**Q1.**                                                                                    **15**

1. $\dfrac{2x+1}{(x+1)(x-1)}$ is:
   - (A) An improper fraction
   - (B) An equation
   - (C) A proper fraction
   - (D) An inequation

2. Point $(-1, 4)$ lies in the quadrant:
   - (A) I
   - (B) II
   - (C) III
   - (D) IV

3. A complete circle is divided into:
   - (A) $90°$
   - (B) $180°$
   - (C) $270°$
   - (D) $360°$

4. The measure of the external angle of a regular octagon is:
   - (A) $\dfrac{\pi}{10}$
   - (B) $\dfrac{\pi}{6}$
   - (C) $\dfrac{\pi}{8}$
   - (D) $\dfrac{\pi}{4}$

5. Two tangents drawn to a circle from a point outside it are of _____ in length:
   - (A) Half
   - (B) Equal
   - (C) Double
   - (D) Triple

6. The solution set of equation $4x^2 - 16 = 0$ is:
   - (A) $\{\pm 4\}$
   - (B) $\{4\}$
   - (C) $\{\pm 2\}$
   - (D) $\pm 2$

7. $\dfrac{1}{\alpha} + \dfrac{1}{\beta}$ is equal to:
   - (A) $\dfrac{1}{\alpha}$
   - (B) $\dfrac{1}{\alpha} - \dfrac{1}{\beta}$
   - (C) $\dfrac{\alpha - \beta}{\alpha\beta}$
   - (D) $\dfrac{\alpha + \beta}{\alpha\beta}$

8. $\dfrac{u}{v} = \dfrac{v}{w} = k$, then:
   - (A) $u = wk^2$
   - (B) $u = vk^2$
   - (C) $u = w^2k$
   - (D) $u = v^2k$

9. The extent of variation between two extreme observations of a data set is measured by:
   - (A) Average
   - (B) Range
   - (C) Quartiles
   - (D) Median

10. The length of a chord and the radial segment of a circle are congruent, the central angle made by the chord will be:
    - (A) $60°$
    - (B) $45°$
    - (C) $30°$
    - (D) $75°$

11. $\csc^2\theta - \cot^2\theta = $ _____:
    - (A) $1$
    - (B) $-1$
    - (C) $0$
    - (D) $\tan\theta$

12. Product of cube roots of unity is:
    - (A) $0$
    - (B) $1$
    - (C) $-1$
    - (D) $3$

13. A line intersecting a circle is called:
    - (A) Tangent
    - (B) Chord
    - (C) Secant
    - (D) Diameter

14. In a proportion $a : b :: c : d$, $b$ and $c$ are called:
    - (A) Means
    - (B) Extremes
    - (C) Fourth proportional
    - (D) Third proportional

15. A collection of well-defined objects is called:
    - (A) Subset
    - (B) Power set
    - (C) Set
    - (D) Super set

Roll No.(in Figures): .................................. , (in Words): ..............................

Marks: 60          **SUBJECTIVE TYPE (PART- I)**          Time :2.10 Hours

**Q2.** Write short answers to any SIX (6) questions:          $(6\times2=12)$

(i)   Solve by factorization:  $x^2 - x - 20 = 0$     (ii)   Define radical equation.

(iii)  Find the discriminant of the following equation:  $6x^2 - 8x + 3 = 0$

(iv)  Evaluate:  $(1 - \omega - \omega^2)^7$

(v)   Without solving, find the sum and the product of the roots of quadratic equation:  $x^2 - 5x + 3 = 0$

(vi)  Use synthetic division to find the quotient and the remainder when:  $(4x^3 - 5x + 15) \div (x + 3)$

(vii) Find the value of p if the ratios $2p + 5 : 3p + 4$ and $3 : 4$ are equal.

(viii) Define joint variation.

(ix)  Find a third proportional to:  $a^2 - b^2$ , $a - b$

**Q3.** Write short answers to any SIX (6) questions:          $(6\times2=12)$

(i)   Define improper fraction.     (ii)   Define rational fraction.

(iii)  If $X = \{1, 4, 7, 9\}$, $Y = \{2,4,5,9\}$ then find $X \cup Y$

(iv)  If $A = \{a , b\}$, $B = \{c , d\}$ then find $A \times B$ and $B \times A$

(v)   Define domain set of relation.     (vi)   Find a and b if $(a - 4, b - 2) = (2,1)$

(vii) Define arithmetic mean.

