

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. The measure which determines the middle most observation in data set is called:
(A) median (B) mode (C) mean (D) harmonic mean
2. 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
3. $\frac{1}{1 + \sin\theta} + \frac{1}{1 - \sin\theta} = \underline{\hspace{2cm}}$.
(A) $2\sec^2\theta$ (B) $2\cos^2\theta$ (C) $\sec^2\theta$ (D) $\cos\theta$
4. The distance of any point of the circle to its center is called:
(A) radius (B) diameter (C) a chord (D) an arc
5. A circle has only one:
(A) secant (B) chord (C) diameter (D) center
6. Out of two congruent arcs of a circle, if one arc makes a central angle of 30° , then the other arc will subtend the central angle of:
(A) 15° (B) 30° (C) 45° (D) 60°
7. The length of the diameter of a circle is how many times the radius of the circle?
(A) 1 (B) 2 (C) 3 (D) 4
8. The solution set of equation $x^2 - 9 = 0$ is:
(A) {9} (B) {3} (C) $\{\pm 3\}$ (D) {9, 3}
9. Roots of the equation $4x^2 - 5x + 2 = 0$ are:
(A) irrational (B) imaginary (C) rational (D) equal
10. $\alpha^2 + \beta^2 =$:
(A) $\alpha^2 - \beta^2$ (B) $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ (C) $(\alpha + \beta)^2 - 2\alpha\beta$ (D) $\alpha + \beta$
11. In continued proportion $a : b = b : c$, $ac = b^2$, is said to be _____ proportional between a and c:
(A) third (B) fourth (C) means (D) extremes
12. The fourth proportional w of $x : y :: v : w$ is:
(A) $\frac{xy}{v}$ (B) $\frac{vy}{x}$ (C) xyv (D) $\frac{x}{vy}$
13. 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
14. A collection of well defined objects is called:
(A) subset (B) power set (C) set (D) super set
15. Power set of an empty set is:
(A) ϕ (B) {a} (C) $\{\phi, \{a\}\}$ (D) $\{\phi\}$

Marks: 60

SUBJECTIVE TYPE (PART- I)

Time :2.10 Hours

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

(6×2=12)

- (i) Write in standard form: $\frac{x}{x+1} + \frac{x+1}{x} = 6$
- (ii) Solve by factorization: $5x^2 = 15x$
- (iii) Write quadratic equation having roots 4, 9
- (iv) Find ω^2 , if $\omega = \frac{-1 + \sqrt{-3}}{2}$
- (v) Define simultaneous equations.
- (vi) Evaluate: $(9 + 4\omega + 4\omega^2)^3$
- (vii) Define ratio and give one example.
- (viii) Find the value of x when $6 : x :: 3 : 5$
- (ix) If u and v varies inversely and $u = 8$ when $v = 3$, find v when $u = 12$.

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

(6×2=12)

- (i) Resolve $\frac{1}{x^2-1}$ into partial fractions.
- (ii) Define an onto function.
- (iii) Write DeMorgan's laws.
- (iv) If $U = \{1,2,3,\dots,10\}$ and $A = \{2,4,6,8\}$ then find A' .
- (v) If $A = \{a, b\}$ and $B = \{c, d\}$, then find $B \times A$ and $B \times B$.
- (vi) Write any two properties of arithmetic mean.
- (vii) Define standard deviation.
- (viii) Find the geometric mean of the observations 2, 4, 8 using basic formula.
- (ix) What do you mean by weighted arithmetic mean?

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

(6×2=12)

- (i) Express angle 225° into radians.
- (ii) Prove that: $\frac{\sin\theta + \cos\theta}{\cos\theta} = 1 + \tan\theta$
- (iii) Define projection of a point.
- (iv) Define a circle.
- (v) Define secant of a circle.
- (vi) Define chord of a circle.
- (vii) Define central angle.
- (viii) Define regular polygon.
- (ix) Define perimeter.

(PART - II)

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

(3×8=24)

- Q5. (a) Solve the given equation: $\sqrt{x+3} = 3x-1$ 4
- (b) Prove that: $x^3 + y^3 = (x+y)(x+\omega y)(x+\omega^2 y)$ 4
- Q6. (a) Using theorem of componendo dividendo, solve the equation: $\frac{\sqrt{x+3} + \sqrt{x-3}}{\sqrt{x+3} - \sqrt{x-3}} = \frac{4}{3}$ 4
- (b) Resolve into partial fractions: $\frac{11x+3}{(x-3)(x^2+9)}$ 4
- Q7. (a) If $A = \{1, 3, 5, 7, 9\}$, $B = \{1, 4, 7, 10\}$, $C = \{1, 5, 8, 10\}$ then verify that 4
 $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
- (b) Calculate standard deviation for the data: 12, 6, 7, 3, 15, 10, 18, 5 4
- Q8. (a) If $\cos\theta = \frac{-2}{3}$ and terminal arm of the angle θ is in quadrant II, find the values of remaining 4
trigonometric functions.
- (b) Practically find the center of an arc ABC. 4
- Q9. Prove that if two chords of a circle are congruent then they will be equidistant from the center. 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.

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15

Q1.

