Total No. of Questions: 25

Enrollment No : _____

MEDICAPS UNIVERSITY

Faculty of Science / Engineering

End Semester Examination May 2025

CA3CO07 Data Structure

Programme	:	BCA / BCA-MCA (Integrated)	**Branch/Specialisation**	:	-
Duration	:	3 hours	**Maximum Marks**	:	60

Note: *All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.*

Section 1 (Answer all question(s))

		Marks	CO	BL
Q1.	Which of the following is a linear data structure?	1	1	1
	○ Graphs ◉ Array ○ Binary Tree ○ AVL Tree			
Q2.	If for an algorithm time complexity is given by O(n) then complexity of it is:	1	1	1
	◉ Linear ○ Constant ○ Exponential ○ None of these			
Q3.	If the two strings are identical, then strcmp() function returns-	1	2	1
	○ 1 ◉ 0 ○ -1 ○ Yes			
Q4.	Which is not a feature of an algorithm?	1	2	1
	○ Unambiguity ○ Output ◉ Infiniteness ○ Effectiveness			
Q5.	A normal queue, if implemented using an array of size MAX_SIZE, gets full when?	1	3	2
	○ Front = (rear + 1)mod MAX_SIZE ○ Front = rear + 1 ◉ Rear = MAX_SIZE – 1 ○ Rear = front			
Q6.	What is the value of the postfix expression 6 3 2 4 + – *?	1	3	2
	◉ -18 ○ -22 ○ 28 ○ 20			
Q7.	In a Doubly Linked List, what does the first node's previous pointer point to?	1	4	2
	○ The Second node ○ The last node ○ Itself ◉ Null			
Q8.	What is a full binary tree?	1	4	1
	○ All the leaves are at the same level ◉ Each node has exactly zero or two children ○ Each node has exactly two children ○ Each node has exactly one or two children			
Q9.	What is the worst case complexity of bubble sort?	1	5	1
	○ O (n log n) ○ O (log n) ○ O(n) ◉ O(n^2)			
Q10.	What is the main advantage of a hash table over linked list?	1	5	1
	○ Easier to implement ○ Simple insertion ◉ Faster search ○ Lower memory usage			

Section 2 (Answer any 2 question(s))

Marks CO BL

Q11. What is data structure? Describe the types of data structures. **5 1 2**

Rubric	Marks
What is Data Structure	2
Describe the types of Data Structures	3

Q12. Why do we need an asymptotic notation? Explain its types. **5 1 2**

Rubric	Marks
Need an asymptotic notation	1
Explain types of asymptotic notation (Big O, Big Omega, Big Theta)	4

Q13. Explain time complexity and space complexity with example. **5 1 2**

Rubric	Marks
Explain Time Complexity	2
Explain Space Complexity	2
Example of Time Complexity and Space Complexity	1

Section 3 (Answer any 2 question(s))

Marks CO BL

Q14. Explain the significance of array and its types with example in data structure. **5 2 2**

Rubric	Marks
Explain the significance of array	2
Explain types of Array	1
Example of 1D and Multidimensional Array	2

Q15. Write a program in C language to find the average of n numbers using arrays. **5 2 3**

Rubric	Marks
Initialization of program	1
Logic of program	3
Output of program	1

Q16. Explain how a string is stored in memory. Also write a program to find length of two given strings. (without using strlen()) **5 2 3**

Rubric	Marks
Explain how a string is stored in memory.	2
write a program to find length of two given strings. (without using strlen())	3

Section 4 (Answer any 2 question(s))

Marks CO BL

Q17. Define Stack in data structure? Write a program to implement Stack using array. **5 3 3**

Rubric	Marks
Define Stack in data structure	2
Write a program to implement Stack using array?	3

Q18. Convert the following Infix expression into Postfix expression using stack. **5 3 3**
K+L-M*N+(O^P) *W/U/V*T+Q

Rubric	Marks
Correct Answer- K L + M N* - O P ^W * U / V / T * + Q+ (if 3-4 steps correct then 2 marks)	5

Q19. Define circular queue in data structure? Write a program to implement queue using array. **5 3 3**

Rubric	Marks
Define Circular Queue in data structure	2
program to implement Queue using array	3

