

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination February 2022 (Re-Test)
B. Tech in Computer Science Engineering, Semester III (CSE+EEE)

Roll No.....

CS1102: DATA STRUCTURES

Time: 3 hours

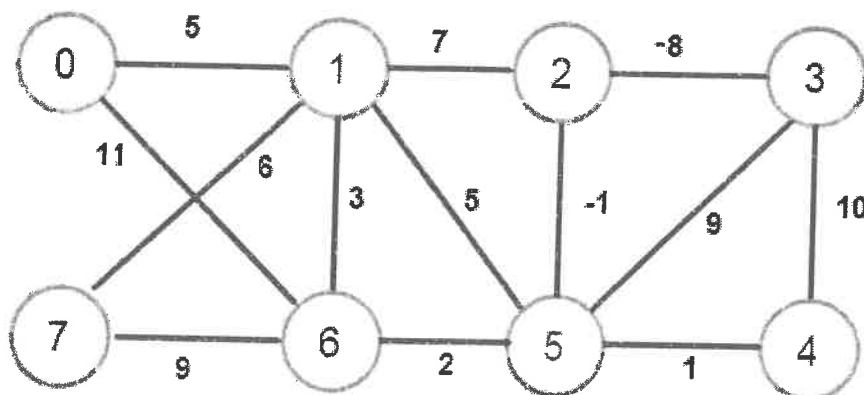
Max. Marks: 25

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

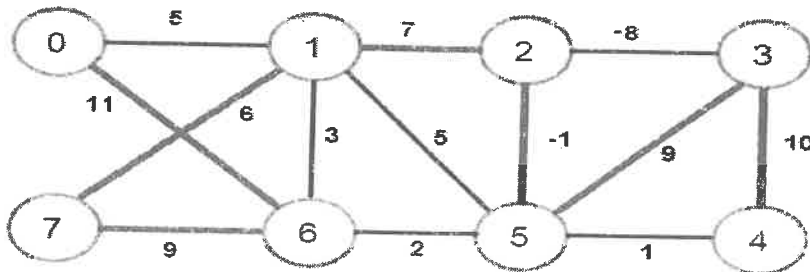
Q.1 I Given a weighted undirected graph, Write JAVA Method/Algorithm that will find the maximum cost path from a given source to any other vertex in the graph which is greater than a given cost. The path should not contain any cycles. 04

For example, consider the following graph,



Let source = 0 and cost = 50.

The maximum cost route from source vertex 0 is 0-6-7-1-2-5-3-4, having cost 51, which is more than cost 50. The solution should return 51.

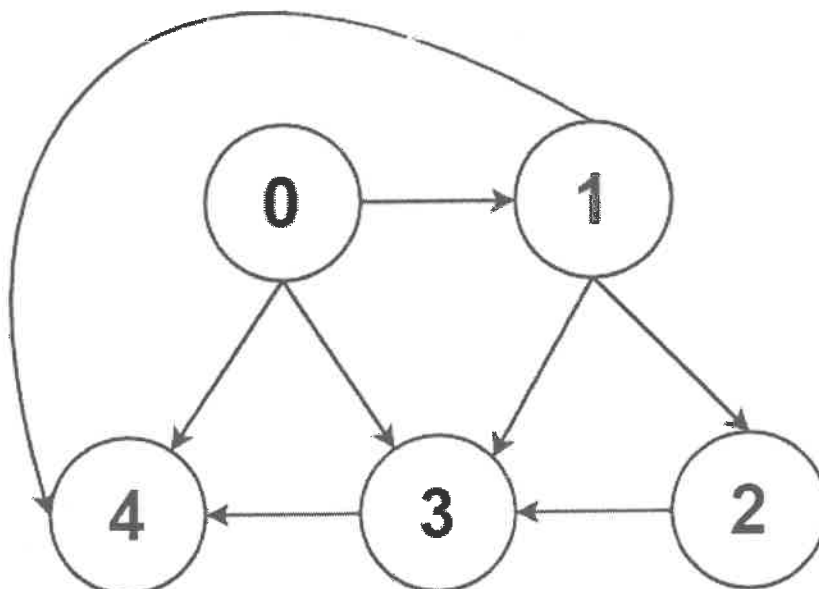


Q.1 II	Given a string s, write Java Program or Algorithm that will find the length of the longest substring without repeating characters. Example 1: Input: s = "abcabcbb" Output: 3 Explanation: The answer is "abc", with the length of 3. Example 2: Input: s = "bbbbbb" Output: 1 Explanation: The answer is "b", with the length of 1. Example 3: Input: s = "pwwkew" Output: 3 Explanation: The answer is "wke", with the length of 3. Notice that the answer must be a substring, "pwke" is a subsequence and not a substring.	04
-----------	--	----

