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PRN. No.

PAPER CODE U114-3103 (Backlog)

DECEMBER 2024 (Backlog) EXAM Sem-I

F.Y. (I.T ENGINEERING)

(PATTERN 2023)

COURSE NAME: Fundamentals of Data Structures

COURSE CODE: IT12233

[Max. Marks: 60]

Time: [2Hr]

(*) Instructions to candidates:
1) Use of scientific calculator is allowed
2) Use suitable data wherever required
3) All questions are compulsory. Solve any THREE sub questions from EACH question

Que. No.	Question Description	Max. Marks	CO mapped	BT Level
Q1.	Solve any three sub questions from the following			
	A) What is the fundamental difference between data, data objects, and data structures?	[5]	[1]	[2]
	B) Define Abstract Data Types (ADTs) and provide examples of commonly used ADTs.	[5]	[1]	[2]
	C) Compare Big O and Theta analysis	[5]	[1]	[2]
	D)Differentiate between time complexity and space complexity in the context of algorithm analysis.	[5]	[1]	[2]
Q2.	Solve any three sub questions from the following			
	A) Write an algorithm for binary search and explain its analysis	[5]	[2]	[2]
	B) 64, 25, 12, 22, 11 ,39,40, 13 Solve using Selection Sort. Show all passes	[5]	[2]	[3]
	C) Consider following numbers 44, 25, 80, 54, 42, 11, 55, 90, 32, 12, 9, 15, 66, 53, 32.Sort using insertion sort. Show output after each pass.	[5]	[2]	[3]
	D)40, 21, 85, 54, 22, 11, 56, 95, 32, 12, 9, 25, 66, 52, 34 Sort using quick sort. Show output after each pass	[5]	[2]	[3]
Q3.	Solve any three sub questions from the following			
	A) Write an algorithm for addition of 2 sparse matrices. What is its complexity? Add the following two sparse matrices Matrix 1: 4 3 4 0 0 5 0 2 8 1 1 5 3 1 9 and Matrix 2: 4 3 5 0 1 7 1 1 8 1 2 9	[5]	[3]	[3]

			[5]	[3]	[3]
	2 2 5				
	3 0 2				
	B) Write an algorithm and explain with example, the procedure for deleting a linked list node from specific position in a doubly linked list.		[5]	[3]	[3]
	C) Describe different types of linked list with an example		[5]	[3]	[2]
	D)Represent following polynomials using linked lists 5x12 + 2x6 + 6 , 6x12 - 5x8 + 12x5. Show the addition process of above polynomials diagrammatically.		[5]	[3]	[2]
Q4.	Solve any three sub questions from the following				
	A) Convert infix to prefix. Show stack contents. (A+B)*C-D*F+C		[5]	[4]	[3]
	B) Write a pseudo code to implement linear queue using array to perform the following operations: · Addition of elements to queue. · Deletion of element from queue. · Display front element. · Display rear element.		[5]	[4]	[3]
	C) Convert A*B+C $ postfix form. Show all steps.		[5]	[4]	[3]
	D)Explain with example the concept of priority queue.		[5]	[4]	[3]

Note: [BT level- 1: Remember 2: Understand 3: Apply 4: Analyze 5: Evaluate 6: Create]