



Daffodil International University
Faculty of Science & Information Technology
Department of Information Technology & Management
Mid-Term Examination, Summer 2025

Course Code: ITM 217; Course Title: Data Structure and Algorithm

Sections & Teachers: FM (A)

Time: 1:30 Hrs

Marks: 25

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.]

12
9
1

1.	A software engineer is reviewing memory logs from an embedded system. She notices that the array element <code>AUTO[1972]</code> is stored at memory address 1128. From the documentation, she also learns that the array starts at index 1960, and each element occupies 4 words in memory.		
a)	Define static array and dynamic array.	[Marks- 2]	CLO-1 Level-1
b)	Based on this information, calculate the starting memory address of the <code>AUTO</code> array.	[Marks- 3]	CLO-1 Level-3
c)	Analyze how increasing the word size (e.g., from 4 to 8) impacts memory efficiency and data handling in an array-based system.	[Marks- 2]	CLO-1 Level-4
2.	The ITM Department's enrollment tracker handles student entries through a smart sequence where each record quietly points to the next. If a student drops out, the system seamlessly bridges the gap without reordering the rest.		
a)	Identify the best data structure for this enrollment tracker and justify your choice based on how it handles additions and removals.	[Marks-2]	CLO-2 Level-5
b)	Construct an algorithm to traverse this enrollment tracker and print the registration IDs of all students whose registration ID is greater than 1000.	[Marks-4]	CLO-2 Level-3
3.	A university helpdesk system uses a queue to manage student complaints. Illustrate how a queue operates in FIFO manner with a diagram.	[Marks-2]	CLO-2 Level-4
b)	Compare implementation of queue using array vs linked list in terms of flexibility and memory usage.	[Marks-3]	CLO-2 Level-2

	c)	Why is <u>circular queue</u> preferred in some cases? Justify with an example.	[Marks-2]	CLO-2 Level-5
4.	a)	Explain the difference between <u>best case</u> , <u>average case</u> , and <u>worst-case</u> time complexities. Support your answer with an example from binary search .	[Marks-3]	CLO-1 Level-2
	b)	Differentiate between selection and iteration control structures in terms of behavior and use cases in algorithm design.	[Marks-2]	CLO-1 Level-2