Q.2	Given a directed acyclic graph (DAG) of n nodes labeled from 0 to n - 1, find all possible paths from node 0 to node n - 1 and return them in any order. Write JAVA method for this and calculate time complexity of your solution.	04
-----	--	----

The graph is given as follows: graph[i] is a list of all nodes you can visit from node i (i.e., there is a directed edge from node i to node graph[i][j]).

Example: source 0 Destination 4

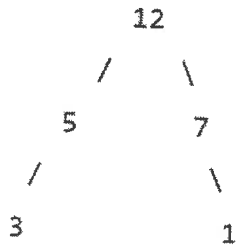


Input: graph = [[4,3,1], [3,2,4],[3], [4], []]

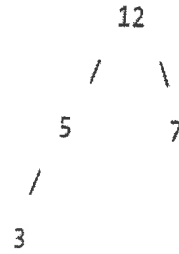
Output: all possible path from 0 to 4 are-

0->4 0->3->4 0->1->3->4 0->1->2->3->4 0->1->4

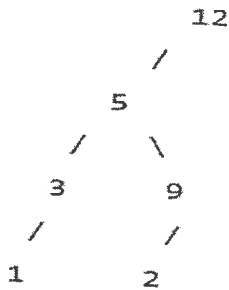
Q.3	Write a JAVA program which will check if all leaves are at same level or not for the given Binary Tree. Also Mention time and space complexity of your code	04
-----	--	----



Output: Leaves are at same level



Output: Leaves are Not at same level



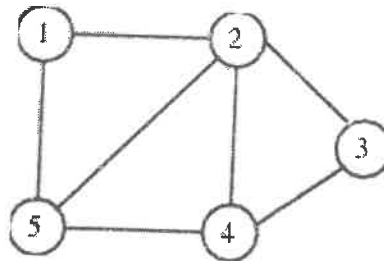
Output: Leaves are at same level

OR

- Q3. Write Java Program to count and print cycles in the Graph using Graph traversal techniques.

04

Input -



Output-

1->2->5->1

2->5->4->2

3->4->2->3

- Q4. Given a sorted array `arr[]` of distinct integers. Write Java Method that will sort the array into a wave-like array and return it in other words, arrange the elements into a sequence such that $arr[1] \geq arr[2] \leq arr[3] \geq arr[4] \leq arr[5]$.

05

Example 1-

Input:

$N = 7$

Input: `A[] = [4, 2, 9, 1, 21, 43, 24]`

Output A[]: [2, 1, 9, 4, 24, 21, 43]

Explanation: In the above example, you can see $2 \geq 1 \leq 9 \geq 4 \leq 24 \geq 21 \leq 43$.

Example 2-

N=6

Input: A[] = [20, 10, 8, 6, 4, 2]

Output: A[] = [20, 8, 10, 4, 6, 2] or [10, 8, 20, 2, 6, 4]

- Q.5 Seven pirates attacked the British ship and looted some rare gems from them. They decided to rest for some time and then divide the gems later. While everyone was resting, two pirates wake up and planned to divide gems equally between the two. When they divided gems equally, one gem was left. So, they decided to wake up the third pirate and divide among three, but alas again one gem was left. They decide to wake up the fourth pirate to divide the gems and again one gem was left. The same happened again with the fifth and sixth. Finally, they woke up the 7th pirate and this time the gems were divided equally. 04

How many minimum gems did they steal in total?

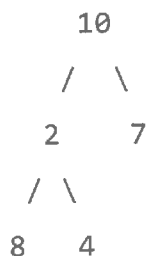
OR

- Q.5 Given a Binary Tree convert it to a Binary Search Tree. The conversion must be done in such a way that keeps the original structure of Binary Tree. Write JAVA program for this. 04

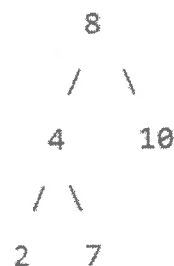
Examples

Example 1

Input:

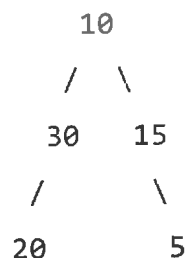


Output:



Example 2

Input:



Output:

