CBCS SCHEME

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17CS/IS33

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.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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)**

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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)**

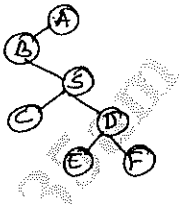

Fig.Q7(c)

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 than $n_0 = n_{2+1}$. **(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) :

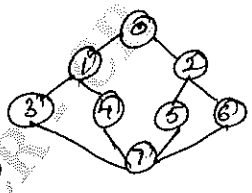

Fig.Q9(a) **(06 Marks)**

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)**

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