

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 set $Q = \left\{ \frac{a}{b} \mid a, b \in \mathbb{Z} \wedge b \neq 0 \right\}$ is called a set of:
(A) whole numbers (B) natural numbers (C) irrational numbers (D) rational numbers
2. The number of elements in power set $\{1,2,3\}$ is:
(A) 4 (B) 6 (C) 8 (D) 9
3. The extent of variation between two extreme observations of a data set is measured by:
(A) average (B) range (C) quartiles (D) dispersion
4. $\frac{3\pi}{4}$ radian = : (A) 115° (B) 135° (C) 150° (D) 30°
5. Locus of a point in a plane equidistant from a fixed point is called:
(A) radius (B) circle (C) circumference (D) diameter
6. $\operatorname{cosec}^2\theta - \cot^2\theta =$:
(A) -1 (B) 1 (C) 0 (D) $\tan\theta$
7. A tangent line intersects the circle at:
(A) three points (B) two points (C) single point (D) no point at all
8. The length of a chord and the radial segment of a circle are congruent. The central angle made by the chord will be:
(A) 30° (B) 45° (C) 60° (D) 75°
9. The measure of the external angle of a regular hexagon is:
(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{2}$
10. Standard form of quadratic equation is:
(A) $bx + c = 0, b \neq 0$ (B) $ax^2 + bx + c = 0, a \neq 0$
(C) $ax^2 = bx, a \neq 0$ (D) $ax^2 = 0, a \neq 0$
11. Product of cube roots of unity is:
(A) 0 (B) 1 (C) -1 (D) 3
12. If $b^2 - 4ac < 0$, then the roots of $ax^2 + bx + c = 0$ are:
(A) irrational (B) rational (C) imaginary (D) equal
13. If $y^2 \propto \frac{1}{x^3}$ then: (A) $y^2 = \frac{k}{x^3}$ (B) $y^2 = \frac{1}{x^3}$ (C) $y^2 = x^2$ (D) $y^2 = kx^3$
14. If $\frac{a}{b} = \frac{c}{d}$, then componendo property is:
(A) $\frac{a}{a+b} = \frac{c}{c+d}$ (B) $\frac{a}{a-b} = \frac{c}{c-d}$ (C) $\frac{ad}{bc}$ (D) $\frac{a-b}{b} = \frac{c-d}{d}$
15. A fraction in which the degree of the numerator is greater or equal to the degree of denominator is called a/an:
(A) proper fraction (B) improper fraction (C) equation (D) identity

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. $x^2 - x - 20 = 0$
- (iii) Discuss the nature of the roots of the quadratic equation $x^2 + 3x + 5x = 0$
- (iv) Evaluate $(1 - \omega + \omega^2)^6$
- (v) Find $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ of the roots of equation $x^2 - 4x + 3 = 0$.
- (vi) Prove that the sum of all the cube roots of unity is zero.
- (vii) Define direct variation. (viii) Find a mean proportional to 16 and 49.
- (ix) Find x if $6 : x :: 3 : 5$

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

- (i) Resolve into partial fractions $\frac{3x-1}{x^2-1}$ (ii) If $X = \{1,4,7,9\}$ and $Y = \{2,4,5,9\}$ then find $Y \cup X$.
- (iii) If $(2a + 5, 3) = (7, b - 4)$ then find a and b
- (iv) If $Y = \{-2,1,2\}$ then find two binary relation for $Y \times Y$
- (v) Define one-one function.
- (vi) The salaries of five teachers are as follows. Find mean. 11500, 12400, 15000, 14500, 14800
- (vii) Find the modal size (mode) of shoe for the given data 4,4,5,6,6,6,7,7,5,8,8,8,6,5,6,7,5
- (viii) Define harmonic mean. (ix) Define mode.

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

- (i) Find θ when $l = 4.5m, r = 2.5m$ (ii) Prove that $\frac{1}{1-\cos\theta} + \frac{1}{1+\cos\theta} = 2\operatorname{cosec}^2\theta$
- (iii) Define acute angle. (iv) Define sector of a circle. (v) Define tangent to a circle.
- (vi) Differentiate between a chord and the diameter of a circle.
- (vii) Define circum angle. (viii) Define vertices. (ix) Define triangle.

