K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
SESSION: 2023-2024 (ODD SEMESTER)
I SESSIONAL TEST QUESTION PAPER   DS-1
SET-A

USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Degree	: B.E	Semester :	III
Branch	: AI & DS	Course Code :	BCS304
Course Title	: Data Structures and Applications	Date :	04/01/2024
Duration	: 9 0 Minutes	Max Marks :	25

Note: Answer ONE full question from each part.
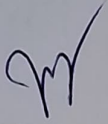
Q No.	Question	Marks	K-Level	CO mapping
PART-A				
1(a)	Define Data structures. **Draw** its classification and explain in brief. **List** the basic operations that can be performed on Data structure?	5	Applying K3	CO1
(b)	**Classify** Structure and Union with suitable example and Explain self-referential structure.	5	Applying K3	CO1
(c)	Explain ADT of the polynomial. Define the 2 ways to represent polynomial in C and Show the structural representation for the given 2 polynomials, $A(x)=4x^{15}+3x^4+5$ and $B(x)=2x^{1000}+10$. **Develop** a function to add 2 polynomials.	5	Applying K3	CO1
OR				
2(a)	**Make** use of stack to convert the following Infix expressions to Postfix expressions: i)2*3/(2-1)+5*3 ii)A+B*C/D-F+A^E	5	Applying K3	CO1
(b)	**Define** Recursion **i) Find out** A(2,1) using Ackerman's function and also write a recursive function for the same.. ii) **Develop** a recursive function for Tower of Hanoi.	5	Applying K3	CO1
(c)	Design, **Develop** and **Implement** a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized Define Multiple Stacks and Queues expressions with the operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands.	5	Applying K3	CO1
PART-B				
3(a)	Define queue. **Illustrate** the operations performed on queue	5	Applying K3	CO2
(b)	**Implement** circular queue using dynamically allocated arrays.	5	Applying K3	CO2

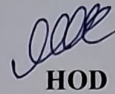|	OR			
4(a)	**Define** priority queue. **Illustrate** two ways of representation of a Priority Queue with an example.	5	Applying K3	CO2
(b)	**Illustrate** Multiple Stacks and Queues	5	Applying K3	CO2

Course Incharge   **IQAC- Coordinator**   **HOD**   **Principal**

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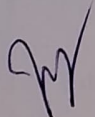
Q No.	Question	Marks	K-Level	CO mapping
	PART-A			
1(a)	Define Data structures. Give its classifications. **Illustrate** dynamic memory allocation functions in detail.	5	Applying K3	CO1
(b)	**Develop** Fast transpose algorithm of Sparse Matrix. Identify the triplet form of Sparse matrix and identify the transpose of the given Matrix. $$\begin{array}{c c c c c c c}& col\,0 & col\,1 & col\,2 & col\,3 & col\,4 & col\,5 \\ row\,0 & 15 & 0 & 0 & 22 & 0 & 15 \\ row\,1 & 0 & 11 & 3 & 0 & 0 & 0 \\ row\,2 & 0 & 0 & 0 & -6 & 0 & 0 \\ row\,3 & 0 & 0 & 0 & 0 & 0 & 0 \\ row\,4 & 91 & 0 & 0 & 0 & 0 & 0 \\ row\,5 & 0 & 0 & 28 & 0 & 0 & 0 \end{array}$$	5	Applying K3	CO1
(c)	**Develop** an algorithm for Knuth-Morris-Pratt Pattern Matching Algorithm and **apply** on the following Data. T=ababcabcababababd P1=ababd	5	Applying K3	CO1
	OR			
2(a)	**Develop** a program for Evaluation of Postfix expression and apply it for the following data i) (2+3)*(2-(4+1)) ii) 8 10 5 / * 9+	5	Applying K3	CO1

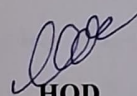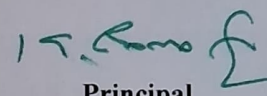|					
(b)	**Define** Recursion i) **Use** Ackerman's function to evaluate A(1,2) and also write a recursive function for the same.. ii) **Develop** a recursive function for Tower of Hanoi using 3 discs.	5	Applying K3	CO1
(c)	**Apply** the Bubble sort algorithm for the following Data? 5,1,4,2,8	5	Applying K3	CO1
PART-B					
3(a)	Discuss the disadvantage of the ordinary queue and how it is solved using a circular queue? **Develop** insertion and deletion functions for circular queue.	5	Applying K3	CO2
(b)	**Illustrate** Dequeue and its variants	5	Applying K3	CO2
OR					
4(a)	**Define** priority queue. **Demonstrate** in detail One-Way list representation of a Priority Queue with an example.	5	Applying K3	CO2
(b)	**Illustrate** circular queue using dynamically allocated arrays.	5	Applying K3	CO2

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