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BCA 4201

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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 41109 Roll No.

BCA Examination 2021-22

(Even Semester)

BASICS OF DATA STRUCTURE USING 'C'

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION–A

1. Attempt all parts of the following : 8×1=8

(a) What are linear data structure?

(b) Write the various operations that can be performed on different data structure.

(c) What is stack and where it can be used?

(d) List out the areas in which data structures are applied extensively?

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(e) For implementing heterogenous linked list, what type of pointer should be used?

(f) What are the notations used in evaluation of arithmetic expressions using prefix and postfix forms?

(g) How many null nodes will be there in a binary tree with 20 nodes?

(h) What is the complexity of bubble sort?

SECTION – B

2. Attempt any two parts of the following : 2×6=12

(a) How can you determine the size of an allocated portion of memory?

(b) Consider the following stack of characters where STACK is allocated N = 8 memory cells.

STACK : A, C, D, F, K, –, –, –

C – means empty cells

Describe the stack as the following operations takes place :

(i) POP (STACK, ITEM)

(ii) POP (STACK, ITEM)

(iii) POP (STACK, ITEM)

(iv) PUSH (STACK, R)

(v) PUSH (STACK, L)

(vi) PUSH (STACK, S)

(vii) PUSH (STACK, P)

(viii) POP (STACK, ITEM)

(c) Write a program to implement linear linked list showing all the operations that can be performed on a linked list.

(d) Write a C function :

(i) To insert an element at the rear end of queue.

(ii) To delete an element from the front end of queue.

OR

Write a recursive program to find out the height of a binary tree.

SECTION – C

Note :– Attempt all questions. Attempt any two parts from each questions. $5 \times 8 = 40$

3. (a) Consider a two dimensional array A of order [25 * 4]. The base address of array is 400, words per memory cell is 4. Find the address of A [12, 4] using row major and column major addressing.

(b) Write algorithm to delete an intermediate node from a singly linked list.

(c) Consider the following arithmetic expression P, written in post fix :

P : 12, 7, 3, –, 1, 2, 1, 5, +, *, +

Transform in infix notation.

(d) Explain bubble sort.

4. (a) WWhat is the use of array data structure.

(b) Write a program to implement a circular queue using arrays. Take into account the exceptions like queue full and queue empty.

(c) What are different typesof linked list? Write AC function to count number of elements present in SLL.

(d) Write C function for following tree traversal :

(i) In order

(ii) Pre order

(iii) Post order

5. (a) Differentiate between static and dynamic memory allocation.

(b) Evaluate :

P : 24, 14, 6, –, /, 4, 2, 10, +, *, +)

(c) Write a C function to sort a single linked list.

(d) Find the position of element 29 using binary search method in an array 'A' given below :

A : 11, 5, 21, 3, 29, 17, 2, 43

6. (a) A matrix B [10] [20] is stored in the memory with each element requiring 2 bytes of storage. If the base address at B [2] [1] is 2140, find the address of B [5] [4] when the matrix is stored in column major wise.

(b) Convert the following infix expression to its postfix form using stack :

$$A + B - C * D / E + F$$

Show diagrammatically each step of conversion using stack.

(c) Write a C function to insert and delete a node from the front end in case of DLL.

(d) Sort the following numbers in ascending order using insertion sort. Given numbers 348, 14, 614, 5381, 47 and the write the output after each iteration.

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