



COMSATS University Islamabad, Lahore Campus

Mid Term Examination – Semester FALL 2021

Course Title:	Data Structure and Algorithm			Course	CSC211	Credit	4		
Course	Dr. Atif Saeed			Program Name:	BCS				
Semester:	4th	Batch:	SP20-BCS		Date:	20-11-2021			
Time Allowed:	90 Minutes			Maximum Marks:	25				
Student's Name:	muhammad moaz ahmed			Reg. No.	SP20-BCS-141				

Important Instructions / Guidelines:

- All questions are compulsory
- Understanding of the questions are part of the paper.
- Read the question paper carefully.
- Any sort of misconduct/misbehave during exam will not be tolerated.
- Cheating from other student or late submission of exam in any case will be marked zero.

Question #	1	2	3	4					Total
Total Marks	8		5	4					25
Obtained Marks									

Q.1 Write a program in C++ that will perform the following operations in a link list?

1. Display the frequency of a given integer (entered by a user) in a Link List?
2. Search the element (entered by a user) in a link list? $(4+4=8)$

Sample Outputs should be like this:-

1. Input: 5 -> 9 -> 0 -> 1 -> 24 -> 5 -> 20 -> 10

Given Integer = 5

Output: 5 occurred at 2 times.

2. Input: 5 -> 9 -> 0 -> 1 -> 24 -> 5 -> 20 -> 10

Given Integer = 24

Output: Element found

Q.2 Write a program in C++ that will remove the duplicate values in an unsorted array of 10 elements. (6)

Q.3 Convert the following in- fix expression into post- fix by applying stack rules. (6)

Explain the steps used during conversion.

$$((A + B) * (C - E)) / (F + G)$$

Q.4 Write a function that reverse the first K elements of a Queue of 10 elements. (5)

Sample Output should be like this:-

Input: A=[10, 20, 30, 40, 50, 60, 70, 80, 90, 100]

K=5

Output: A=[50, 40, 30, 20, 10, 60, 70, 80, 90, 100]



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Terminal FALL- 2021

Course Title:	Data Structure and Algorithms			Course Code:	CSC211	Credit Hours:	4(3,1)						
Course Instructor/s:	Dr. Atif Saeed / Humera Niaz			Programme Name:	BS Computer Science								
Semester:	4 th	Batch:	SP20-BCS	Section:	B	Date:	Jan 3, 2022						
Time Allowed:	3 hours			Maximum Marks:	75								
Student's Name:	M. Moaz Ahmed			Reg. No.	SP20-BCS-141								
Important Instructions / Guidelines:													
• Answer all questions. Be very brief & precise. Manage your time accordingly.													

Question 1:

Marks: 5+5+5 = 15

- How to implement a stack using one or two queues by modification their enqueue and dequeue operations.
- The result of evaluating the postfix expression $10\ 5\ +\ 60\ 6\ /\ *\ 8\ -$ will be?
- The postfix form of the expression $A*(B+D)/E - F*(G+H/K)$ is

Question 2:

Marks: 5+5+5 = 15

- Write an algorithm that insert a new value at the rear end of linear queue.
- Describe the overhead of implementing a priority queue with arrays.
- Apply Quick/Insertion sort on a given array 54, 26, 93, 17, 77, 31, 44, 55, 20
What is the sequence of array after first pass.

Question 3: Write pseudo code for the following

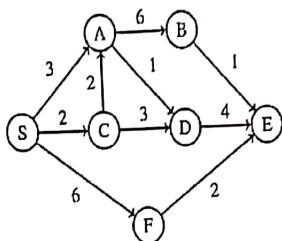
Marks: 5+5+5 = 15

- To insert a new node at some specified position in doubly linked list.
- To find the minimum value from unordered linked list
- To find the sum of all the nodes that is present in a linked list.

Marks: $5+5+5 = 15$

Question 4:

- a) Using the following graph find the shortest path (Start vertex S) by dijkstra algorithm also showing each step of the algorithm.



- b) By using the following matrix, construct a graph and draw the list representation.
adjacencyMatrix

	1	2	3	4	5	6
1	0	1	0	0	0	0
2	1	0	1	1	0	0
3	0	0	1	0	0	0
4	1	0	1	0	0	0
5	0	0	0	0	0	1
6	0	0	0	0	0	0

- c) Write any algorithm for printing all the vertices starting from a given vertex in a graph.

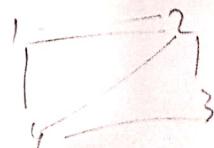
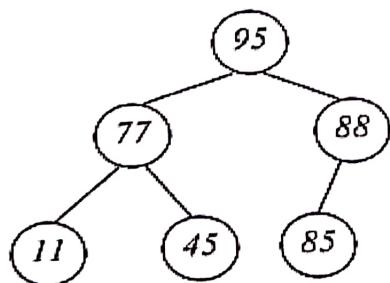
Marks: $3+4+3+3+2 = 15$

Question 5:

- a) While inserting the elements 71, 65, 84, 69, 67, 83 in an empty binary search tree (BST) in the sequence shown, the element in the lowest level is

(BST) in the sequence shown, the element in the lowest level is

- b) Consider the following max-heap for the following questions.



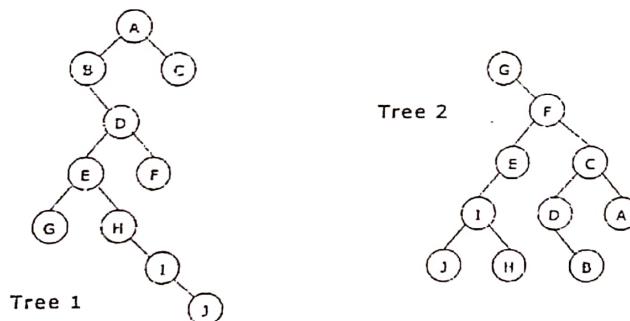
- a. Draw the corresponding array of the heap.

Index	0	1	2	3	4	5	6	7	8	9
Data										

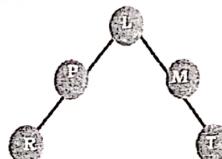
- b. Show the contents of the array after 105 is inserted into the heap.

Index	0	1	2	3	4	5	6	7	8	9
Data										

- c) Which traversal of tree1 and tree2 will produce the same sequence of node names



- d) Figure below is a balanced binary tree. If a node inserted as child of the node R, how many nodes will become unbalanced?



- e) What is the maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0.

In

B G E H I J D F A C

Pre

A B D E G H I J F C

G D I H E F D B C A

G F E I J H C D B A

J H I E B D A C F G