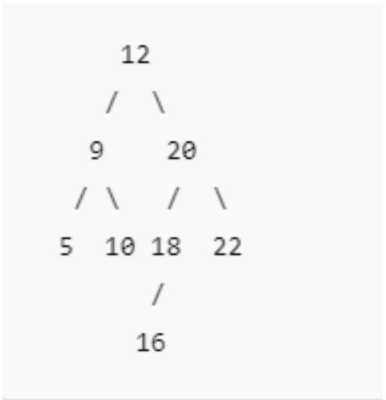
Section 5 (Answer any 2 question(s))

Marks CO BL

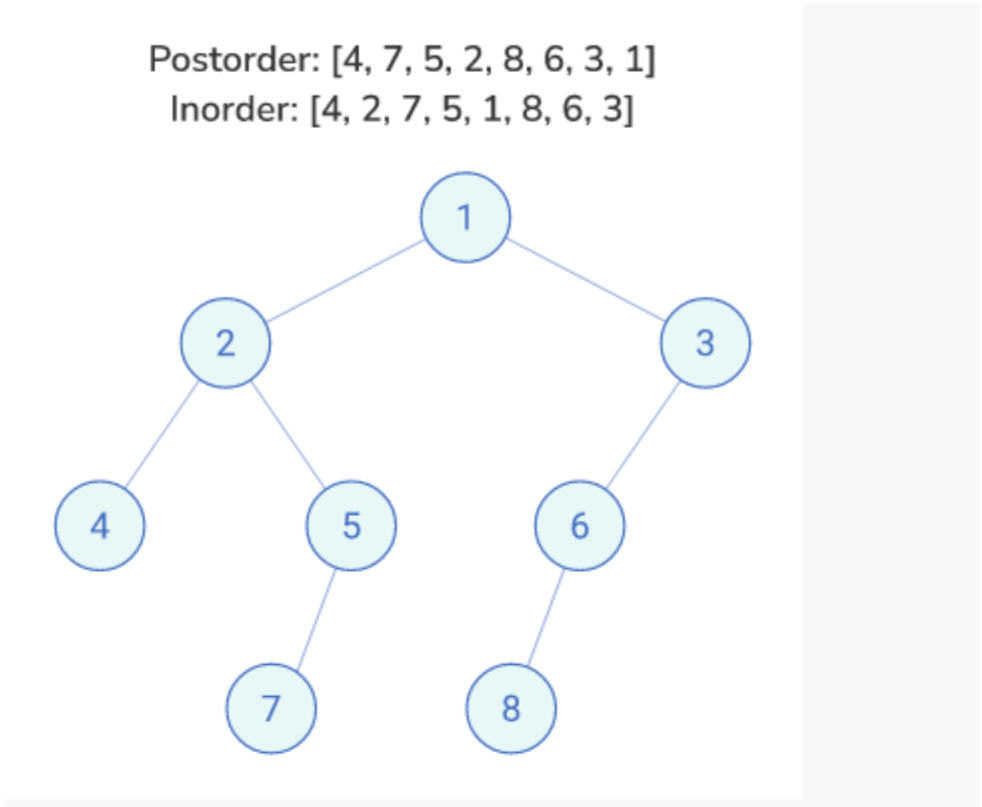
Q20. Write program to demonstrate concept of insertion at end in linked list. **5 4 3**

Rubric	Marks
code for creating a node	2
code for concept of insertion at end in linked list	3

Q21. Describe AVL tree with its properties? Construct AVL tree with following data 12,16,5,10,18,22,20,9. **5 4 3**

Rubric	Marks
Describe AVL tree with its properties	2
Correct Answer 	3

Q22. Construct a binary tree from given Inorder and Postorder traversal **5 4 3**
Postorder: 4, 7, 5, 2, 8, 6, 3, 1
Inorder: 4, 2, 7, 5, 1, 8, 6, 3

Rubric	Marks
Correct Answer  (For 3-4 correct steps 2 marks)	5

Section 6 (Answer any 2 question(s)) **Marks CO BL**

Q23. Define the graph. Explain Breadth First Search traversal of Graph with suitable example. **5 5 2**

Rubric	Marks
Define the graph	1
Explain Breadth First Search traversal of Graph	3
Example of Breadth First Search traversal of Graph	1

Q24. Describe the concept of Binary search. Write an application program for binary search in C language. **5 5 3**

Rubric	Marks
Describe the concept of Binary search	2
application program for binary search in C language	3

Q25. Define the following terms: **5 5 2**
(i) Hash table
(ii) Hash Function
(iii) Separate chaining method

Rubric	Marks
Define Hash table	1
Define Hash Function	2
Define Separate chaining method	2

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