(viii) Find arithmetic mean: 12,14,17,20,24,29,35,45

(ix)  The salaries of five teachers in rupees are as: 11500, 12400, 15000, 14500, 14800

**Q4.** Write short answers to any SIX (6) questions:          $(6\times2=12)$

(i)   Define degree.     (ii)   Convert $25°30'$ to decimal degree.

(iii)  Find '$\ell$', when $\theta = 180°$ , $r = 4.9$ cm     (iv)   Define obtuse angle.

(v)   Define circular area.     (vi)   Define length of tangent.

(vii) Define an arc of the circle.     (viii) What is meant by sector of a circle?

(ix)  Define circum circle.

## (PART - II)

Note:   Attempt any THREE questions. Question number 9 is compulsory.          $(3\times8=24)$

**Q5.** (a)  Solve the equation:  $x^4 - 13x^2 + 36 = 0$          4

(b)  Prove that:  $x^3 + y^3 = (x + y)(x + \omega y)(x + \omega^2 y)$          4

**Q6.** (a)  Find value of $\dfrac{x + 2y}{x - 2y} + \dfrac{x + 2z}{x - 2z}$ by using theorem of componendo-dividendo if  $x = \dfrac{4yx}{x + z}$.          4

(b)  Resolve into partial fractions:  $\dfrac{9}{(x - 1)(x + 2)^2}$          4

**Q7.** (a)  If $A = \{1,2,3,4,5,6\}$ , $B = \{2,4,6,8\}$ $C = \{1,4,8\}$ then prove that:          4

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

(b)  Find the standard deviation 'S' for the set of numbers 12,6,7,3,15,10,18,5          4

**Q8.** (a)  Prove that:  $\dfrac{1 + \sin\theta}{1 - \sin\theta} - \dfrac{1 - \sin\theta}{1 + \sin\theta} = 4\tan\theta\sec\theta$          4

(b)  Draw two circles with radii 2.5 cm and 3 cm. If their centres are 6.5 cm apart, then draw two direct common tangents.          4

**Q9.** Prove that perpendicular from the centre of a circle on a chord bisects it.          8

(OR) Prove that any two angles in the same segment of a circle are equal.

**Q1.**                                                                                                    **15**

1. The number of terms in a standard quadratic equation $ax^2 + bx + c = 0$:
   (A) 1         (B) 2         (C) 3         (D) 4

2. Product of cube roots of unity is:
   (A) 0         (B) 1         (C) –1         (D) 3

3. The discriminant of $ax^2 + bx + c = 0$ is:
   (A) $b^2 - 4ac$         (B) $b^2 + 4ac$         (C) $-b^2 + 4ac$         (D) $-b^2 - 4ac$

4. If $u \propto v^2$ then:
   (A) $u = v^2$         (B) $u = kv^2$         (C) $uv^2 = k$         (D) $uv^2 = 1$

5. If $\dfrac{a}{b} = \dfrac{c}{d}$ then componendo property is:
   (A) $\dfrac{a}{a+b} = \dfrac{c}{c+d}$         (B) $\dfrac{a}{a-b} = \dfrac{c}{c-d}$         (C) $\dfrac{ad}{bc}$         (D) $\dfrac{a-b}{b} = \dfrac{c-d}{d}$

6. A fraction in which the degree of numerator is less than the degree of the denominator is called:
   (A) An equation         (B) An improper fraction         (C) An identity         (D) A proper fraction

7. A set with no element is called:
   (A) Subset         (B) Empty set         (C) Singleton set         (D) Super set

8. If $A \subseteq B$ then $A \cap B$ is equal to:
   (A) A         (B) B         (C) $\phi$         (D) $A \cup B$

9. A frequency polygon is a many sided _____:
   (A) Closed figure         (B) Rectangle         (C) Circle         (D) Triangle

10. $\sec\theta \cot\theta = $ _____:
    (A) $\sin\theta$         (B) $\dfrac{1}{\cos\theta}$         (C) $\dfrac{1}{\sin\theta}$         (D) $\dfrac{\sin\theta}{\cos\theta}$

11. The symbol for a triangle is denoted by:
    (A) $\angle$         (B) $\Delta$         (C) $\perp$         (D) $\odot$

