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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, Master of Computer Applications (MCA)

Semester End Examination; June - 2017

Data Structures using C

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Define data structures. Write C function to concatenate two strings without using built-in functions. 6

b. Write C program to store *n* employee's information (name of employee, employee number, department name and salary). Display the details of employees working for a particular department. (Use structures and functions). 8

c. Assume each element of the array is stored in row major order occupies two units of storage. If '*a*' is declared by each of the following and the address of the first element of '*a*' is 100, find the address of the indicated array element : 6

(i) int a[100]; address of a[10] (ii) int a [10] [20]; address of a [0][0]

(iii) int a [10] [10]; address of a [3] [5] (iv) int a [10]; address of a[9].

2 a. What is abstract data type? Give ADT for rational numbers with following operations: making rational, add_rational, multiply_rational and equality_rational. 10

b. Write C program to store student's information (name, register number, three subject marks). Display student's details who have scored the highest score in the class (use structures and functions). 10

UNIT - II

3 a. Write a recursive C program for binary search. 5

b. Write a C function for evaluation of postfix expression. Evaluate the following postfix expression using algorithm: 62+2*697-/-. 10

c. What is Tower of Hanoi problem? Trace Tower of Hanoi for three disks. 5

4 a. Convert the following infix expression to postfix and prefix form : 6

(i) (A+B) * (C-D) (ii) A-B/(C*D$E) (iii) (9-8)$ (7/5$4).

b. Given an empty stack of size three, show the status of stack for the following operations : 5

(i) Pop (ii) Push 40, 30, 66, 55 (iii) Pop

(iv) Push 100, 200 (v) Pop.

c. Write C modules for Push, Pop and Display operations of stack. 9

Contd…2

UNIT - III

5 a. What is the advantage of circular queue over queues? Write C modules to implement operations on circular queue. 10

b. Write C modules for insertion, deletion and display operations for queue. 10

6 a. Write C modules for the following :

(i) Search key in a Singly Linked List 10

(ii) Create Circular Doubly Linked List.

b. Write C functions for the following :

(i) Display contents of Circular Singly Linked List 10

(ii) Delete a node in a Singly Linked List based on key.

UNIT - IV

7 a. Write a C program to search a number using linear search method. 9

b. Explain Indexed sequential search. 6

c. Write C function for searching using BST. 5

8 a. Define Binary search tree. Construct BST for the following data and carry out inorder, preorder and postorder traversals. Show the array memory representation of constructed BST. 10

Data: 14, 15, 4, 9, 7, 18, 3, -5, 16, 42.

b. What are hashing and hash collision? Explain two methods for resolving hash clashes. 6

c. Define strictly binary tree and complete binary tree. 4

UNIT - V

9 a. Write C program for sorting *N* strings using Insertion sort. Trace insertion sort for the following strings : 14

"Zoya", "Bhargavi", "Yasmin", " Dipak", "Asha", "Prashant" , "Deepika", "Ashoka".

b. Trace Radix sort for the following data : 6

251, 575, 482, 376, 121, 925, 869, 330.

10 a. Write C program to sort *N* numbers using Quick sort. 10

b. Explain the working of shell sort. Trace shell sort for the following data : 10

25, 57, 48, 37, 12, 92, 86, 33.

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