Max. Marks: 50                                    Time: 90 Min

**Instructions**: All questions are compulsory. The question paper consists of 13 questions divided into four sections A, B C and D. Section A comprises of 4 questions of one mark each, section B comprises of 3 questions of two marks each, section C comprises 4 question of 4 marks each and section D comprises of 4 questions of six marks each.

## Section: A (Each question of 1 mark)

1. Write the solution set of the equation
   $x^2 + 2x - 3$ in roster form.
2. Write down all the subsets of  A = { a, b ,c }
3. If A = {a,b} and B = {3,4} . Find the number of
   relations from A to B
4. Find the value of $\tan \frac{19\pi}{3}$.

## Section: B (Each question of 2 marks)

5. Let f = $\left\{ \left( x, \frac{x^2}{x^2+1} \right) : x \in R \right\}$ be a function from

   R to R. Determine domain and range of f.
6. Write the following relations :
   (i)  R = { (x , y) : 3x − y = 0, where x,y ∈ A
      where   A = {1, 2, 3,.......14}
   (ii) R = {(x , y) : x , y ∈ A, |x − y| = even}
       where  A = {1, 2, 3, 4}

7. Convert  $40°20'$ into radian measure.

## Section: C (Each question of 4 marks)

8. If A={1,2,5} ,B = {1,2,3,4} and C= {5,6,2} ,verify that
   $(i) A \times (B \cap C) = (A \times B) \cap (A \times C)$
   $(ii)(A − B) \times C = (A \times C) − (B \times C).$

9. Write the following relations :
   (i)  R = { (x , y) : 3x − y = 0, where x, y ∈ A
      where   A = {1, 2, 3,.......14}
   (ii) R = {(x , y) : x, y ∈ A, y ≤ x}  where A = {1, 2, 3, 4}
   (iii) R = {(x , x + 3) : x ∈ { 0, 1, 2, 3, 4, 5}}
   (iv) R = {(x , y) : x , y ∈ A, |x − y| = even}
      where  A = {1, 2, 3, 4}

10.  If  $f(y) = \frac{1}{2y+1}, y \neq \frac{-1}{2}$ then show that $f[f(y)] = \frac{2y+1}{2y+3}.$

   $provided\ y \neq \frac{-3}{2}$

11. Solve for x, If $2cos^2x + 3 \sin x = 0$

## Section: D (Each question of 6 marks)

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

13. Prove that $cos^2x + cos^2\left(x + \frac{\pi}{3}\right) + cos^2\left(x − \frac{\pi}{3}\right) = \frac{3}{2}$

14. Of the members of three sports teams in a  certain school 23 are in the cricket team, 27 in  the hockey team and 30 in the football team. 15 play both hockey and cricket, 16 play both hockey and football, 14 play football and cricket and 9 play all the three games. Find the total  number of members of the three teams. Also find the number of members who play either of the three games.

15. In a survey of 60 people, it was found that 25 people read news paper H, 26 read news paper T, 26 read newspaper I, 9 read both H & I, 11 read both H & T, 8 read both T & I, 3 read all three newspapers.
   Find : (i)  the number of people who read at least one of the newspapers.
        (ii)  the number of people who read exactly one newspaper

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