Parvatibai Chowgule College of Arts and Science
Autonomous

B.Voc Semester End Examination, April 2018

Semester: II

Subject: Software Development

Title: Data Structures

Duration: 2 Hours Max. Marks: 45

Instructions: 1. All questions are compulsory
2. Figures to the right indicate marks

Q1. Answer <u>ANY THREE</u> of the following. **(9)**

1. Explain with a diagram how numbers are stored in a low level array.
2. What is asymptotic analysis? Explain with an example big-oh notation.
3. What is a circular queue? State any one difference between a stack and a queue.
4. State any three differences between a queue and a tree data structure.

Q2. Answer <u>ANY TWO</u> of the following. **(12)**

1. Solve the following using a stack
    a. Convert the following infix expression to postfix.
        i. (a+b/(c*d-(e+f)))
    b. Evaluate the following postfix expression
        i. 3 3 9 / + 3 3 * 3 7 - + -
2. What is a linked list data structure? Why is self used in class methods? Write python code to define a node class.
3. Write python code for the following
    a. Define a node class for a binary search tree.
    b. Define a function search(). This function searches for a number in the binary search tree. If the number is found, ‘Found’ is printed else ‘Not Found’ is printed to the console.

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Q3. Answer ANY TWO of the following. **(12)**

1. Explain the two fundamental operations of a stack. Using a stack write an algorithm to reverse a string.
2. What is the difference between a dynamic queue and a circular queue. Write python code for the following functions of a circular queue
    a. isEmpty(): Prints 'Yes' if the circular queue is empty
    b. length(): Prints the number of elements in the queue
    c. first(): Prints the first element of the queue
    d. last(): Prints the last element in the queue.
3. What is a doubly linked list? Write python code for the following doubly linked list functions.
    a. insertFirst(): Insert a node at the start of the linked list
    b. insertBack(): Insert a node at the end of the linked list
    c. display(): Display the linked list in reverse.

Q4. Answer ANY ONE of the following. **(12)**

1. Explain the following graph traversals with an example
    a. BFS - Breadth First Search
    b. DFS - Depth First Search
2. Explain the tree data structure with an example. Consider the following numbers 70, 200, 50, 40, 60, 30, 20, 35, 69
    a. If the above numbers are added sequentially into a binary search tree, draw the resulting tree.
    b. Draw the tree after 50 is successfully deleted from the tree.
    c. Draw the tree after 40 is successfully deleted from the tree.
    d. Write code to display the binary search tree in pre-order and post-order.

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