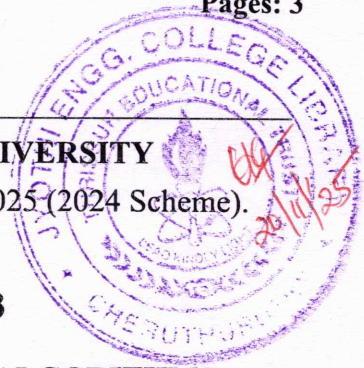


Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**B.Tech Degree S3 (R) (FT/WP) Examination November 2025 (2024 Scheme).****Course Code: PCCST303****Course Name: DATA STRUCTURES AND ALGORITHMS**

Max. Marks: 60

Duration: 2 hours 30 minutes

PART A*(Answer all questions. Each question carries 3 marks)*

CO Marks

- | | | | |
|---|--|-----|-----|
| 1 | Compute the time complexity of the following code fragment.
for(i=0;i<n;i++)
for(j=n;j>0;j=j/2)
printf("DATA STRUCTURE"); | CO1 | (3) |
| 2 | Write algorithm for push and pop operations of a stack using array. | CO1 | (3) |
| 3 | What is self-referential structure? Give an example. | CO2 | (3) |
| 4 | Write algorithm to find the largest element in a singly linked list. | CO2 | (3) |
| 5 | Compare Min-heap and Max-heap with example. | CO3 | (3) |
| 6 | Construct an expression tree for (A+B*C)-D-E*F-(G-H/I). | CO3 | (3) |
| 7 | Perform radix sort to sort the numbers 34, 21, 3, 121, 342, 65 and 44 | CO4 | (3) |
| 8 | Write algorithm to sort an array using insertion sort. | CO4 | (3) |

PART B*(Answer any one full question from each module, each question carries 9 marks)***Module -1**

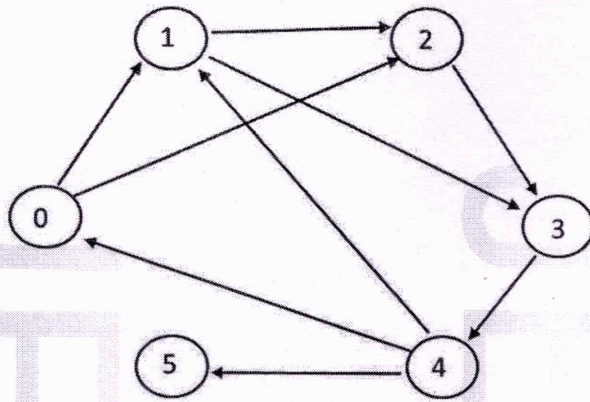
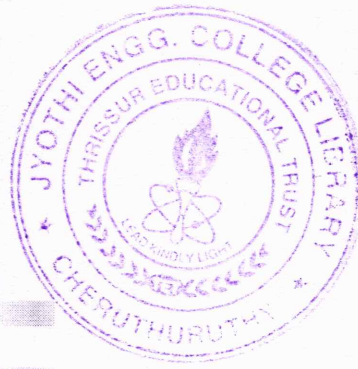
- | | | | | |
|----|----|--|-----|---|
| 9 | a) | Describe different notations to be used to express time complexity of an algorithm. | CO1 | 6 |
| | b) | Write algorithm for various insertion operations of a double ended queue using array. | CO1 | 3 |
| 10 | a) | Convert the infix expression $(A+B*C/D)-(E-F/G)$ to postfix form using a stack. Evaluate the resultant postfix expression by replacing A,B,C,D,E,F and G with 3,2,4,2,5,8 and 4. | CO1 | 6 |
| | b) | Write algorithm to find transpose of given sparse matrix. | CO1 | 3 |

Module -2

- | | | | | |
|----|----|---|-----|---|
| 11 | a) | Write algorithm for add two polynomials(single variable) using linked list. | CO2 | 5 |
| | b) | Write algorithm for insert node at the beginning and end of a circular singly linked list. | CO2 | 4 |
| 12 | a) | Consider the requests from processes in given order 300K, 25K, 125K, and 50K. Let there be two blocks of memory available of size 150K followed by a block size 350K. Which of the memory allocation schemes can satisfy the above requests? Justify your answer. | CO2 | 6 |
| | b) | Write algorithm to display elements in a doubly linked list in reverse order. | CO2 | 3 |

Module -3

- | | | | | |
|----|----|--|-----|---|
| 13 | a) | Create a binary search tree using the following values 35,12, 47, 36, 52, 30 ,25 and 49 . Delete from this tree the nodes 30 and 47(delete 47 using inorder successor). | CO3 | 6 |
| | b) | Write algorithm for different tree traversals. | CO3 | 3 |
| 14 | a) | Write algorithm for graph traversal using BFS. Perform BFS on the given graph from source vertex 0. if multiple choices may be available for the next node choose in ascending order. | CO3 | 6 |



b) Explain the following terms with examples:

CO3

3

- i) Full binary tree
- ii) Complete binary tree

Module -4

- 15 a) Write algorithm to sort an array using quick sort. Apply quick-sort to sort the numbers 45,33,56,22,76,78,40 and 30. CO4 6
- b) Explain any three hashing functions with examples. CO4 3
- 16 a) Given the values 72,13,6,5,10,36,43 and 17 and a hash table of size 11.show the resultant table after inserting values in the given order by using hash function $h(k)=k\%11$ with each of the following collision strategies. CO4 6
- i) Linear Probing
 - ii) Quadratic Probing
 - iii) Separate Chaining
- b) Write algorithm to search an element in a sorted array using binary search. CO4 3
