

NOTE: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen Ink. Cutting or filling two or more circles will result in zero mark in that question.

Q1. 15

1. A collection of well defined objects is called:
(A) Subset (B) Power set (C) Set (D) Super set
2. The identity $(5x + 4)^2 = 25x^2 + 40x + 16$ is true for _____ of x:
(A) One value (B) Two values (C) All values (D) Three values
3. Find x in proportion $4 : x :: 5 : 15$:
(A) $\frac{75}{4}$ (B) $\frac{4}{3}$ (C) $\frac{3}{4}$ (D) 12
4. In a proportion $a : b :: c : d$, a and d are called:
(A) Means (B) Extremes (C) Third proportional (D) Fourth proportional
5. Cube roots of '-1' are:
(A) $-1, -\omega, -\omega^2$ (B) $-1, \omega, -\omega^2$ (C) $-1, -\omega, \omega^2$ (D) $1, -\omega, -\omega^2$
6. If α, β are the roots of $7x^2 - x + 4 = 0$, then $\alpha\beta$ is:
(A) $-\frac{1}{7}$ (B) $\frac{4}{7}$ (C) $\frac{7}{4}$ (D) $-\frac{4}{7}$
7. The number of terms in a standard quadratic equation $ax^2 + bx + c = 0$ is:
(A) 1 (B) 2 (C) 3 (D) 4
8. Angle inscribed in a semi circle is:
(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$
9. A line intersecting a circle is called:
(A) Secant (B) Tangent (C) Chord (D) Boundary
10. A 4cm long chord subtends a central angle of 60° , the radial segment of this circle is:
(A) 1cm (B) 2cm (C) 3cm (D) 4cm
11. A line which has only one point in common with a circle is called:
(A) Sine of a circle (B) Cosine of a circle (C) Tangent of a circle (D) Secant of a circle
12. Radii of a circle are:
(A) Double of the diameter (B) All equal
(C) All unequal (D) Half of any chord
13. The union of two non-collinear rays, which have common end point is called:
(A) An angle (B) A degree (C) A minute (D) A radian
14. A grouped frequency table is also called:
(A) Data (B) Frequency distribution
(C) Frequency polygon (D) Rectangle
15. If $R = \{(1,3), (2,2), (3,1), (4,4)\}$, the range of R is:
(A) $\{1,2,4\}$ (B) $\{3,2,4\}$ (C) $\{1,3,4\}$ (D) $\{1,2,3,4\}$

Marks: 60

SUBJECTIVE TYPE (PART- I)

Time :2.10 Hours

Q2. Write short answers to any SIX (6) questions:

(6×2=12)

- (i) Define pure quadratic equation.
- (ii) Solve by factorization $x^2 - x - 20 = 0$
- (iii) Find the nature of roots of the equation $x^2 - 5x + 5 = 0$
- (iv) Evaluate: $(1 - 3\omega - 3\omega^2)^5$
- (v) If α, β are the roots of the equation $x^2 + px + q = 0$, then evaluate $\alpha^2 + \beta^2$.
- (vi) Use synthetic division to find the quotient and remainder, when $(x^2 + 7x - 1) \div (x + 1)$
- (vii) If $3(4x - 5y) = 2x - 7y$, find the ratio $x : y$
- (viii) $A \propto \frac{1}{r^2}$ and $A = 2$ when $r = 3$, find r when $A = 72$.

(ix) Find a fourth proportional to 5, 8, 15.

Q3. Write short answers to any SIX (6) questions:

(6×2=12)

- (i) Define improper fraction.
- (ii) Resolve the fraction $\frac{x^3 - x^2 + x + 1}{x^2 + 5}$ into proper fraction.
- (iii) Define binary relation.
- (iv) If $X = \{1,4,7,9\}$ and $Y = \{2,4,5,9\}$ then find $Y \cup X$.
- (v) If $X = \{a,b,c\}$ and $Y = \{d,e\}$, then find the number of elements in $X \times Y$ and $Y \times X$.
- (vi) If $(3 - 2a, b - 1) = (a - 7, 2b + 5)$, then find the value of a and b .
- (vii) Define arithmetic mean.
- (viii) Find range for the following weights of the students:
110, 109, 84, 89, 77, 104, 74, 97, 49, 59, 103, 62
- (ix) Find harmonic mean for the data:

