Q1.   15

1. The measure which determines the middle most observation in a data set is called:
    (A) median   (B) mode   (C) mean   (D) range

2. $\sec\theta \cot\theta$ is equal to:

    (A) $\sin\theta$ (B) $\cos\theta$ (C) $\dfrac{1}{\sin\theta}$ (D) $\dfrac{1}{\cos\theta}$

3. Right bisectors of the chord of a circle always pass through the:
    (A) radius   (B) centre   (C) diameter   (D) circumference

4. Tangents drawn at the ends of diameter of a circle are _____ to each other.
    (A) parallel   (B) perpendicular   (C) non parallel   (D) collinear

5. The semi circumference and the diameter of a circle both subtend a central angle of:
    (A) 90°   (B) 360°   (C) 270°   (D) 180°

6. Angle inscribed in semi circle is:

    (A) π (B) $\dfrac{\pi}{2}$ (C) $\dfrac{\pi}{3}$ (D) $\dfrac{\pi}{4}$

7. How many common tangents can be drawn for two touching circles?
    (A) 2   (B) 4   (C) 3   (D) 5

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

9. Roots of the equation $4x^2 - 4x + 1$ are:
    (A) real, equal   (B) real, unequal   (C) imaginary   (D) irrational

10. If α , β are the roots of $7x^2 - x + 4 = 0$ then $\alpha\beta$ is:

    (A) $\dfrac{1}{7}$ (B) $\dfrac{7}{4}$ (C) $\dfrac{-4}{7}$ (D) $\dfrac{4}{7}$

11. In a proportion $a : b :: c : d$, b and c are called:
    (A) extremes   (B) means   (C) third proportional   (D) fourth proportional

12. If $\dfrac{u}{v} = \dfrac{v}{w} = k$, then:

    (A) $u = wk^2$ (B) $u = vk^2$ (C) $uv^2 = k$ (D) $u = v^2k$

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

14. A set with no element is called:
    (A) subset   (B) empty set   (C) singleton set   (D) super set

15. If number of elements in set A is 3 and in set B is 4, then number of elements in A×B is:
    (A) 3   (B) 4   (C) 7   (D) 12

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

    (i) Define radical equation.

    (ii) Write in standard form: $\dfrac{1}{x+4}+\dfrac{1}{x-4}=3$

    (iii) Define synthetic division.

    (iv) Discuss the nature of the roots of the equation. $x^2 + 6x - 1 = 0$

    (v) Find the discriminant of the equation. $9x^2 - 30x + 25 = 0$

    (vi) Evaluate: $\left(1-w-w^2\right)^7$ **(vii)** What is meant by direct variation?

    (viii) If $3(4x - 5y) = 2x - 7y$, find the ratio $x : y$.

    (ix) Find the fourth proportional of 5, 8, 15.

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

    (i) Define a rational fraction.   **(ii)** Resolve into partial fractions $\dfrac{1}{x^2-1}$

    (iii) Define intersection of two sets.   **(iv)** Find B', if: $U = \{1,2,3,......10\}$, $B = \{3,5,8\}$

    (v) Find a and b, if: $(a - 4 , b - 2) = (2 , 1)$

    (vi) Find $Y \times Y$ if: $Y = \{-2, 1, 2\}$

    (vii) Define Arithmetic Mean.

    (viii) Find Harmonic Mean for the given data. 12,5,8,4

    (ix) Find median: 82, 93, 86, 92, 79

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

    (i) What is meant by quadrantal angles?   **(ii)** Convert 25°30' to decimal degrees.

    (iii) Find θ, when: $\ell= 4.5m$; $r = 2.5m$ **(iv)** What is meant by projection of a point?

    (v) Define circle.   **(vi)** What is meant by length of a tangent?

    (vii) Define sector of a circle.   **(viii)** Define cyclic quadrilateral.

    (ix) The length of the side of a regular pentagon is 5cm, find its perimeter.

(PART - II)

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

Q5. (a) Solve the equation. $\sqrt{x+3} = 3x - 1$ 4

    (b) If α , β are the roots of the equation $4x^2 - 5x + 6 = 0$, then find the value of $\dfrac{\alpha^2}{\beta}+\dfrac{\beta^2}{\alpha}$ 4

Q6. (a) Using theorem of componendo-dividendo find the value of: $\dfrac{\sqrt{x^2 + 8p^2} - \sqrt{x^2 - p^2}}{\sqrt{x^2 + 8p^2} + \sqrt{x^2 - p^2}}=\dfrac{1}{3}$ 4

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

Q7. (a) Verify that: $(B - A)' = B' \cup A$, if: $U=\{1,2,3,4,......10\}$, $A=\{1,3,5,7,9\}$, $B=\{1,4,7,10\}$ 4

    (b) Find variance. 9, 9, 8, 8, 9, 8, 9, 18   4

Q8. (a) Prove that: $(\cot\theta + \mathrm{cosec}\theta)(\tan\theta - \sin\theta) = \sec\theta - \cos\theta$ 4

    (b) Circumscribe a circle about a triangle ABC with sides $\overline{AB} =6cm$, $\overline{BC} = 3cm$ and $\overline{CA} = 4cm$.   4

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

(OR) Prove that the opposite angles of any quadrilateral inscribed in a circle are supplementary.

