Roll.No. | 24UMAET5A01

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc. Mathematics - END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - V

24UMAET5A01 - Mathematical Thinking in Computer Science

Total Duration : 1 Hrs.30 Mins. Total Marks : 40

Section B

Answer any **TEN** questions $(10 \times 2 = 20$ Marks)

1. Can you tile a chess board (no cover laps) by Domino (1 $\times$2 - tiles). Justify.
2. Prove that sum of first n natural numbers is n(n+1)/2 by Induction method
3. Fill a 3$\times$3 magic square.
4. Complete the 4$\times$4 Magic square.

16			13
		10	
9			
		15	

5. Find the maximum amount that can be paid with 3 coins and 5 coins.
6. A simple Tower of Hanoi puzzle consists of 3 pegs and a 3 circular disks,What is the least number of mores that are required to more the disc to another empty peg.
7. What is called a Hand shaking puzzle?
8. Show that sum of any five consecutive integers is divisible by 5.
9. Explain Universal and existential statements.
10. Prove that for any natural number n:
    $2 + 2^2 + 2^3 + \ldots.. + 2^n = 2^{n+1} - 2$.
11. Discuss the problem of 3 x 5 table with row sum as 20 and column sum as 10
12. There are boys and girls in a class. Some of them study French, while others study German. Prove that there are a boy and a girl studying different languages.

Section C

Answer any **FOUR** questions $(4 \times 5 = 20$ Marks)

13. Find an unknown- integer $1 \leq y \leq 127$ by asking 7 question "Is x = y?"
    ($-----$ for any $1 \leq y \leq N$). Opponents reply shall be x = y,
    $x < y$ or $x > y$.

Contd...

14. Prove that every odd number is of one of the forms 4n + 1 or 4n + 3 where n is an integer

15. Discuss pigeon hole principle by means of an example.

16. In a group of 20 students everyone has solved three problems from the homework assignment, and each problem was solved by two students. What is the number of problems in the assignment?

17. Discuss an algorithm to describe an even Permutation.

18. A classic unsolved problem in number theory asks if there are infinitely many pairs of 'twin primes', pairs of primes separated by 2, such as 3 and 5, 11 and 13, or 71 and 73. Prove that the only prime triple (i.e. three primes, each 2 from the next) is 3, 5, 7.

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