X	12	5	8	4
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Q4. Write short answers to any SIX (6) questions:

(6×2=12)

- (i) Prove that: $\cos^4 \theta - \sin^4 \theta = \cos^2 \theta - \sin^2 \theta$
- (ii) What is radian measure of the central angle of an arc 50m long on the circle of radius 25m?
- (iii) Express 300° angle into radian.
- (iv) Define acute angle.
- (v) What is meant by chord of a circle?
- (vi) Define secant.
- (vii) What is meant by segment of a circle?
- (viii) Define circum angle.
- (ix) Define diameter of a circle.

(PART - II)

Note: Attempt any THREE questions. Question number 9 is compulsory.

(3×8=24)

Q5. (a) Solve the equation by completing square: $x^2 - 2x - 195 = 0$ 4

(b) If α, β are the roots of the equation $x^2 + px + q = 0$, form equation whose roots are α^2, β^2 . 4

Q6. (a) If $a:b = c:d$, ($a, b, c, d \neq 0$) by using k-method, show that $\frac{4a - 9b}{4a + 9b} = \frac{4c - 9d}{4c + 9d}$ 4

(b) Resolve into partial fractions: $\frac{6x^3 + 5x^2 - 7}{3x^2 - 2x - 1}$ 4

Q7. (a) If $U = \{1,2,3,4,\dots,10\}$, $A = \{1,3,5,7,9\}$, $B = \{1,4,7,10\}$, $C = \{1,5,8,10\}$ then verify that: 4

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

(b) The salaries of five teachers in rupees are as follows. Determine standard deviation. 4
11500, 12400, 15000, 14500, 14800

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

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

Q9. Prove that two chords of a circle which are equidistant from the center, are congruent. 8

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

NOTE: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink. Cutting or filling two or more circles will result in zero mark in that question.

15

Q1.

1. Angle inscribed in a semi circle is:
(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{5}$ (D) $\frac{\pi}{2}$
2. A line intersecting a circle is called:
(A) Tangent (B) Chord (C) Secant (D) Boundary
3. The semi circumference and diameter of a circle both subtend a central angle of:
(A) 90° (B) 180° (C) 270° (D) 360°
4. A line which has only one point in common with a circle is called:
(A) Tangent of a circle (B) Sine of a circle (C) Cosine of a circle (D) Secant of a circle
5. A chord passing through the center of a circle is called:
(A) Diameter (B) Radius (C) Circumference (D) Secant
6. $\frac{3\pi}{4}$ radians =:
(A) 115° (B) 135° (C) 150° (D) 30°
7. A histogram is a set of adjacent:
(A) Squares (B) Rectangles (C) Circles (D) Triangles
8. If number of elements in set A is 3 and in set B is 4, then number of elements in $A \times B$ is:
(A) 3 (B) 4 (C) 7 (D) 12
9. The set $\{x / x \in W \wedge x \leq 101\}$ is called:
(A) Infinite set (B) Subset (C) Null set (D) Finite set
10. A function of the form $f(x) = \frac{N(x)}{D(x)}$, with $D(x) \neq 0$, where $N(x)$ and $D(x)$ are polynomials in x , is called:
(A) An identity (B) An equation (C) A fraction (D) Irrational
11. If $\frac{u}{v} = \frac{v}{w} = k$, then:
(A) $u = wk^2$ (B) $u = vk^2$ (C) $u = w^2k$ (D) $u = v^2k$
12. In a proportion $a : b :: c : d$, b and c are called:
(A) Mean (B) Extremes (C) Fourth proportional (D) Third proportional
13. $\alpha^2 + \beta^2 = ?$
(A) $\alpha^2 - \beta^2$ (B) $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ (C) $(\alpha + \beta)^2 - 2\alpha\beta$ (D) $\alpha + \beta$
14. If α, β are the roots of $3x^2 + 5x - 2 = 0$, then $\alpha + \beta$ is:
(A) $\frac{5}{3}$ (B) $\frac{3}{5}$ (C) $-\frac{5}{3}$ (D) $-\frac{2}{3}$
15. An equation which remains unchanged when x is replaced by $\frac{1}{x}$ is called a/an:
(A) Exponential equation (B) Reciprocal equation
(C) Radical equation (D) Quadratic equation

