Class Test (2) Examination: Summer-2025
Course Code: CIS 122 (Batch: 21_A)
Course Title: Data Structure
Date: 17/07/2025

Time: 30 Minutes **Total Marks: 15**

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1. Consider the sorted array M[12] = {122, 117, 112, 102, 94, 84, 79, 57, 48, 30, 21, 18}. Now find out the number x=101 from the sorted array utilizing binary search approach. Also compare the results with linear search. [6]

2. Explain the concepts of overflow and underflow with suitable examples. [3]

3. If the sequence of operations – DEQUEUE, ENQUEUE (m), ENQUEUE (e), DEQUEUE, ENQUEUE (h), ENQUEUE (e), ENQUEUE (d), DEQUEUE, ENQUEUE (i), ENQUEUE (a), DEQUEUE are performed on a Circular Queue, therefore find out the REAR value. [Capacity of Queue is 3] [6]

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Course Code: CIS 122 (Batch: 21_A)
Course Title: Data Structure
Date: 19/06/2025

Time: 30 Minutes | Total Marks: 15

1. Suppose an array M contains 15 elements, with indices starting from 0. Draw a flowchart to update all even elements by multiplying them by 2. *For example, M = [2, 4, 5, 8, 9], Output = [4, 8, 5, 16, 9]* [5]
2. Consider an array M that contains 10 integers (the array index starting with 0). Now, write a flowchart/algorithm that splits the array M into two arrays based on negative and non-negative numbers. [Assume that the values of negative number are stored in array A, and the values of non-negative number are stored in array B] [7]
3. List the various operations that can be performed on data structure. [3]

Class Test (2) Examination: Summer-2025
Course Code: CIS 122 (Batch: 21_B)
Course Title: Data Structure
Date: 20/07/2025

Time: 30 Minutes | Total Marks: 15

1. Explain the difference between linear search and binary search. When is each method preferred? [4]
2. Draw a flowchart for circular ENQUEUE operations of the queue. [6]
3. The five items: A, B, C, D and E are pushed in a stack, one after the other starting from A. The stack is popped four times and each element is inserted in a queue. Then two elements are deleted from the queue pushed back on the stack. Now one item is popped from the stack. The popped item is..... [5]

Class Test (3) Examination: Summer-2025
Course Code: CIS 122 (Batch: 21_B)
Course Title: Data Structure
Date: 11/08/2025

Time: 30 Minutes | Total Marks: 15

1. The CIS Club of Daffodil International University will organize a Study Tour in different historical places in different districts. The places and traveling cost are displayed in Figure-1. Now, you will connect all the historical places with the minimum traveling cost using Prim's algorithm. [7]

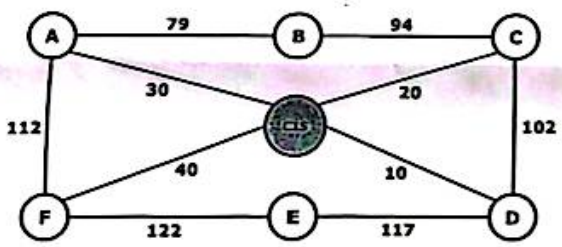


Figure-1: Weighted Undirected Graph

2. Define the following terms: [4]
   A. Mixed graph
   B. Complete graph
   C. Bipartite graph
   D. Adjacency Matrix
3. Write a pseudocode which is performed to traverse operation. [Assume that the linked list contains 8 positive integer values] [4]

Class Test (1) Examination: Summer-2025
Course Code: CIS 122 (Batch: 21_A)
Course Title: Data Structure
Date: 19/06/2025

Time: 30 Minutes **Total Marks: 15**

1. Suppose an array **M** contains 15 elements, with indices starting from 0. Draw a flowchart to update all even elements by multiplying them by 2. *For example, M = [2, 4, 5, 8, 9], Output = [4, 8, 5, 16, 9]* [5]

2. Consider an array **M** that contains 10 integers (the array index starting with 0). Now, write a flowchart/algorithm that splits the array **M** into two arrays based on negative and non-negative numbers. [Assume that the values of negative number are stored in array **A**, and the values of non-negative number are stored in array **B**] [7]

3. List the various operations that can be performed on data structure. [3]

Course Title: Data Structure

Date: 12/08/2025

Time: 30 Minutes **Total Marks: 15**

1. How many zeros are there in the adjacency matrix of the graph shown in **Figure 02**? [4]

2. [6]

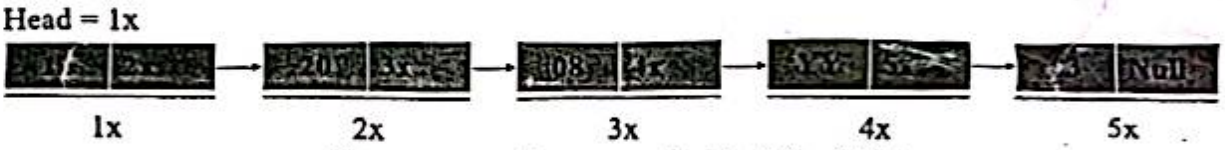


Figure 01: One-way single linked list

Write the pseudocode to separate the linked list (refer to **Figure 01**) into two linked lists based on the following condition:
Let YY = (last two digits of your Student ID + 2).

