Structures and Applications

Time: 3 hrs. Max. Marks: 80

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

Module - I

1 a. What do you mean by dynamic memory allocation? List and explain various functions supported by C to carryout dynamic memory allocation. (09 Marks)

b. What is sparse matrix? Show with a suitable example sparse matrix representation starting as triplets. (03 Marks)

c. Write simple transfer algorithm to transpose the given sparse matrix. (04 Marks)

OR

2 a. Write the Knuth Morris Pratt pattern matching algorithm and apply the same to search the pattern `abc-dabey' in the test `abcxabcdabxabcdabcdabey' (08 Marks)

b. Consider two polynomials $A(x) = 4x^{L5} + 3x^4 + 5$ and $B(x) = x^4 + 10x^2 + 1$. Show diagrammatically how these polynomials can be stored in a 1-D array. Also give its C representation. (03 Marks)

c. What is data structure? List and explain different operation performed on data structure. (05 Marks)

Module-2

3 a. List the disadvantages of linear queue and explain how it is solved in circular queue. Implement circular queue with supporting functions using array. (08 Marks)

b. Convert the following infix expression into postfix expression:

i) (a + b) * d + e / (f + a * d) + c

ii) ((a / (b — c + d)) * (e — a) * c) (04 Marks)

c. What is recursion? Write recursive function to solve tower of Hanoi problem. (04 Marks)

OR

4 a. Define stack. Implement push and pop functions for stack using arrays with stackfull and stackempty conditions. (08 Marks)

b. Convert the following infix expression to postfix expression using stack.

((a / b) — c) + (d * e))— (a * c) (08 Marks)

Module-3

5 a. Give the node structure to create singly linked list of integer and write function to perform.

i) Create list

ii) Insert node at the end

iii) Delete first node

iv) Display all nodes. (08 Marks)

b. What are the disadvantages of doubly linked list over singly linked list? Illustrate with example. Write node structure of doubly linked list. (08 Marks)

OR

6 a. What a C program to implement linked stack? **(08 Marks)**

b. Write node structure for linked representation of polynomial. Explain algorithm to add two polynomial represented using linked lists. **(08 Marks)**

Module 4

7 a. What is a tree? Explain with suitable example: i) Binary tree ii) Skewed binary tree iii) Complete binary tree. **(07 Marks)**

b. Draw a binary tree for the following expression 3 + 4 * (7 — 6) / 4 + 3. Traverse the generated tree using inorder, preorder and postorder. Also write functions for each traversal. **(09 Marks)**

OR

8 a. For a given data, draw a binary search tree and show the array and linked representation of the same 100, 85, 45, 55, 110, 20, 70, 65. **(08 Marks)**

b. What is binary search tree? Write an algorithm to search given element in a binary search tree. **(08 Marks)**

Module-5

9 a. What is collision? What are the methods to resolve collision? Explain linear probing with an example. **(08** Marks)

b. What are the methods used for traversing a graph? Explain any one with example. **(08** Marks)

OR

10 a. Define graph. Differentiate between tree and graph. **(03 Marks)**

b. For the given graph, show adjacency matrix and adjacency list representation. (Ref.Fig.Q.10(b). **(05 Marks)**

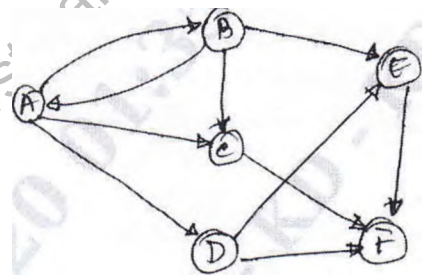

Fig.Q.10(b)

c. Briefly explain basic operations that can be performed on a file. Explain indexed sequential file organization. **(08 Marks)**