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Code No.: 144 S

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.C.A. I Year II-Semester (Supplementary) Examinations, December - 2016

Data Structures

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE questions from Part-B

Part-A (10 × 2 = 20 Marks)

1. An algorithm's behavior pattern or performance profile is measured in terms of the _____ and _____ that are consumed while the algorithm is processing.
2. When $m \times n$ (read m by n) designates a matrix with m rows and n columns, then a matrix has _____ elements and when $m = n$, we call it as _____.
3. Explain Stack Abstract data type supporting methods Pop () and Push ().
4. An Expression is made up of _____, _____ and _____.
5. Explain the need for AVL Trees and write one of its applications.
6. Find the number of distinct binary trees with 3 nodes.
7. What is the purpose of external sorting?
8. Briefly explain hash table with an example.
9. The graphs $G1$ with vertices $V(G1) = \{1,2,3,4\}$; $E(G1) = \{(1,2),(1,3),(1,4),(2,3),(2,4),(3, 4)\}$ is directed or undirected explain?
10. Any tree consisting solely of edges in G and including all vertices in G is called a _____.

Part-B (5 X 10=50 Marks)

11. a) Differentiate between Circular List and Double Linked List. [5]
b) Define a sparse matrix. How do you represent a sparse matrix? [5]
12. a) Explain "A Mazing Problem". [5]
b) Write an algorithm for evaluating a postfix expressions using stacks. [5]
13. a) Explain the purpose of m-way search trees. [4]
b) Prove the following statement: [6]
If a complete binary tree with n nodes (i.e., $\text{depth} = \lceil \log_2 n \rceil + 1$) is Represented sequentially then for any node with index i , then we have:
LCHILD (i) is at $2i$ if $2i < n$. If $2i > n$, then i has no left child.
14. a) Differentiate between Heap and Merge Sort. [6]
b) Show that algorithm QSORT takes $O(n^2)$ time when the input file is already in sorted order. [4]
15. a) Explain "Minimum Cost Spanning Trees" [4]
b) Demonstrate various ways of representing graphs. [6]
16. a) Write an algorithm for a binary search. [5]
b) Design an algorithm to copy a sparse matrix. [5]
17. Answer any two of the following:
a) Create a Binary Search Tree for the following data and write the inorder, preorder and postorder forms of the data 23, 5, 17, 21, 7, 22, 19, 2, 9, 10 [5]
b) Sort the following data using selection sort. [5]
76, 24, 45, 24, 17, 52, 7, 81, 36, 5.
c) Compare and Contrast Prim's and Kruskals's algorithm. [5]