- All elements greater than 10 and divisible by 4 should be placed in one linked list.
- All other elements should be placed in a second linked list.

3. Find out the minimum travel cost from **2** to **4** of **Figure 02**. [5]

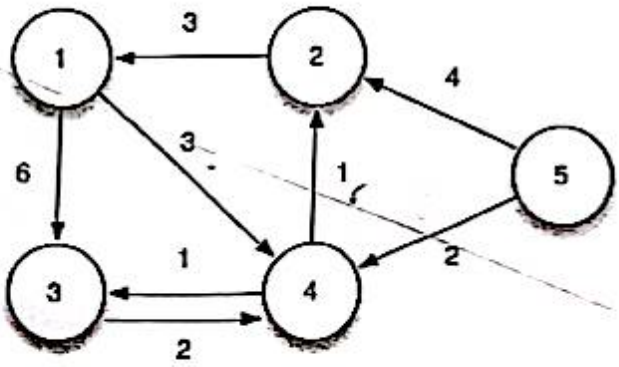


Figure 02: Directed Graph

Daffodil International University

Faculty of Science & Information Technology

Department of Computing and Information System

Final Examination, Summer-2025

Course Code: CIS122, Course Title: Data Structure

Level: 1 Term: 2

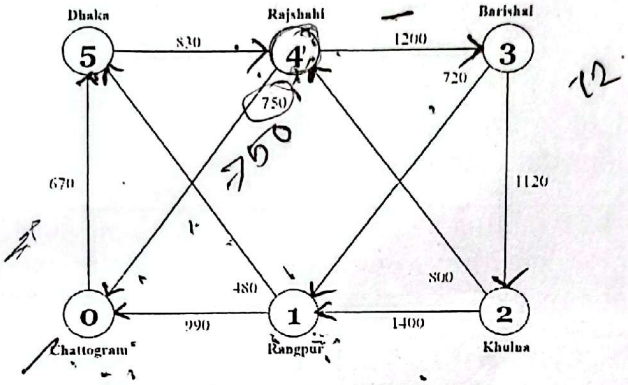
Exam Duration: 2 Hours **Marks: 40**

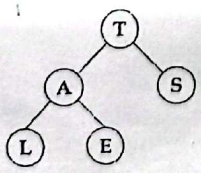
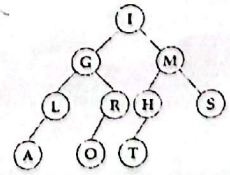
Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	(a)	Why do we need to study data structures? Mention the common operations on various data structures.	[3]	CO3 L-1,2,4
	(b)	Suppose an array **M** contains 12 elements, with indices starting from 0. Draw a flowchart/algorithm to update all elements at even indices by multiplying them by 3.	[4]	
	(c)	The five items: **CIS, CSE, SWE, MCT** and **ITM** are pushed in a stack, one after the other starting from **CIS**. The stack is popped three times and each element is inserted in a queue. Then three elements are deleted from the queue pushed back on the stack. Now one item is popped from the stack. The popped item is.....	[4]	

2.	(a)	Suppose an array contains **n** elements in descending order. Draw a flowchart to find an element using the binary search algorithm.	[4]	CO3 L-2,4
	(b)	Write the pseudocode to insert the value '**150**' into the linked list after the node containing '**YY**', based on the given scenario shown in Figure 01. ['**YY**' = (last two digits of your Student ID + 2)]  **Figure 01:** One way single linked list	[4]	

3.	(a)	How many zeros are there in the adjacency matrix of the graph shown in **Figure 02**?	[3]	CO4 L-2,5
	(b)	During the month of October 2025, the Department of Computing and Information Systems (CIS) of Daffodil International University (DIU) intends to embark on a study tour that will journey through the various divisions of Bangladesh. Mr. Mehedi, who is in charge of coordinating the tour, has created a list of the numerous divisions, along with the travel charges that are related with each particular pair of places (see **Figure 02**).  **Figure 02:** Directed graph *Now,* ***identify the two divisions in Figure 02 that have the lowest travel costs. Given the circumstances, a more in-depth analysis is necessary.***	[7]	

4.	(a)	Write the **preorder**, **inorder**, and **postorder** traversals of the binary tree [preorder and postorder from **Figure 03**, inorder from **Figure 04**].  **Figure 03:** Binary Tree  **Figure 04:** Binary Tree	[3]	CO4 L-1,4,5
	(b)	Suppose, Huffman tree is constructed for the following data: {H, I, M, E, L} with frequency {18, 12, 6, 35 and 20} respectively. Now, find out the Huffman message of the code "010011010".	[5]	
	(c)	Define the following terms: I. Mixed graph II. Complete graph III. Bipartite graph	[3]	