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17CS/IS33

Third Semester B.E. Degree Examination, July/August 2021
Data Structures and Applications

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. Define Data structure, classify them briefly. **(05 Marks)**
b. What is structure, how it is different from an array, how are they defined and initialized. **(05 Marks)**
c. Explain with examples about dynamic memory allocation functions. **(10 Marks)**

2 a. With example explain about self referential structures. **(05 Marks)**
b. What is pointer variable? How pointers are declared and initialized in C? Can we have multiple pointers to a variable? **(05 Marks)**
c. Write a C program to
i) Compare two strings
ii) To concatenate two strings. **(10 Marks)**

3 a. Define stack, list the application of stack. Write a C function to insert on element in stack and delete a element from stack. **(06 Marks)**
b. With suitable example explain infix postfix and prefix expression. **(06 Marks)**
c. Explain the evaluation of postfix expression 456 *+. Mention the rule for evaluation of postfix expression. **(08 Marks)**

4 a. Define Queue, explain the implementation of queue. **(06 Marks)**
b. State clearly problem of Tower of Hanoi. Write a program to solve this problem for 3 disks using the technique of recursion. **(08 Marks)**
c. Explain the following:
i) Dequeue ii) Priority Queue. **(06 Marks)**

5 a. Define list. Explain the representation of linked list in memory. **(05 Marks)**
b. Explain circular linked list and doubly linked list with example. **(10 Marks)**
c. List out operations performed on list explain any two of them. **(05 Marks)**

6 a. Define polynomial, explain the representation of polynomial. Write a C program to add two polynomial. **(10 Marks)**
b. What is sparse matrix? Write the tripelet form and linked list representation of sparse matrix given in below Fig. Q.6(b) and write the program. **(10 Marks)**

$$\begin{bmatrix} 0 & 0 & 3 & 0 & 4 \\ 0 & 0 & 5 & 7 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 6 & 0 & 0 \end{bmatrix}$$

Fig.Q.6(b) Sparse Matrix.

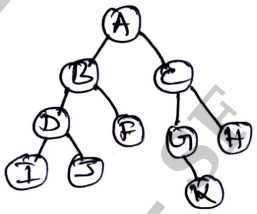
Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

7 a. Define the following with example:
   i) Binary tree
   ii) Complete binary tree
   iii) Binary search tree
   iv) Threaded binary tree. **(10 Marks)**

   b. Write C routine for In order Pre order and Post order traversal with example for each. **(10 Marks)**

8 a. Explain how to
   i) Insert a node into binary search tree
   ii) Searching a binary search tree. **(10 Marks)**

   b. For the tree given below write the In order Pre order and Post order traversal. **(06 Marks)**



   c. Construct a tree for post order traversal
   4, 12, 10, 18, 24, 22, 15, 31, 44, 35, 66, 90, 70, 50, 25 **(04 Marks)**

9 a. Define Graph. Explain the matrix and adjacency list representation of a graph with example. **(05 Marks)**

   b. Explain the following traversal methods:
   i) Breadth first search
   ii) Depth first search. **(10 Marks)**

   c. Explain Radix sort. **(05 Marks)**

10 Write a note on:
   a. File Attributes
   b. File Organization and Indexing
   c. Hashing
   d. Elementary graph operation. **(20 Marks)**

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