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

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, B.E. - Information Science and Engineering

Semester End Examination; Dec - 2016/Jan - 2017

Data Structure

Time: 3 hrs

Max. Marks: 100

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

UNIT - I

- 1 a. Define stack with an example. 4
- b. Implement push and pop functions for stacks using arrays. 8
- c. Convert the following postfix expression to infix and prefix expressions,
 - i) $AB + C * DE - FG + \$$ 8
 - ii) $ABC DE \$ * / -$
- 2 a. Define recursion. List the types of recursion and write a recursive function to implement 'Tower of Hanoi'. 8
- b. Convert the infix expression to postfix expression, $A \$ B * C - D + E / F / (G + H)$.
Write a C function to evaluate postfix expression and apply the same to evaluate. 12
 $A = 5, B = 6, C = 4, D = 3, E = 9, F = 3, G = 2, H = 1.$

UNIT - II

- 3 a. Differentiate between singly linked list and doubly linked list. 4
- b. Write a C function to implement circular singly linked list. 8
- c. Implement the insert and delete operation on a queue using linked list. 8
- 4 a. Write a C function to insert a node at front and rear end in a circular linked list. 10
- b. Explain Dynamic memory allocation and deallocation with examples. 6
- c. Write a C routine to delete a node from a DLL. 4

UNIT - III

- 5 a. Explain the reversing of a string using doubly linked list with a C routine. 10
- b. Write a C function to add two polynomials using singly linked list. 10
- 6 a. Explain the three primitive operations that can be applied to a queue. 10
- b. Explain the implementation of priority queues for insertion and deletion. 10

UNIT - IV

- 7 a. Write C routines to traverse a binary tree in preorder and post-order. 10
- b. Using node representation of binary trees, implement binary tree operations in C. 10
- 8 a. Illustrate the following expression and its tree representations:
 $-(A + B) * (C + \log(D+E!)) - f(G, H, I, J)$ 10
Show the general traversal of the trees.

- b. Write a recursive procedure that accepts a pointer to an expression tree and replaces the tree with a tree node containing numerical result of the expression's evaluation. 10

UNIT - V

- 9 a. Illustrate Quicksort with a program to sort a list of N numbers. 10
- b. Write the method involved in Binary tree sort and write a C routine to sort an array of n elements using Binary tree sort. 10
- 10 a. Illustrate sentinel search with example. 10
- b. Write a C routine to search for a given key using ordered list search. 10

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