12. A circle has only one _____:
    (A) Secant         (B) Chord         (C) Diameter         (D) Centre

13. The arcs opposite to incongruent central angles of a circle are always _____:
    (A) Parallel         (B) Perpendicular         (C) Congruent         (D) Incongruent

14. The length of the diameter of a circle is how many times the radius of the circle?
    (A) 4 times         (B) 3 times         (C) 2 times         (D) 1 time

15. How many common tangents can be drawn for two touching circles?
    (A) 1         (B) 2         (C) 3         (D) 4

**Q2. Write short answers to any SIX (6) questions:**        (6×2=12)

(i)   Write the quadratic equation $\dfrac{x}{x+1} + \dfrac{x+1}{x} = 6$

(ii)   Write the standard quadratic equation and also write quadratic formula to solve it.

(iii)   Find the sum and product of the roots of the equation $2px^2 + 3qx - 4r = 0$ without solving.

(iv)   Form a quadratic equation whose roots are $3+\sqrt{2}$ and $3-\sqrt{2}$

(v)   Evaluate: $(1-3\omega-3\omega^2)^5$        (vi)   Define synthetic division.

(vii) Find p, if 12, p and 3 are in continued proportion.

(viii) Find the ratio $x : y$, if $3(4x - 5y) = 2x - 7y$        (ix)   Find a fourth proportional to 5, 8, 15

**Q3. Write short answers to any SIX (6) questions:**        (6×2=12)

(i)   What is an improper fraction?        (ii)   Find partial fraction of $\dfrac{3}{(x+1)(x-1)}$

(iii)   If $X = \{1,4,7,9\}$ and $Y = \{2,4,5,9\}$ then find $Y \cap X$

(iv)   If $X = \{1,3,5,7, ----, 9\}$, $Y = \{0,2,4,6,8, ----, 20\}$ and $Z = \{2,3,5,7,11,13,17,19,23\}$ then find:

$$(X \cap Y) \cap Z$$

(v)   Find a and b if $(2a + 5, 3) = (7, b - 4)$        (vi)   Define an onto function.

(vii) Define a frequency distribution.

(viii) Find arithmetic mean by direct method: 200, 225, 350, 375, 270, 320, 290

(ix)   For the following data, find the harmonic mean: | $x$ | 12 | 5 | 8 | 4 |

**Q4. Write short answers to any SIX (6) questions:**        (6×2=12)

(i)   Verify the identity: $(1 - \sin\theta)(1 + \sin\theta) = \cos^2\theta$

(ii)   How many minutes are there in two right angles?

(iii)   Find ' r ', when $\ell = 52\,cm$ , $\theta = 45°$        (iv)   What is meant by zero dimension?

(v)   Define circumference.        (vi)   Define secant.

(vii) Define chord of a circle.        (viii) Define cyclic quadrilateral.

(ix)   Define an arc.

## (PART - II)

**Note:**   Attempt any THREE questions. Question number 9 is compulsory.        (3×8=24)

Q5. (a) Solve the equation: $5x^{\frac{1}{2}} = 7x^{\frac{1}{4}} - 2$        4

     (b) Find the value of h using synthetic division, if 3 is the zero of the polynomial $2x^3 - 3hx^2 + 9$    4

Q6. (a) Using componendo-dividendo theorem, solve the equation $\dfrac{\sqrt{x+3}+\sqrt{x-3}}{\sqrt{x+3}-\sqrt{x-3}} = \dfrac{4}{3}$      4

     (b) Resolve into partial fraction: $\dfrac{1}{(x^2-1)(x+1)}$        4

Q7. (a) If $U=\{1,2,3,4, ----, 10\}$, $A=\{1,3,5,7,9\}$ and $B=\{1,4,7,10\}$ then verify that $B-A = B \cap A'$    4

     (b) Calculate variance for the data: 10, 8, 9, 7, 5, 12, 8, 6, 8, 2        4

Q8. (a) Verify: $(\tan\theta + \cot\theta)\tan\theta = \sec^2\theta$        4

     (b) Draw two equal circles of each radius 2.4 cm. If the distance between their centres is 6cm, then draw their transverse tangents?        4

Q9. Prove that a straight line, drawn from the centre of a circle to bisect a chord (which is not a diameter) is perpendicular to the chord.        8

(OR) Prove that the measure of a central angle of a minor arc of a circle is double that of the angle subtended by the corresponding major arc.