

--	--	--	--	--	--	--	--	--	--



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

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; Dec - 2016/Jan - 2017

Data Structures with C

Time: 3 hrs

Max. Marks: 100

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

### UNIT - I

- 1 a. What is a pointer? Show its usage in a C program. Explain the concept of static and dynamic memory allocation. 10
- b. By using one dimensional array, write a program in C to arrange numbers from 1 to 10 in ascending order. 10
- 2 a. Bring out the difference between a structure and union with an example. In what way structure is superior to union? 10
- b. In what way an algorithm help in design of a Data structure? Explain the concept of Data abstraction. What is the advantage of Data Abstraction? 10

### UNIT - II

- 3 a. Explain the operation of Stack and Queue with an example. Mention one application of Stack and Queue. 10
- b. Explain the storage of the expression  $(a*b) + (c*d) + (p*q*r*s)$  in stack and queue. 10
- 4 a. Convert  $(a*b) + (c*d)$  into prefix and postfix expressions. 10
- b. Show the Implementation of Stack and Queue by using one dimensional array with a valid example. 10

### UNIT - III

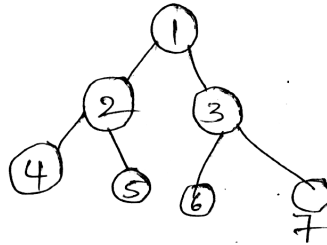
- 5 a. Show the numbers 1, 2, 3, 4, 5 in a singly and doubly linked list. Also show the above data representation in one dimensional array. 10
- b. For the below sparsed matrix, show the data storage in singly linked list and doubly linked list. 10

$$\begin{bmatrix} 2 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 2 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 1 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 & 1 \end{bmatrix}_{(7 \times 5)}$$

- 6 a. Show the representation of chains by using a standard C program. Show all header files in the program. 10
- b. Write a C program to represent a singly linked list. The list should have 'n' nodes. 10

**UNIT - IV**

7 a.



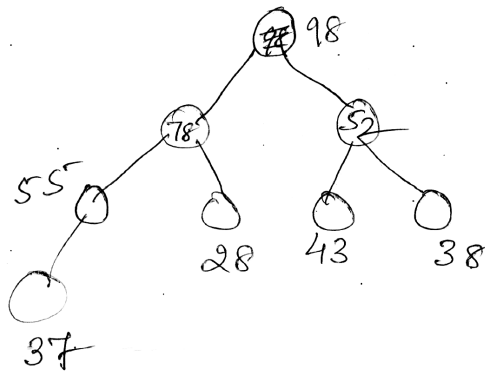
10

Show the Prefix, Post-fix and Infix traversals. Data is shown in nodes in the above diagram. Represent the Data in one dimensional array (assume data elements).

b. Compare the operation of a heap and a binary tree with example trees. Show a min heap and a max heap with 6 data elements.

10

8 a.



10

- (i) Insert 87 in the above heap
- (ii) Delete 98 in the above heap after insertion of 87.

b. Build a heap by using following data elements,  
8, 20, 9, 4, 15, 10, 7, 10, 7, 22, 3,12.

10

**UNIT - V**

9 a. Why Optimal search tree is known as efficient Binary search Tree? Draw a standard AVL Tree.

10

b. List two applications of AVL Trees. What are its advantages?

10

10 a. Show a Red Black Tree with 10 data elements. What is the concept of Red Black Trees?

10

b. Why a splay tree is used? Compare the usage of AVL trees and splay trees.

10

\* \* \*