1. If one zero of the polynomial $p(x) = (a^2 + 4)x^2 + 20x + 4a$ is reciprocal of the other, find the value of a.

2. Find the roots of the quadratic equation $X^2 + X - (a + 1)(a + 2) = 0$

3. Solve for $X : 10X - \frac{1}{X} = 3, X \neq 0$

4. In δABC , $\angle B = 90\circ$ and $\tan A = \frac{1}{\sqrt{3}}$.Then find the value of $\sin A \cos C + \cos A + \sin C$

5. If $x = A \sin\theta + b \cos\theta$ and $y = a \cos\theta - b \sin\theta$,then find the value of $(x^2 + y^2)$.

6. Answer any **four** of the following questions:

   (a) The sum and the product of the zeroes of a quadratic polynomial are -1 and -12 respectively. The polynomial is

      i. $x^2 - x - 12$
      ii. $x^2 + x - 12$
      iii. $x^2 - x + 12$‘
      iv. $x^2 + x + 12$

   (b) The zeroes of the quadratic polynomial x

      i. both positive.
      ii. both equal.
      iii. both negative.
      iv. one positive and one negative.

   (c) If the zeroes of the polynomial $5X^2 - 26X + k$ are reciprocal of each other, then the value of k is

      i. 5
      ii. -5
      iii. 1/5
      iv. $-\frac{1}{5}$

   (d) If α, β are the zeroes of the polynomial $x^2 - 5x - 14$, then the value of $\alpha\beta - \alpha - \beta$ is

      i. -9
      ii. 19
      iii. 9
      iv. -19

   (e) What should be added to the polynomial $x^2 - 5x + 4$, so that 3 is a zero of the resulting polynomial ?

      i. 5
      ii. 4
      iii. 2

iv. 1

7. If $2\sin 2A = \sqrt{3}$, then find the value of A.
8. If $7\sin^2\theta + 3\cos^2\theta = 4$, then show that $\tan\theta = \frac{1}{\sqrt{3}}$, $0\circ \leqslant \theta \leqslant 90\circ$
9. Find the quadratic polynomial whose zeroes are $(\sqrt{5}-4) and (\sqrt{5}+4)$.
10. If the sum of LCM and H C F of two numbers is 1260 and the LCM is 900 more than their H C F, find their LCM.
11. Find the values of m and n for which $x = 2$ and $x = 3$ are the roots of the quadratic equation $3x^2 - 2mx + 2n = 0$.
12. Divide 19 into two parts such that sum of their squares is 193.
13. The angles of depression of the top and bottom of an 8 m tall building from the top of a multi-storeyed building are 30◦ and 45◦ respectively. Find the height of the multi-storeyed building.
14. From a point on the ground, the angles of elevation of the bottom and top of a transmission tower fixed on the top of a 20m high building are 45◦ and 60◦ respectively. Find the height of the tower.
15. As observed from the top of 75m high lighthouse from the sea-level,the angles of depression of two ships are 30◦ and 45◦. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.
16. It takes 12 hours to fill a swimming pool using two pipes together. If the larger pipe is used for 4 hours and smaller pipe is used for 9 hours, only half of the pool is filled. How long will it take for each pipe alone to fill the pool?