Semester: **III**	DEPARTMENT OF ISE	AY: 2026-27
Course Code: **1BCS305**	Course Name: DATA STRUCTURES AND APPLICATIONS	

Question Bank

Q.	Module-01	M	L	C
1.	Define Data Structures. Explain the classification of Data Structures with example. Explain all operations of Data Structures. OR Define Data Structures. Explain with neat block schematic different type of data structures with examples. What are the primitive operations that can be performed?	10	L2	CO1
2.	With suitable example, discuss types of structures.	10	L2	CO1
3.	With suitable example, discuss self-referential structures.	4	L2	CO1
4.	Discuss four dynamic memory allocation functions. OR Explain dynamic memory allocation functions with suitable examples.	6	L2	CO1
5.	Differentiate between structures and unions shown examples for both.	6	L2	CO1
6.	What is sparse matrix? Give the triplet form for given matrix and also find its transpose. **A =** $\begin{vmatrix} 10 & 0 & 0 & 40 \\ 11 & 0 & 22 & 0 \\ 0 & 0 & 0 & 0 \\ 20 & 0 & 0 & 50 \\ 0 & 15 & 0 & 25 \end{vmatrix}$	10	L3	CO1
7.	What is Sparse matrix? Give the triplet form of a given matrix and find its transpose **A =** $\begin{vmatrix} 0 & 0 & 3 & 0 & 4 \end{vmatrix}$	10	L3	CO1

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	0 0 5 7 0 0 0 0 0 0 0 2 6 0 0				
8.	For the given sparse matrix draw the triplet representation and also draw the transpose of resultant triplet. **A =** 15 0 0 22 0 -15 0 11 3 0 0 0 0 0 0 -6 0 0 0 0 0 0 0 0 91 0 0 0 0 0 0 0 28 0 0 0	10	L3	CO1
9.	Write a C-function to add two polynomials with calculation $p(x) = 3x^{14} + 2x^8 + 1$ $q(x) = 8x^{14} – 3x^{10} + 10x^6$	10	L3	CO1
10.	Write a C-function to add two polynomials with calculation $p(x) = 3x^4 + 2x^4 + 1$ $q(x) = 6x^4 – 3x^1 + 8$	10	L3	CO1
11.	In computer science, polynomials are frequently used to model various systems. Consider two polynomials: A(x) = 2x^3 + 4x^2 + 3x + 1 and B(x) = 5x^2 + 2x + 6 (a) Represent both polynomials using arrays. (b) Write a C program to perform addition.	10	L3	CO1
	Module-02			
12.	Define a stack. Explain the basic stack operations (PUSH, POP and PEEK) with suitable examples.	8	L2	CO2
13.	Consider an initially empty stack of size 5. Perform PUSH(10), PUSH(20), PUSH(30), POP(), PUSH(40), POP() and PEEK(). Show the stack contents and TOP value after each operation.	10	L3	CO2
14.	Explain the applications of stacks in computer science with suitable examples.	6	L2	CO2
15.	Explain the array representation of a stack. Write algorithms for PUSH and POP operations, including overflow and underflow conditions.	6	L3	CO2

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16.	Write an algorithm or C program to implement a stack using an array with PUSH, POP and DISPLAY operations. Handle overflow and underflow conditions.	8	L3	CO2
17.	What are Polish notation and Reverse Polish notation? Explain infix, prefix and postfix expressions with suitable examples.	10	L2	CO2
18.	Convert the infix expression (A+B)*C-D/E into postfix notation using a stack. Show the stack contents at every step.	8	L3	CO2
19.	Convert the infix expression A+B*(C-D)/E into postfix notation using a stack. Show the stack contents at every step.	8	L3	CO2
20.	Write an algorithm to convert an infix expression into a postfix expression using a stack. Explain the steps with a suitable example.	10	L3	CO2
21.	Write the algorithm for evaluating a postfix expression using a stack. Demonstrate the algorithm with a suitable numerical example.	10	L3	CO2
22.	Evaluate the postfix expression 5 6 2 + * 12 4 / - using a stack. Show every PUSH, POP and intermediate result.	8	L3	CO2
23.	Define a queue. Explain the FIFO principle and basic queue operations with suitable examples.	6	L2	CO2
24.	Differentiate between stack and queue with respect to principle, insertion, deletion, representation and applications.	8	L2	CO2
25.	Explain the array representation of a queue with a suitable diagram. Describe the roles of FRONT and REAR.	8	L2	CO2
26.	Explain the representation of a queue using a dynamic array. Discuss how memory resizing can be handled when the array becomes full.	8	L2	CO2
27.	Write an algorithm or C program to implement a circular queue using an array. Perform insertion, deletion and display operations, handling overflow and underflow.	10	L3	CO2
28.	A queue is initially empty and has a capacity of 4. Perform ENQUEUE(10), ENQUEUE(20), ENQUEUE(30), DEQUEUE(), ENQUEUE(40) and ENQUEUE(50). Show FRONT, REAR and the queue contents after every operation.	10	L3	CO2
	Module-03			
29.	What are the disadvantages of ordinary queue? Discuss the implementation of circular queue.	10	L2	CO3
30	Develop functions in C to implement insertion, deletion and display operations on circular queue of integers.	10	L3	CO3
31.	Define Queue. Discuss how to represent queue using dynamic arrays.	10	L3	CO3
32.	What is a linked list? Explain the different types of linked list with neat diagram.	10	L2	CO3

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33.	Give the structure definition for singly linked list (SLL). Write a C function to, (i) Insert on element at the end of SLL.	10	L3	CO3

***Note:**

1. All modules should contain a minimum of **10** questions each and the total number of questions must be **50**.
2. Questions can carry marks of 06, 07, 08, 09, 10 and for problems: 04 or 05.
3. Follow the RBTL as per the keywords used to frame the questions.
4. Maintain the Course Outcomes (COs) as per the syllabus.
5. M: Marks, L: RBTL, C:COs.

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