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Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Data Structures & Applications

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Differentiate between Structures and Unions with example. (05 Marks)
 b. Explain the functions supported by 'C' to carry out dynamic memory allocation. (05 Marks)
 c. Express the given sparse matrix as triplets and find its transpose and also write a fast transpose algorithm to transpose a sparse matrix

$$\begin{bmatrix} 15 & 0 & 0 & 22 & 0 & -15 \\ 0 & 11 & 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & -6 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 91 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 28 & 0 & 0 & 0 \end{bmatrix}$$

(10 Marks)

OR

- 2 a. How would you represent polynomial using array of structures and also write a function to as 2 polynomials. (10 Marks)
 b. Find the table and corresponding graph for the second pattern matching algorithm where the pattern is P = ababab. (10 Marks)

Module-2

- 3 a. Convert the following Infix expression to Postfix expression :
 (i) (((a/b) - c) + ((d*e)) - a * c) (ii) A - B | (C * D \$ E) (06 Marks)
 b. Write a function to evaluate Postfix expression. (08 Marks)
 c. Define Recursion and Evaluate A(1, 3) using Ackermann's function. (06 Marks)

OR

- 4 a. Explain with suitable example disadvantages of ordinary queue and how it is solved using circular queue, write functions for circular queue insertion and deletion. (10 Marks)
 b. Define stack. Give 'C' implementation of PUSH and POP functions. Include check for empty and full conditions of stacks. (06 Marks)
 c. Evaluate the following Postfix expression
 623 + - 382 | + * 2 \$ 3 + (04 Marks)

Module-3

- 5 a. Write 'C' function to perform the following :
 (i) Assume a four node single linked list with data value 15, 25, 40, 50
 (ii) Insert a node with data value 30 in between the nodes 25 and 40.
 (iii) Delete a mode with data value '40'.
 (iv) Search a mode with data value '25' (15 Marks)

- b. Write a note on linked representation of sparse matrix. Give linked representation of the

given sparse matrix
$$\begin{bmatrix} 0 & 5 & 3 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

(05 Marks)

OR

- 6 a. Write a note on Doubly linked lists and also write functions to insert at front and delete at front using D.L.L. (08 Marks)
 b. Write a function to add 2 polynomials using Single Linked lists. (08 Marks)
 c. Write a function to Concatenate 2 Single Linked lists. (04 Marks)

Module-4

- 7 a. With suitable example define the following :
 (i) Binary tree (ii) Full binary tree (iii) Almost complete B.T
 (iv) Strict Binary tree (v) Level of B.T (05 Marks)
 b. Create expression tree for the Postfix expression given below.
 AB/C*D*E+ and traverse the resulting expression tree using inorder and preorder traversals. (05 Marks)
 c. Write a note on Threaded Binary tree for a given Binary tree in Fig.Q7(c), Insert 'r' as a right child of 'S' in a Threaded Binary tree and write the function to insert (10 Marks)

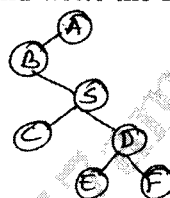


Fig.Q7(c)

OR

- 8 a. Define BST. Write a function to insert an item into BST. (10 Marks)
 b. Show that for any non-empty b-tree T, if n_0 is the number of leaf nodes and n_2 is the number of nodes of degree 2 then $n_0 = n_2 + 1$. (05 Marks)
 c. Write 'C' functions to illustrate copying of binary tree. (05 Marks)

Module-5

- 9 a. Define graph. Give adjacency matrix and adjacency lists for the graph given below Fig.Q9(a) :

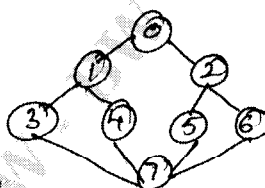


Fig.Q9(a)

(06 Marks)

- b. Write an algorithm for DFS, show BFS and DFS traversals for the graph given in Q.No.9(a). (10 Marks)
 c. Write a note on Hashing functions. (04 Marks)

OR

- 10 a. What is collision? What are the methods to resolve collision? Explain linear probing with an example. (10 Marks)
 b. Suppose 9 cards are punched as follows 348, 143, 361, 423, 538, 128, 321, 543, 366. Apply Radix sort to sort them in 3 phases and give its complexity. (10 Marks)
