Name:.....
Roll No:.....

MAR ATHANASIUS COLLEGE OF ENGINEERING (AUTONOMOUS),
KOTHAMANGALAM - 686666
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
B.TECH FIRST SERIES EXAMINATION, AUGUST 2026 (S5 CS, DS & AH)
B24CS3T04 ALGORITHM ANALYSIS AND DESIGN

Max. Marks: 40 Duration: 1.5 Hours

PART A

Answer all questions. Each question carries 3 marks.

1. Give the recurrence equation for the binary search algorithm. Justify it. (CO 1)
2. Arrange the functions in the increasing order of their growth rate: n, n^2, $n!$, 2^n, $\sqrt{n}$, $n \log n$. (CO1)
2. Define Balance factor and explain why it is needed. (CO 2)
3. Explain disjoint sets and illustrate the array representation of disjoint sets. (CO 2)

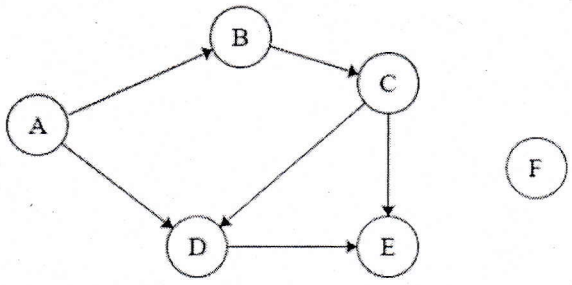
PART B

Answer all questions. Each question carries 14 marks.

4. (a) Explain with examples different notations used in the asymptotic analysis. (CO 1)(7 marks)
   (b) Solve the following recurrence relations:
   i. $T(n) = 2T\left(\frac{n}{2}\right) + n$ using substitution Method
   ii. $T(n) = T\left(\frac{2n}{3}\right) + 1$ using Master's theorem

   (CO 1) (7 marks)

5. (a) Construct an AVL trees with the following data: 44,17, 32, 78, 50, 88, 48, 62, 84, 92, 80, 82. Also delete the elements 62, 84, 78, 17. Detail the procedure to be followed while deleting a node from an AVL tree. (CO 2)(9 marks)
   (b) Find all possible topological orderings of the following graph :



(CO 2)(5 marks)

VISION

Mould competent professionals to serve as a valuable resources for society in pursuit of excellence.

MISSION

- Provide quality education tuned to the challenging phases of technology.
- Mould disciplined and Socially Committed engineers capable of professional leadership.
- Promote theoretical and practical understanding, along with critical thinking and logical reasoning.