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15CS33

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Data Structures and Applications

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1   a. Explain the functions supported by C to carryout dynamic masonry allocation with example. **(06 Marks)**

   b. Summarize the advantages and disadvantages of using record oriented fixed length for storing strings. **(04 Marks)**

   c. Write a C program with structure definition and variable declaration to read and display information about 5 items using nested structures. Consider the following fields like, Itemcode, Itemname, Itemprice, Item expiring date (dd mm yy) **(06 Marks)**

OR

2   a. What is the degree of polynomial? With a C function to add 2(two) polynomials. **(08 Marks)**

   b. With a neat diagram, explain the linked representation of sparse matrix for Fig Q2(a)

$$\begin{bmatrix} 15 & 0 & 2 & 0 \\ 0 & 21 & 0 & 13 \\ 32 & 0 & 0 & 45 \\ 0 & 0 & 51 & 0 \end{bmatrix}_{4 \times 4}$$

   Fig Q2(b) sparse matrix **(05 Marks)**

   c. Differentiate structure and version. **(03 Marks)**

Module-2

3   a. Write a C program to implement stack operation. **(08 Marks)**

   b. Convert the following infix expression to postfix form using stack
   $(A + B \uparrow D)/(E - F) + G$. **(04 Marks)**

   c. Define Ackermann function and find the value of A(1, 3). **(04 Marks)**

OR

4   a. Write a C program to implement Oracular queue operations. **(08 Marks)**

   b. Evaluate the following postfix expression 3, 5, +, 6, 4 −, *, 4, 1, −,2, $\uparrow$, +. **(04 Marks)**

   c. Write a C program to implement Tower of Hanoi using recursion. **(04 Marks)**

Module-3

5   a. Write C functions to perform the following operations on singly linked list
      i)   Insert a node at the beginning of list
      ii) Delete a node at the end of list **(10 Marks)**

   b. Define the following terms with example
      i)   Doubly linked list
      ii) Circular singly linked list
      iii) Header linked list. **(06 Marks)**

OR

6   a. Write a C program to insert newnode at a specified position in a doubly linked list. **(08 Marks)**

   b. Write a C program to implement Queue operations using singly linked list. **(08 Marks)**

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Module-4

7 a. Draw the Binary Search Tree (BST) for the following data and transverse the tree in
   i) Inorder   ii) preorder   iii) postorder.
   14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17, 9, 14, 5 **(05 Marks)**

  b. Draw the binary tree to represent the following expression
   $A + (B - C) * (E - F)/G$. **(04 Marks)**

  c. Explain the following with example
   i) Complete Binary tree
   ii) Height of the tree
   iii) Skewed binary tree
   iv) Binary tree. **(07 Marks)**

OR

8 a. Construct the Binary Search Tree using inorder and preorder sequence :
   Inorder   :   Q   B   K   C   F   A   G   P   E   D   H   R
   Preorder :   G   B   Q   A   C   K   F   P   D   E   R   H
   (06 Marks)

  b. Write a C function to construct the BST. **(07 Marks)**

  c. What is the advantage of threaded binary tree over binary tree? **(03 Marks)**

Module-5

9 a. For the given graphs, show Fig Q9(a) the adjacency matrix and linked representation of the graph.
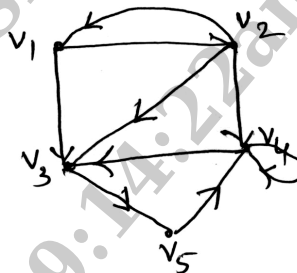

Fig Q9(a) **(06 Marks)**

  b. Explain hashing with an example. How do you resolve collision? **(06 Marks)**

  c. How does an append mode in a file opening differ from the write mode? **(04 Marks)**

OR

10 a. Draw the graph G, for information stored in memory as shown below :

NODE	A	B		E		D	C		Start = 1
NEXT	7	4	0	6	8	0	2	3	Avail = 5
ADJ	1	2		5		7	9		
	1	2	3	4	5	6	7	8	

Dest	2	6	4		6	7	4		4	6	
Link	10	3	6	0	0	0	0	4	0	0	Avail = 8
	1	2	3	4	5	6	7	8	9	10	

(06 Marks)

  b. Sort the following list of numbers using Radix sort
   366, 3481, 1432, 3618, 4235, 5380, 1289, 3211, 5437 **(05 Marks)**

  c. Summarize the features of relative file organization. **(05 Marks)**

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