Q2. Write short answers to any SIX (6) questions:

(6×2=12)

- (i) Solve by factorization: $17x^2 = 4 - 32x$ (ii) Write in standard form: $\frac{1}{x+4} + \frac{1}{x-4} = 3$
 (iii) Find the discriminant of the quadratic equation $4x^2 - 7x - 2 = 0$.
 (iv) Evaluate: $\omega^{37} + \omega^{38} - 5$
 (v) If α, β are the roots of the equation $4x^2 - 5x + 6 = 0$, then find the value of $\alpha^2\beta^2$.
 (vi) Define solution set of simultaneous equations.
 (vii) Find a, if the ratios $a + 3 : 7 + a$ and $4:5$ are equal.
 (viii) $V \propto \frac{1}{r^3}$ and $V = 5$ when $r = 3$. Find V when $r = 6$ and r when $V = 320$.

(ix) Find a third proportional to 6, 12.

Q3. Write short answers to any SIX (6) questions:

(6×2=12)

- (i) Define rational fraction.
 (ii) Resolve into partial fractions: $\frac{x-11}{(x-4)(x+3)}$ (iii) Define difference of two sets.
 (iv) If $A = \{1,2,3,4,5,6\}$ and $B = \{2,4,6,8\}$ then prove that $A \cup B = B \cup A$.
 (v) If $A = \{0,2,4\}$, $B = \{-1,3\}$, find $A \times A$ and $B \times A$.
 (vi) Write all the subsets of the set $\{a,b\}$.
 (vii) Write two properties of arithmetic mean. (viii) Find the harmonic mean for the given data:

X	12	5	8	4
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(ix) The salaries of five teachers in rupees are given. Find range of data.
 11500, 12400, 15000, 14500, 14800

Q4. Write short answers to any SIX (6) questions:

(6×2=12)

- (i) Write the relationship between radian and degree measure.
 (ii) Find r , when $\ell = 56\text{cm}$ and $\theta = 45^\circ$
 (iii) Convert $(32.25)^\circ$ to D°, M', S'' form.
 (iv) Whether the triangle with sides 8cm, 15cm, 17cm is right angled triangle?
 (v) Define circular area. (vi) Define tangent of a circle.
 (vii) Define circumference of a circle. (viii) Define in-center of a triangle.
 (ix) Define perimeter.

(PART - II)

Note: Attempt any THREE questions. Question number 9 is compulsory.

(3×8=24)

Q5. (a) Solve the equation: $(x+1)(x+3)(x-5)(x-7) = 192$

4

(b) Solve the simultaneous equations: $x^2 + 2y^2 = 22, 5x^2 + y^2 = 29$

4

Q6. (a) If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$ ($a, b, c, d, e, f \neq 0$) then by using k method show that: $\frac{ac+ce+ea}{bd+df+fb} = \left(\frac{ace}{bdf}\right)^{\frac{2}{3}}$

4

(b) Resolve into partial fractions: $\frac{x^2 - 3x + 1}{(x-1)^2(x-2)}$

4

Q7. (a) If $A = \{1,3,5,7,9\}$, $B = \{1,4,7,10\}$, $C = \{1,5,8,10\}$ then verify that

4

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

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

4

Q8. (a) prove that: $\sqrt{\frac{\sec\theta+1}{\sec\theta-1}} = \frac{\sec\theta+1}{\tan\theta}$

4

(b) Draw two circles with radii 3.5cm and 2cm. If their centers are 6cm apart, then draw two transverse common tangents.

4

Q9. Prove that two chords of a circle which are equidistant from the center are congruent.

8

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