



Terminal Examination – Semester Fall 2017

Course Title:	Data Structure and Algorithms	Course Code:	CSD202(Th)	Credit Hours:	4(3,1)
Course Instructor:	Humera Faisal	Programme Name:	BCS		
Semester:	3 rd	Batch:		Section:	A & D
Date:				Date:	13-01-2018
Time Allowed:	3 Hours			Maximum Marks:	100
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Important Instructions / Guidelines:					
• Use proper indentation, comments, naming conventions and self-explanatory names if you want to secure better marks.					

Question #1:

Marks: 5+5+5+5=20

- Explain how to implement two stacks in one array $A[1..n]$ in such a way that neither stack overflows unless the total number of elements in both stacks together is n .
- What is Priority queue, also explain why array data structure is not suitable for the implementation of priority queue.
- Execute your algorithm to convert an infix expression to a post fix expression with the following infix expression as input
 $Q = [(A + B)/(C + D) - (E / F)] + (G + H) / I$
- Consider an array $A[20, 10]$. DATA is stored in memory in 'row-major order'. Assume 4 words per memory cell and the base address of array A is 100. Find the address of $A[11, 5]$.

Marks: 6+6+8=20

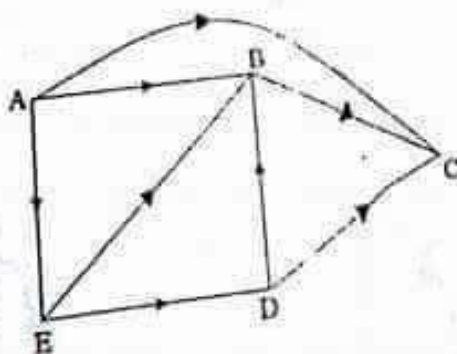
Question #2:

- Write an algorithm that inserts a node immediately after the "current" node.
- Write an algorithm that deletes the "current" node from a doubly linked list.
- Delete nodes which have a greater value on right side.

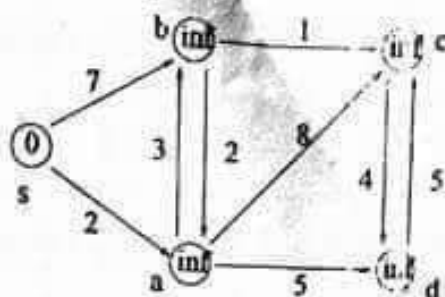
Marks: 3+7+10=20

Question #3:

- Differentiate between graph and tree data structures.
- Define Graph. What are the different ways of representing a graph? Represent the following graph using those ways.



- c) S, a, b, c, and d are 5 data items having their respective distances given in the diagram, show in each step how to construct the shortest path using Dijkstra algorithm: S considered as source node.



Question #4:

Marks: $(4+2+2+2)+(5+5)=20$

- a) Make a BST for the following sequence of numbers. And Traverse the tree in Preorder, Inorder and postorder.

45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48

- b) Build a min heap tree H from the following list of numbers: Show each step separately:

79, 12, 38, 10, 4, 17, 25, 15

- c) Write an algorithm for the merge sort procedure.

Question #5:

- a) Apply Quick Sort algorithm on the following data to sort in ascending order

54, 26, 93, 17, 77, 31, 44, 55, 20

- b) Write an algorithm for binary search technique.

- c) What do you mean by hashing? The following values are stored in a hash table

25, 42, 96, 101, 102, 162, 197

Describe how the values are hashed by using division method of hashing with a table size of 10. Use chaining as the method of collision resolution.

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