

**Sub: - Mathematics**

**Practice Paper**

**Time:- 1 1/2 Hours**

**Marks:- 50**

**General Instruction :**

1. All questions are compulsory.
2. The question paper consists of 14 questions divided into three sections A, B and C. **Section A** comprises of 4 questions of **one mark** each. **Section B** comprises of 7 questions of **four marks** each and **Section C** comprise of 3 questions of **six marks** each.
3. Use of calculators is not permitted.

**SECTION 'A'**

1. Find the number of non empty subsets of the set { 1, 2, 3, 4 }
2. A wheel makes 180 revolutions per minute. Through how many radians does it turn in 1 second?
3. Solve  $|4x - 3| < 27$
4. Write the general solution of  $\sin^2 2\theta = 0$

**SECTION 'B'**

5. Prove that  $5^{2n} - 1$  is divisible by 24, using principle of mathematical induction for all  $n \in \mathbb{N}$
6. Prove by using principle of mathematical induction  $\left(1 + \frac{1}{1}\right)\left(1 + \frac{1}{2}\right)\left(1 + \frac{1}{3}\right)\dots\left(1 + \frac{1}{n}\right) = n + 1$  for all  $n \in \mathbb{N}$
7. Prove that  $\cos 20^\circ \cos 30^\circ \cos 40^\circ \cos 80^\circ = \frac{\sqrt{3}}{16}$
8. Show that  $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2 \cos 8\theta}}} = 2 \cos \theta$
9. Let  $U = \{1,2,3,4,5,6,7,8,9,10\}$ ,  $A = \{1,2,3,4\}$ ,  $B = \{2,4,6,8,10\}$ ,  $C = \{3,4,5,6\}$ 
  - i) Find  $(B - C)^c$

ii) Verify that  $(A \cap B)^c = A^c \cup B^c$

10. Using properties of sets prove that

i)  $A \cup (A \cap B) = A$       ii)  $A \cap (A \cup B) = A$

11. The cost and revenue functions of the product are given by  $C(x) = 2x + 400$  and  $R(x) = 6x + 20$  respectively, where  $x$  is the number of items produced by the manufacturer. How many items the manufacturer must sell to realize some profit?

### SECTION 'C'

12. In a town of 10,000 families, it was found that 40% families buy newspaper A, 20% families buy newspaper B, and 10% families buy newspaper C, 5% buy newspaper A & B, 3% buy newspaper B & C and 4% buy newspaper A & C. If 2% families buy all three newspapers, then find the number of families which buy newspaper

i) A only,    ii) at least one of the three papers,    iii) none of A, B & C.

13. Solve:  $x + 2y \leq 3, 3x + 4y \geq 12, x \geq 0, y \geq 1$  graphically.

14. In any triangle  $\Delta ABC$ , prove that:  $(b^2 - c^2)\cot A + (c^2 - a^2)\cot B + (a^2 - b^2)\cot C = 0$