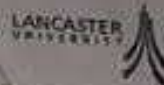




COMSATS - Lancaster Dual Degree Programme
COMSATS Institute of Information Technology Lahore



Terminal Examination – Semester Fall 2014

Course Title:	Data Structure and Algorithms	Course Code:	CSC114	Credit Hours:	(3,1)
Course Instructors:	Dr. Ghulam Rasool, Dr. Ghulam Mahdi, Dr. Farukh Zohra, Miss Sahar Anwar, Miss Mahroosh Fatima	Programme Name:	BS Computer Science/BS Software Engineering		
Semester:	III	Batch:	FA13	Section:	A,B&C
Time Allowed:	03 Hours		Date:		
Student's Name:	Kauf David		Maximum Marks:	100	
Reg. No.	POP FA13-034-013				

Important Instructions / Guidelines: Use proper indentation, comments, naming conventions and self-explanatory names if you want to secure better marks.

Q.1

[Marks 05+02+03+10 = 20]

- Write an algorithm that should calculate the product of even numbers from a 2-d array named as My_Array of M rows and N columns.
- Briefly explain stack? Describe at least three applications where stack is used.
- Write pseudo code of an algorithm for inserting a data element ITEM in a circular queue CIRQ_QUEUE.

Q.2

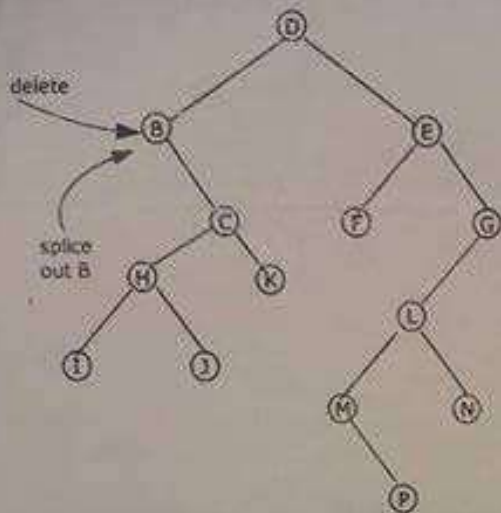
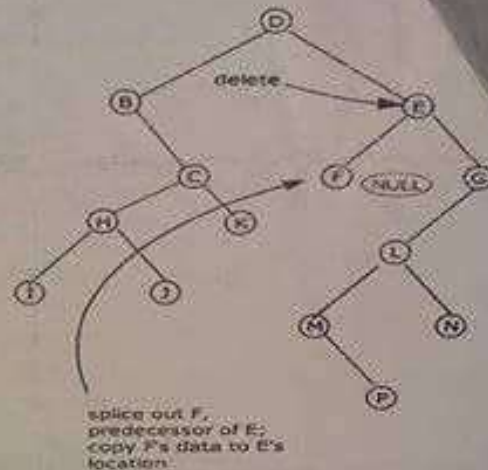
[Marks 03+03+06+08 = 20]

- The following figure uses a 2D array to simulate linked-list (First column stores data and second column stores next pointer). Initial head pointers of two lists are mentioned as First_list_start and Second_list_start. Based on the figure, answer the following question

	node	data	next
	[0]	66	-1
	[1]	29	-1
	[2]	9	0
First_list_start →	[3]	33	8
	[4]	11	3
Second_list_start →	[5]	15	9
	[6]	7	2
	[7]	18	4
	[8]	21	6
	[9]	48	7

- If we run `traverse()` on the First_list, what is the output supposed to be? [03 Marks]
- If we run `traverse()` on the second_list, what is the output supposed to be? [03 Marks]

- b. Write down an algorithm to delete data in BST in such a manner that it shrinks into a BST. There can be following scenarios, if the node to delete is leaf then tree shrink is simple otherwise outputs of tree shrink:



Q 4:

[Marks 10+10 = 20]

- a. Write an algorithm/program for the following function to search a value Num in $O(\log(n))$ time in a sorted array of size N.

bool search(int Num/Array[], int N, int Num)

{

- b. Show every step of sorting of "in-place" sorting algorithm for the given values?

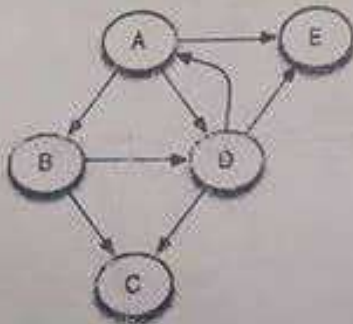
[10 Marks]

65	70	75	80	85	60	55	50	45
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Q.5

[Marks 10+10 = 20]

- a) Define DFS and BFS graph traversal methods. Traverse the following graph using DFS and BFS methods. Show only results of traversal methods.

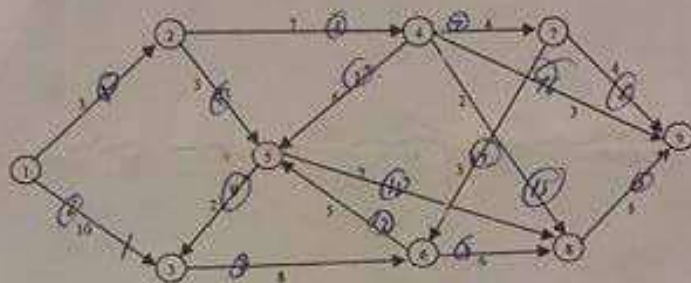
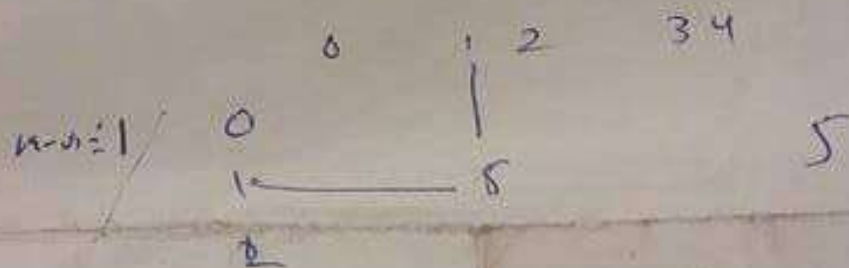


FACTORIAL Using Recursion

Date: _____

2

b) Find the shortest paths from node 1 to all other nodes for the following graph using Dijkstra Algorithm.



if (adj[i][j] % 2 == 0)

{
 mul = mul * adj[i][j]
 1 * 2

}