1. If $A \subseteq B$, then $A - B$ is equal to:
(A) A (B) B (C) ϕ (D) $B - A$
2. The set $\{x|x \in \mathbb{W} \wedge x \leq 101\}$ is:
(A) infinite set (B) subset (C) null set (D) finite set
3. $\frac{2x+1}{(x+1)(x-1)}$ is:
(A) an improper fraction (B) an equation (C) a proper fraction (D) an identity
4. If $a : b = x : y$ then alternendo property is:
(A) $\frac{a}{x} = \frac{b}{y}$ (B) $\frac{a}{b} = \frac{x}{y}$ (C) $\frac{a+b}{b} = \frac{x+y}{y}$ (D) $\frac{a-b}{x} = \frac{x-y}{y}$
5. If $u \propto v^2$ then:
(A) $u = v^2$ (B) $u = kv^2$ (C) $uv^2 = k$ (D) $uv^2 = 1$
6. If α, β are the roots of $px^2 + qx + r = 0$, then sum of roots 2α and 2β is:
(A) $\frac{-q}{p}$ (B) $\frac{-2q}{p}$ (C) $\frac{r}{p}$ (D) $\frac{-q}{2p}$
7. Two square roots of unity are:
(A) 1, ω (B) 1, $-\omega$ (C) 1, $-\omega$ (D) ω, ω^2
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. How many common tangents can be drawn for two disjoint circles?
(A) 2 (B) 3 (C) 1 (D) 4
10. A pair of chords of a circle subtending two congruent central angles is:
(A) congruent (B) incongruent (C) overlapping (D) parallel
11. Tangents drawn at the ends of diameter of a circle are _____ to each other.
(A) parallel (B) non-parallel (C) collinear (D) perpendicular
12. Line segment joining any point of the circle to the center is called:
(A) circumference (B) diameter (C) radial segment (D) perimeter
13. $\sec^2\theta =$:
(A) $1 - \sin^2\theta$ (B) $1 + \tan^2\theta$ (C) $1 + \cos^2\theta$ (D) $1 - \tan^2\theta$
14. $20^\circ =$:
(A) $360'$ (B) $630'$ (C) $3600'$ (D) $1200'$
15. Sum of the deviations of variable 'X' from its mean is always:
(A) 0 (B) 1 (C) same (D) 2

Marks: 60

SUBJECTIVE TYPE (PART- I)

Time :2.10 Hours

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

(6×2=12)

- (i) Solve by factorization: $x^2 - x - 20 = 0$ (ii) Define reciprocal equation.
(iii) Without solving the equation $2px^2 + 3qx - 4r = 0$, find the sum and product of its roots.
(iv) Evaluate: $(9 + 4\omega + 4\omega^2)^3$
(v) Write the quadratic equation having the roots $-1, -7$
(vi) If α, β are the roots $4x^2 - 5x + 6 = 0$, then find the value of $\alpha^2\beta^2$.
(vii) Define inverse variation.
(viii) Find the fourth proportional to 8, 7, 6
(ix) Find x in the given proportion. $3x - 2 : 4 :: 2x + 3 : 7$

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

(6×2=12)

- (i) Find partial fractions of $\frac{3}{(x+1)(x-1)}$.
(ii) Find the sets X and Y if $X \times Y = \{(a,a), (b,a), (c,a), (d,a)\}$
(iii) If $A = \{1, 2, 3, 4, 5, 6\}$, $B = \{2, 4, 6, 8\}$ then prove that $A \cap B = B \cap A$
(iv) Write all the subsets of the set $\{a, b\}$.
(v) Define a function.
(vi) Name two measures of central tendency.
(vii) Find the harmonic mean for the given data:

x	12	5	8	4
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(viii) On 5 terms tests in mathematics, a student has made marks of 82, 93, 86, 92 and 79. Find median for the marks.
(ix) Define mode.

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

(6×2=12)

- (i) Prove that: $\tan^4\theta + \tan^2\theta = \tan^2\theta \sec^2\theta$ (ii) What are trigonometric ratios?
(iii) Define right angle. (iv) Define circumcircle.
(v) Define secant of circle with diagram. (vi) Define circumference of a circle.
(vii) Define cyclic quadrilateral. (viii) Define radius.
(ix) Define incircle.

(PART - II)

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

(3×8=24)

- Q5. (a) Solve $x^{\frac{2}{3}} + 54 = 15x^{\frac{1}{3}}$ 4
(b) Find p if the roots of the equation $x^2 - x + p^2 = 0$ differ by unity. 4
Q6. (a) If 2 is added in each number of the ratio 3 : 4, we get a new ratio 5 : 6 find the numbers. 4
(b) Resolve into partial fractions: $\frac{1}{(x-1)^2(x-2)}$ 4
Q7. (a) Prove that $(A \cup B)' = A' \cap B'$ such that $U = \{1,2,3,4,5,6,7,8,9,10\}$, $A = \{1,3,5,7,9\}$, $B = \{2,3,5,7\}$ 4
(b) Find the standard deviation 'S' of: 12, 6, 7, 3, 15, 10, 18, 5 4
Q8. (a) Prove that: $(\tan\theta + \cot\theta)(\cos\theta + \sin\theta) = \sec\theta + \operatorname{cosec}\theta$ 4
(b) Inscribe a circle in a triangle ABC with sides $|AB| = 5\text{cm}$, $|BC| = 3\text{cm}$ and $|CA| = 3\text{cm}$. 4
Also measure its in radius.
Q9. Prove that a straight line, drawn from the center of a circle to bisect a chord (which is not a diameter) is perpendicular to the chord. 8
(OR) Prove that any two angles in the same segment of a circle are equal.