United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

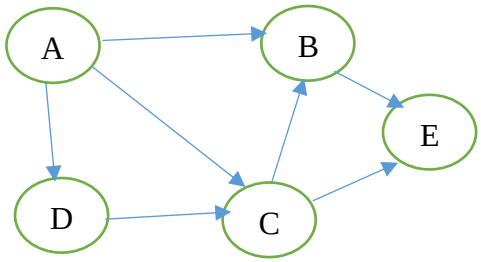
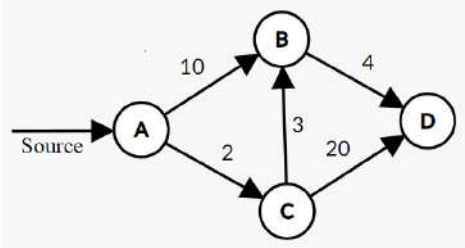
Final Exam Year: 2019 Trimester: Summer

Course: CSI 217 Data Structures

Marks: 40 Time: 2 hours

There are FIVE questions. Answer all of them. Figures in the right-hand margin indicate full marks.

1.	a)	What are the merits of doubly linked list over linear linked list? OR What are the merits of a circular queue over a normal one?	[1]
	b)	Suppose you have a double linked list which starting node is pointed by a pointer named "head" and ending node is pointed by another pointer named "tail". Now develop an algorithm that finds the middle node of the list. OR Discuss a case where Binary Search Tree searching and insertion will take O(n) time	[2]
	c)	Design an algorithm to display the contents of a QUEUE implemented by an array.	[2]
	d)	Assume some people are waiting for bus tickets in a line, where special people will get more priority. Now answer the following questions: i) Which data structure you suggest to implement it? ii) Design it using your data structure? iii) Write algorithms to provide service for the people?	[3]
2.	a)	Show the simulation (Recursive call sequences and corresponding output) of Tower of Hanoi for the number of disks, n = 4 and the starting peg A, destination peg B and auxiliary peg X. OR Given an adjacency matrix of a graph, write a code to find out the maximum number of neighbours/adjacent nodes that any vertex has in that graph. Your function will return the maximum value.	[4]
	b)	Convert the infix expression: (a+b-c*d)/a*(e-f/b*e)-f*g into corresponding postfix expression using stack. Evaluate the expression for the given value: a = 5, b = 7, c = 2, d = 1, e = 5, f = 20, and g = 2. OR Suppose you have a student database containing name, id and marks of the students. How would you sort the database according to the marks of the students?	[4]
3.	a)	Draw the following graphs i) Weighted and Unweighted ii) Cyclic and Acyclic iii) Directed and Undirected iv) Complete binary tree and Balanced binary tree	[2]
	b)	Suggest data structures for representing a binary tree. Show relation of left and right children with respect to father.	[2]
	c)	Construct the binary search tree for the following traversal sequence. Preorder: ABDEFCGH In-order: DBFEACHG	[2]
	d)	Write an algorithm to determine the level of each of the nodes in a binary tree	[2]

4.	Consider the values: 500, 20, 1, 50, 2, 60, 60, 60, 0, 10.		
	a)	Now develop a binary search tree (BST) using those values.	[1]
	b)	Write the pre-order, in-order and post-order traversal for the BST in question 4(a).	[3]
	c)	Show the tree after deleting the value: 500, 50 and 10 (each deletion is applied on successive resultant tree).	[2]
	d)	Construct an algorithm that search a particular value in BST.	[2]
5.	a)	Insert the values: 26, 51, 24, 15, 33, 18, 17, 79 into a hash table of eleven slots using following hash function: h(k) = (Rev(k + 1) mod 11) Here, function Rev(k) reverses the decimal digits of k, for example, Rev(37) = 73	[2]
	b)	If any conflict is occurred during the construction of hash table in 5(a), resolve it by the separate chaining method.	[1]
	c)	Answer the following questions for the graph given below  i) Show adjacency list and matrix for the above graph. ii) Simulate the graph above for BFS algorithm. iii) Find a topological order from the graph above. OR Find the shortest path in the following graph and just mark it in the graph. You don't have to write any code.  	[1] [2] [2]