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17CS33

Third Semester B.E. Degree Examination, July/August 2022 Data Structures and Applications

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define data structures. Give its classifications. (05 Marks)
- b. Explain the functions supported by C to carry out dynamic memory allocation. Design a function to create 2D array dynamically. (10 Marks)
- c. Explain with example: i) Structures and Unions. (05 Marks)

OR

- 2 a. Define polynomial. How would you represent two polynomials using array of structures? Design a function to add two polynomials and store the result in the same array. (10 Marks)
- b. Construct an algorithm to sort 'n' integers using bubble sort and estimate its efficiency. (05 Marks)
- c. Design an algorithm to search pattern string 'p' in the text string 'T' using an automata. (05 Marks)

Module-2

- 3 a. Define stack. List and implement the different operations on stack. (10 Marks)
- b. Construct an algorithm to evaluate valid postfix expression and hence evaluate the postfix expression $623 + - 382/+ *$. All operands are single digit positive integers and operators are binary in nature. (10 Marks)

OR

- 4 a. Give disadvantages of ordinary queue and how it is solved in circular queue. Explain with suitable example how you would implement circular queue using dynamically allocated arrays. (10 Marks)
- b. Define Recursion. Design a recursive algorithm for the following:
 - i) Factorial of a given number
 - ii) Tower of Hanoi. (10 Marks)

Module-3

- 5 a. Give the node structure to create a singly limited list of integers and write a function to perform the following:
 - i) Create a two node list.
 - ii) Printing a list.
 - iii) To search an item in the list. (10 Marks)
- b. Write a C function to perform the following:
 - i) Reversing a singly linked list.
 - ii) Concatenating a singly linked list. (10 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. Explain with suitable 'C' representation, linked stack and linked queue. (10 Marks)
 b. Write a node structure for doubly linked list and write a function to perform the following:
 i) Insertion into a doubly linked circular list.
 ii) Deletion from a doubly linked circular list. (10 Marks)

Module-4

- 7 a. Define tree and write the
 i) List representation
 ii) Leftchild-right sibling representation
 iii) Representation as a degree-two tree.
 For the following tree.

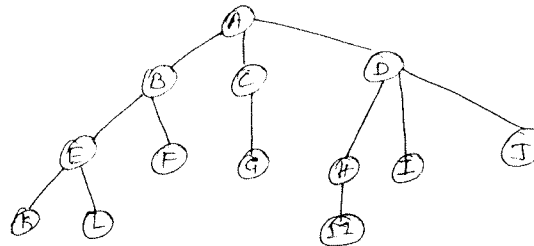


Fig.Q.7(a)

- (10 Marks)
 b. Write a node structure for binary tree, write a function to perform the following:
 i) Copying a binary tree.
 ii) Testing for equality of binary trees. (10 Marks)

OR

- 8 a. Define binary search tree. Design a function to perform the following:
 i) Recursive search of a binary search tree
 ii) Iterative search of a binary search tree. (10 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. (10 Marks)

Module-5

- 9 a. Write 'C' function for the following tree traversals:
 i) Preorder ii) Postorder iii) Inorder with reference to the given binary tree, write the three traversals. (10 Marks)

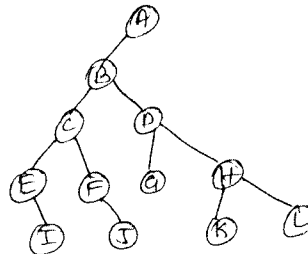


Fig.Q.9(a)

- b. Define graph, write the differences between graph and trees. Explain with example, different representation of graph. (10 Marks)

OR

- 10 a. Explain with example, different graph traversals methods. (10 Marks)
 b. Write a short note on Hashing. Explain any three popular Hash functions. (10 Marks)
