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Third Semester B.E. Degree Examination, June/July 2017

Data Structure and Applications

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Write a C program with an appropriate structure definition and variable declaration to read and display information about 5 employees using nested structures. Consider the following fields like Ename, Empid, DOJ (Date, Month, Year) and Salary (Basic, DA, HRA). (08 Marks)
- b. Give ADT of sparse matrix and show with a suitable example sparse matrix representation storing as triples. Give a sample transpose function to transpose sparse matrix. (08 Marks)

OR

- 2 a. What is a polynomial? What is the degree of the polynomial? Write a function to add two polynomials. (08 Marks)
- b. List and explain the functions supported by C for dynamic memory allocation. (04 Marks)
- c. Write a C program to concatenate Fname and Lname of a person without using any library function. (04 Marks)

Module-2

- 3 a. Define stack and write the ADT of stack. Implement push and pop functions for stack using arrays with StackFull and StackEmpty conditions. (08 Marks)
- b. What is an input restricted double ended queue? Implement the same with the supporting functions. (08 Marks)

OR

- 4 a. Write the postfix form of the following expression using stack:
 i) $(a + b) * d + e / (f + a * d) + c$ ii) $((a/(b - c + d)) * (e - a) * c)$ (04 Marks)
- b. Write a function to evaluate a postfix expression and trace the same for the expression $a/b - d * e + a * c$ where $a = 6, b = 3, c = 1, d = 2, e = 4$. (06 Marks)
- c. Explain with a suitable example, how would you implement circular queue using dynamically allocated arrays. (06 Marks)

Module-3

- 5 a. Give the node structure to create a linked list of integers and write C functions to perform the following:
 - i) Create a three node list with data 10, 20 and 30.
 - ii) Insert a node with the data value 15 in between the nodes having the data values 10 and 20.
 - iii) Delete the node whose data is 20.
 - iv) Display the resulting singly linked list. (10 Marks)
- b. Write a node structure for linked representation of polynomial. Explain the algorithm to add two polynomials represented using linked list. (06 Marks)

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.

OR

- 6 a. Write C functions to perform the following:
- Reversing a singly linked list.
 - Concatenating singly linked list.
 - Finding the length of the list.
- (06 Marks)
- b. List out the difference between the doubly linked list and singly linked list. Illustrate with example the following operations on a doubly linked list:
- Inserting a node at the beginning.
 - Inserting at the intermediate position.
 - Deletion of a node with a given value.
 - Search a key element.
- (10 Marks)

Module-4

- 7 a. Define binary trees. Explain the following with example:
- Complete binary tree
 - Skewed binary tree
 - Almost complete binary tree
 - Degree of a binary tree.
- (09 Marks)
- b. For the 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.
- (07 Marks)

OR

- 8 a. Draw a binary tree for the following expression $3 + 4 * (7 - 6) / 4 + 3$. Traverse the above generated tree using inorder, preorder and postorder. Also write a function in C for each one.
- (09 Marks)
- b. What is the advantage of threaded binary tree over binary tree? Explain the construction of threaded binary tree for 10, 20, 30, 40, 50.
- (07 Marks)

Module-5

- 9 a. Define graph. Write the difference between graph and trees. For the given graph, show the adjacency matrix and adjacency list representation of the graph. [Refer Fig.Q9(a)]

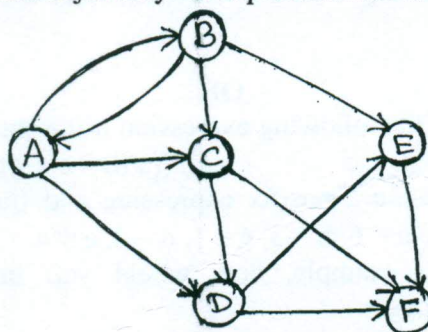


Fig.Q9(a)

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

OR

- 10 a. Write a C function for insertion sort. Sort the following list using insertion sort: 50, 30, 10, 70, 40, 20, 60.
- (08 Marks)
- b. What is collision? What are the methods to resolve collision? Explain linear probing with an example.
- (08 Marks)
