LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **MATHEMATICS**

FIFTH SEMESTER – NOVEMBER 2018

16UMT5ES01 – DATA STRUCTURES AND ALGORITHMS

Date: 03-11-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

SECTION A

Answer **ALL** the questions: **(10x2 = 20)**

1. Define Algorithm Efficiency.
2. Draw the data structures for (a) Matrix, (b) Linear List (c) Tree and (d) Graph
3. Write the algorithm for ordered list search.
4. Apply sentinel search algorithm to find the target 17 in the list $85, 17, 42, 28$.
5. Change the infix expression $A + (B * C)$ to postfix expression.
6. What is reversing data?
7. Define Queue Front and Queue Rear.
8. Given three nodes to be stored in a binary tree, what is the maximum height?
9. Draw a Complete tree of level 3.
10. Apply selection sort to sort the following list $23, 78, 45, 8, 32, 56$.

SECTION B

Answer any **FIVE** questions: **(5x8 = 40)**

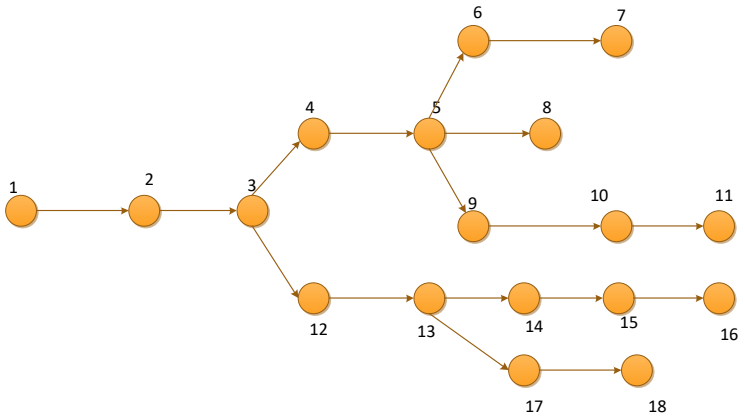
11. Differentiate Atomic and Composite data with examples.
12. Explain Big—O—Notation with the standard measures of efficiency and find the notation for the following: (i) $5n^{\frac{5}{2}} + n^{\frac{2}{5}}$ (ii) $6 \log n + 9n$
13. Write the Sequential search algorithm and apply it to find the target 25 in the list $10, 4, 21, 36, 25, 14, 91$.
14. Write the algorithm to convert decimal to binary and convert the decimal 45 to binary.
15. Solve the Four Queen's problem using stacks.
16. Write the algorithm for Recursive Fibonacci $f(n)$. Find $f(7)$ for Fibonacci sequence using recursive function.
17. Brief Tree Nomenclature.
18. Explain Heap sort. Apply heap sort to sort the list. $90, 61, 75, 12, 6, 8, 80, 18$.

SECTION C

Answer any **TWO** questions: **(2x20 = 40)**

19. (a) Explain the concept of Abstract Data Type
    (b) Brief the algorithm efficiency of all types of loops in detail. (8+12)
20. (a) Write the Binary Search Algorithm. Apply Binary search to find the target 19 in the list. $6, 5, 13, 12, 42, 75, 15, 19, 22, 21, 14, 18, 27$
    (b) Define General Linear Lists, Give an example and explain the four basic list operators. (12+8)

21. (a) Define Backtracking. Apply backtracking algorithm to find the goal 16 in the given tree:



(b) Write $ABC * +DE/-$ to infix expression using stack. (12+8)

22. (a) Define Binary tree and its properties.

(b) Write the algorithm for Bubble sort and apply bubble sort to sort the list $23, 78, 45, 8, 56$.

(8+12)

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