Q1.   **15**

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

2. If α, β are the roots of equation, then $\alpha + \beta$ is: $3x^2 + 5x - 2 = 0$
   (A) $\frac{5}{3}$ (B) $\frac{3}{5}$ (C) $\frac{-5}{3}$ (D) $\frac{-2}{3}$

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

4. In a ratio a:b, a is called:
   (A) relation   (B) antecedent   (C) consequent   (D) third

5. The third proportional of x^2 and y^2 is:
   (A) $\frac{x^2}{y^2}$ (B) $x^2 y^2$ (C) $\frac{y^4}{x^2}$ (D) $\frac{y^2}{x^4}$

6. $\frac{x^3 + 1}{(x-1)(x+2)}$ is:
   (A) a proper fraction   (B) an improper fraction (C) an identity   (D) a constant term

7. A collection of well-defined distinct objects is called:
   (A) subset   (B) power set   (C) set   (D) empty set

8. The different number of ways to describe a set is:
   (A) 1   (B) 2   (C) 3   (D) 4

9. A frequency polygon is a _____ of many sides:
   (A) closed figure   (B) rectangle   (C) square   (D) circle

10. 20° is equal to:
    (A) 360'   (B) 630'   (C) 1200'   (D) 3600'

11. Radii of a circle are:
    (A) all equal   (B) double of diameter   (C) all un-equal   (D) half of any chord

12. A circle has only one _____ :
    (A) secant   (B) chord   (C) diameter   (D) centre

13. A 4cm long chord subtands a central angle of 60°, the radial segment of this circle is _____ :
    (A) 1cm   (B) 2cm   (C) 3cm   (D) 4cm

14. A cricle passes through the vertices of right angled $\triangle ABC$ with $m\overline{AC} = 3cm$, $m\overline{BC} = 4cm$ and $m\angle C = 90°$ radius:
    (A) 1.5cm   (B) 2.0cm   (C) 2.5cm   (D) 3.5cm

15. The circumference of a circle is called:
    (A) chord   (B) segment   (C) boundary   (D) secant

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: (6×2=12)

(i) Define quadratic equation.   (ii) Solve by factorization: $5x^2 = 15x$

(iii) Find the discriminant of: $2x^2 - 7x + 1 = 0$

(iv) Prove that the sum of the all cube roots of unity is zero.

(v) Find w^2, if: $w = \dfrac{-1 + \sqrt{-3}}{2}$

(vi) Using synthetic division, show that $(x-2)$ is the factor of. $x^3 + x^2 - 7x + 2$

(vii) Define inverse variation.

(viii) Find the third proportional to 6 and 12.

(ix) Find x, if: 6:x::3:5

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

(i) Define identity.   (ii) change in proper fraction. $\dfrac{x^3 - x^2 + x + 1}{x^2 + 5}$

(iii) Define union of sets.

(iv) Find $X \cup Y$ and $X \cap Y$ if: $X = \{1,4,7,9\}$, $Y = \{2,4,5,9\}$

(v) Define into function.

(vi) Find the range and domain of "R" if: $R = \{(a,b), (b,a), (c,d), (d,e)\}$

(vii) Define harmonic mean.

(viii) Find the median of the given data: 1.9, 2.3, 2.5, 2.7, 2.9, 3.1

(ix) Define variance and write its formula.

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

(i) Convert $\dfrac{7\pi}{8}$ into degree.   (ii) Find "r", when: $\ell = 52cm$, $\theta = 45°$

(iii) Write 47.36° into D°, M; and S" from.

(iv) Whether the triangle with sides 8cm, 15cm and 17cm is acute obtuse or rightangled?

(v) Define circle.   (vi) Define secant line.

(vii) Define circumference of a circle.   (viii) Define circum angle.

(ix) Define the inscribed circle.

(PART - II)

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

Q5. (a) Solve the equation by completing square method. $x^2 + 17x + \dfrac{33}{4} = 0$ 4

(b) If α, β are the roots of the equation $x^2 - 7x + 9 = 0$, form an equation whose roots are 2α and 2β.   4

Q6. (a) Solve by using theorem of componendo-dividendo $\dfrac{\sqrt{x^2 + 2} + \sqrt{x^2 - 2}}{\sqrt{x^2 + 2} - \sqrt{x^2 - 2}} = 2$ 4

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

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

(b) Find standard deviation from the given data. 9, 3, 8, 8, 9, 8, 18   4

Q8. (a) Prove that: $(\cot\theta + \csc\theta)(\tan\theta - \sin\theta) = \sec\theta - \cos\theta$ 4

(b) Inscribe a circle in an equilateral triangle ABC with each side of length 5cm.   4

Q9. Prove that two chords of a circle are congruent then they will be equidistant from the centre.   8

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