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Daffodil International University

Faculty of Science & Information Technology
Department of Information Technology & Management
Mid Term Examination, Fall 2026
Course Code: ITM 217; Course Title: Data Structure and Algorithms
Section: A; Teacher: FR

Time: 1:30 Hrs **Marks: 25**

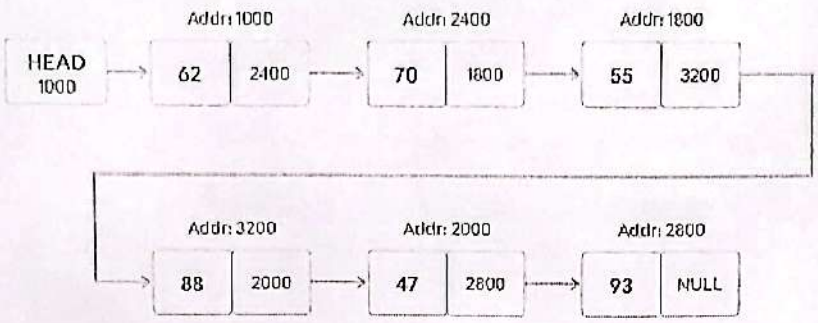
Answer ALL Questions

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

1.	*a)*	**Describe** the different types of operations performed on Array Data structure.	[Marks-5]	CLO-1 *Level-2*
	b)	**Discuss** the following terms with appropriate examples. Explain how each metric is used to evaluate the performance and efficiency of algorithms: I. Time Complexity II. Space Complexity	[Marks-5]	
2.	*a)*	A stack of files in an office tray follows the stack (LIFO) principle and can hold a maximum of N = 8 files. Initially, the stack contains the following file numbers (from bottom to top): Stack: 105, 112, 118, 124, 131, ——, ——, —— **Apply** the following operations on the stack: 1.PUSH(140) 5.POP(ITEM) 2.PUSH(147) 6.POP(ITEM) 3.PUSH(153) 7.PUSH(166) 4.PUSH(160) 8.POP(ITEM) Instructions • After each operation, clearly show the updated state of the stack. • For every POP operation additionally mention the removed book number. • Clearly indicate the step where stack overflow or stack underflow occurs.	[Marks-4]	CLO-2 *Level-3*

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	b)	You are given a singly linked list that represents the scores of different students in a quiz, arranged in the following order:  Demonstrate how to perform the following deletion operations on the linked list: 1. Deletion at the Beginning: Delete the first node (the node containing the score 62) from the list. 2. Deletion in the Middle: Delete the node containing the score 88 from the list. 3. Deletion at the End: Delete the last node (the node containing the score 93) from the list. Each operation is applied to the list as it stands after the previous operation. **Instructions** • For each deletion operation, clearly draw the linked list structure before and after the deletion. • Write pseudocode that shows how the node to be deleted is located (for example, using a temporary pointer and a previous pointer), how the pointers are updated to bypass the deleted node, and how the deleted node is released from memory.	[Marks-6]	
3.	*a)*	Consider the following arithmetic expression P written in postfix notation: P: 40, 8, 2, +, /, 6, 3, 2, −, *, + **Calculate** the value of the arithmetic expression P. (Use a stack to store operands and perform the evaluation step by step.)	[Marks-5]	CLO-3 *Level-3*