



☐ Sessional 1 ☐ Sessional 2 ☒ Terminal Examination

Fall 2016

|                     |                                                                          |       |               |               |                                              |        |        |
|---------------------|--------------------------------------------------------------------------|-------|---------------|---------------|----------------------------------------------|--------|--------|
| Course Title        | Data Structures and Algorithms                                           |       |               | Course Code   | CSD 202                                      | Credit | 4(3,1) |
| Course Instructor/s | Dr. Ghulam Rasool, Dr. M. AksamIftikhar, Mr. Imran Latif, Ms Humera Niaz |       |               | Program Name  | BS Computer Science, BS Software Engineering |        |        |
| Semester            | 3 <sup>rd</sup>                                                          | Batch | FA15-BCS, BSE | Section       | BCS(A,B&C), BSE(A, B&C)                      | Date   |        |
| Time Allowed        | 03 Hour                                                                  |       |               | Maximum Marks | 100                                          |        |        |
| Student's Name      | Hafiz Abdul Waffay                                                       |       |               | Reg. No.      | FA15-BSE-035                                 |        |        |

Question 1.

[Marks 4+8+8=20]

- What is the difference between an array and a stack?
- Write an algorithm that converts an infix expression into postfix notation.
- Write an algorithm or a program for deletion in a Circular Queue.

Question 2.

[Marks 6+6+8=20]

- Consider a singly circular linked list. Write down an algorithm to
  - Insert an element at the end of the linked list.
  - Delete an element from beginning of the list
- Identify the most appropriate type of linked list for implementing following data structures in terms of efficient memory and computation requirements
  - Stack using linked list
  - Queue using linked list

[3+3 = 6]

Also identify the operations on linked list needed to efficiently support the push/pop operations for stack and enqueue/dequeue operations for queue.

[3+3=6]

- Consider a double-ended singly linked list. Write down an algorithm/pseudocode to swap the second element (pointed by 'second') and last (pointed by 'tail') element of the list. However, the swapping should be performed by exchanging the links of nodes, rather than data. The integrity of the list should be maintained after the swapping operation. (Hint: You need an extra pointer to second last element to perform the exchanging of links.)

[8]



Question 3.

Marks: [10+4+6=20]

Consider the binary search tree that is shown below and write algorithm that should traverse a tree using In-Order, Pre-Order and post-order traversal method and also perform in-order, pre-order and post-order tree traversal. [3+3+4=10]



B. Write an algorithm to insert a new node in the max heap.

[4]

C. Define Heap. Give two different reasons to explain why the following binary tree is not a heap. [3+3=6]

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      91
     /  \
    77   46
   /  \  /  \
  13  3 68  81 11
  
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Question 4.

[Marks: 8+3+9=20]

A. Show step by step procedure for sorting following data items stored in an array using selection sort technique. [8]

2 9 5 7 4 8

B. Suppose, you have a large volume of data for sorting. Which sorting algorithm you will prefer and why? [3]

C. Write an algorithm or a program that takes as input a list of n distinct integers and finds the location of the largest even integer in the list or returns 0 if there are no even integers in the list. [9]

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