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

(An Autonomous Institution affiliated to VTU, Belgaum)

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

Semester End Examination; Dec. - 2015

Data Structures

Time: 3 hrs

Max. Marks: 100

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

UNIT - I

- 1 a. Explain the classification of data structures. Give any two examples for each type. 6
- b. Write a function to convert parenthesized infix expression to postfix form and trace the stack contents for the expression $(A-(B+C))*D^(E+F)$. 10
- c. Consider a stack called 'S' write the sequence of push and pop operations for 5 elements. 4
- 2 a. Evaluate the following expressions by applying evaluation algorithm and tracing the stack contents for $A = 1, B = 2, C = 3, D = 4, E = 5, F = 6, G = 7, H = 8$ and $I = 9$ (Consider real arithmetic) 10
 - i) $++A - *BCD / +EF *GHI$
 - ii) $+ - / ABC * D ** EFG$
- b. What are the advantages and disadvantages of using recursion? Explain. 6
- c. Write a recursive function to find the largest of 'N' elements in an array. 4

UNIT - II

- 3 a. What do you mean by dynamic memory allocation? Explain with syntax, different functions used for this. 8
- b. What are the advantages and disadvantages of linked representation over array representation? 4
- c. Write a function to insert a new node by position into a circular single linked list with header node. Define the node structure to handle list of integers and initialize the empty list. 8
- 4 a. What are header nodes? Explain with an example, how header nodes are useful in linked list. 6
- b. Write routines to perform the following operations using circular double linked list with header node by defining the node structures to handle list of integers and initializing the empty list, 14
 - i) To insert a new node to the immediate right of k^{th} node.
 - ii) To delete a node from the immediate left of k^{th} node.

UNIT - III

- 5 a. Explain with an example, how polynomials of three variables are represented using linked list. 4
- b. Write a function to reverse a given linked list. 4
- c. Write a program to read, display and evaluate a given polynomial by defining the node structure to store polynomial terms of two variables. 12
- 6 a. Write a program to implement double ended queue by defining Queue structure to maintain Queue of integers. 10
- b. Write a program to implement priority Queue by defining Queue structure to maintain queue of integers. 10

UNIT - IV

- 7 a. Discuss with an example for each, the different storage representations of Binary trees. 10
- b. Construct and write the inorder and preorder traversals for the same, 10
- i) $A B + C D E \$ *$
- ii) $6 3 2 - 5 * + 2 \$ 3 +$ (Single digit + ve operands)
- 8 a. Write recursive functions to perform the following operations on a Binary tree, 6
- i) To count the number of leaf nodes
- ii) To find the height of the tree
- b. Construct the Binary search tree for the sequence of input 100, 200, 50, 90, 300, 150, 25, 180, 80, 140, 30, 25 4
- c. What are Threaded binary trees? Explain with example, its different types. 10

UNIT - V

- 9 a. Write a program to sort the given elements using Quick sort method. 10
- b. Write a program to sort the given elements using Heap sort method. 10
- 10a. Write a program to search an element using sentinel search method. 10
- b. Write a program to search an element using ordered list search method. 10

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