Hall Ticket Number:

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Code No. : 14144 B

# VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
*Accredited by NAAC with A++ Grade*

## B.E. IV-Semester Main & Backlog Examinations, July-2022

### Principles of Data Structures (OE-II)

Time: **3 hours**                                    Max. Marks: **60**

*Note: Answer all questions from Part-A and any FIVE from Part-B*

**Part-A (10 × 2 = 20 Marks)**

| Q. No. | Stem of the question | M | L | CO | PO |
|---|---|---|---|---|---|
| 1. | Why is recursion required in functions? | 2 | 1 | 4 | 1 |
| 2. | List the properties of Asymptotic notations of big-oh and big-theta | 2 | 1 | 2 | 1 |
| 3. | Why Linked Lists are used? | 2 | 1 | 3 | 1 |
| 4. | List the steps in accessing an array element. | 2 | 1 | 1 | 2 |
| 5. | Define Overflow and Underflow in stack. | 2 | 1 | 3 | 1 |
| 6. | List the auxiliary Queue operations. | 2 | 1 | 3 | 1 |
| 7. | Define Skew Tree. | 2 | 1 | 1 | 1 |
| 8. | How many different binary trees are possible with n nodes? | 2 | 2 | 3 | 2 |
| 9. | Write the Time complexity and Space complexity of unordered and ordered Linear search. | 2 | 2 | 2 | 2 |
| 10. | Which sorting techniques follow divide and conquer approach? | 2 | 1 | 1 | 1 |

**Part-B (5 × 8 = 40 Marks)**

| | | | | | |
|---|---|---|---|---|---|
| 11. a) | Analyze the general rules used in determining runtime complexity of an algorithm. | 4 | 2 | 2 | 1 |
| b) | Write a C program to print Fibonacci series using recursion. | 4 | 3 | 4 | 3 |
| 12. a) | Compare Linked list with arrays | 4 | 2 | 3 | 2 |
| b) | Devise an algorithm to insert a node at the end of the linked list. | 4 | 3 | 3 | 2 |
| 13. a) | Evaluate the given Postfix expression 123*+4- using stacks. | 5 | 4 | 3 | 3 |

| | | | M | L | CO | PO |
|---|---|---|---|---|---|---|
| 15. | a) | Given a sorted array of n elements with duplicates. Devise an algorithm to find the number of occurrences of number using binary search. | 5 | 4 | 3 | 3 |
| | b) | Explain Quick sort technique with an example. | 3 | 2 | 3 | 1 |
| 16. | a) | Define Data Structure and explain various types of Data structures with examples | 4 | 2 | 1 | 1 |
| | b) | Develop an algorithm to delete an intermediate node in a singly linked list. | 4 | 3 | 3 | 2 |
| 17. | | Answer any *two* of the following: | | | | |
| | a) | Construct an algorithm for reversing a Queue Q. Illustrate with example. | 4 | 3 | 3 | 2 |
| | b) | Write the algorithms for Preorder, Inorder and Postorder traversals with examples. | 4 | 4 | 3 | 1 |
| | c) | Sort the array 7 8 1 2 5 3 6 4 using bubble sort.List all the steps. | 4 | 3 | 3 | 3 |

M : Marks;　L: Bloom's Taxonomy Level;　CO: Course Outcome;　PO: Programme Outcome

| i) | Blooms Taxonomy Level – 1 | 20% |
|---|---|---|
| ii) | Blooms Taxonomy Level – 2 | 32.5% |
| iii) | Blooms Taxonomy Level – 3 & 4 | 47.5% |

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