(PART - II)

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

Q5. (a) Solve by using quadratic formula. $\frac{x+2}{x-1} - \frac{4-x}{2x} = 2\frac{1}{3}$ 4

(b) Solve the given equation by using synthetic division having roots -2 and 6 $x^4 - 49x^2 + 36x + 252 = 0$ 4

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

(b) Resolve into partial fractions $\frac{7x-25}{(x-4)(x-3)}$ 4

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

(b) The length of 32 items are given below. Find the mean length of the distribution. 4

Length	20 - 22	23 - 25	26 - 28	29 - 31	32 - 34
Frequency	3	6	12	9	2

Q8. (a) If $\cos\theta = \frac{-2}{3}$ and terminal arm of the angle θ is in quadrant II, find the values of remaining trigonometric functions. 4

(b) Draw two perpendicular tangents to a circle of radius 3cm. 4

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

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. The range of $R = \{(1,3), (2,2), (3,1), (4,4)\}$ is:
 (A) $\{1,2,4\}$ (B) $\{3,2,4\}$ (C) $\{1,3,4\}$ (D) $\{1,2,3,4\}$
2. Mean is affected by change in:
 (A) value (B) ratio (C) origin (D) place
3. $\frac{1}{2} \operatorname{cosec} 45^\circ = \underline{\hspace{2cm}}$. (A) $\frac{1}{2\sqrt{2}}$ (B) $\sqrt{2}$ (C) $\frac{1}{\sqrt{2}}$ (D) $\frac{\sqrt{3}}{2}$
4. $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} = \underline{\hspace{2cm}}$.
 (A) $2\sec^2\theta$ (B) $2\cos^2\theta$ (C) $\sec^2\theta$ (D) $\cos\theta$
5. The symbol used for a triangle is:
 (A) $<$ (B) Δ (C) \perp (D) \odot
6. Two tangents drawn to a circle from a point outside it are of _____ in length.
 (A) half (B) equal (C) double (D) tripple
7. A pair of chords of a circle subtending two congruent central angles is:
 (A) congruent (B) incongruent (C) over lapping (D) parallel
8. A line intersecting a circle is called:
 (A) tangent (B) chord (C) diameter (D) secant
9. The quadratic formula is:
 (A) $x = \frac{b \pm \sqrt{b^2 - 4ac}}{2a}$ (B) $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ (C) $x = \frac{b \pm \sqrt{b^2 + 4ac}}{2a}$ (D) $x = \frac{-b \pm \sqrt{b^2 + 4ac}}{2a}$
10. Sum of the cube roots of unity is:
 (A) 0 (B) 1 (C) -1 (D) 3
11. If α, β are the roots of $3x^2 + 5x - 2 = 0$ then $\alpha + \beta$ is:
 (A) $-\frac{5}{3}$ (B) $\frac{5}{3}$ (C) $\frac{3}{5}$ (D) $-\frac{2}{3}$
12. The fourth proportional w of $x : y :: v : w$ is:
 (A) $\frac{xy}{v}$ (B) $\frac{x}{vy}$ (C) $\frac{vy}{x}$ (D) xyv
13. If $\frac{u}{v} = \frac{v}{w} = k$ then:
 (A) $u = vk^2$ (B) $u = w^2k$ (C) $u = v^2k$ (D) $u = wk^2$
14. $\frac{2x+1}{(x+1)(x-1)}$ is a/an:
 (A) equation (B) identity (C) proper fraction (D) improper fraction
15. A set with no element is called:
 (A) subset (B) singleton set (C) super set (D) empty set

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. $x^2 - 11x = 152$
- (ii) Solve by using quadratic formula. $6x^2 - 3 - 7x = 0$
- (iii) If α, β are the roots of the equation $lx^2 + mx + n = 0$ ($l \neq 0$) then find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$.
- (iv) Evaluate: $\omega^{37} + \omega^{38} - 5$
- (v) Find the discriminant of $6x^2 - 8x + 3 = 0$
- (vi) If α, β are the roots of the equation $x^2 - 3x + 6 = 0$ form equation whose roots are α^2, β^2 .
- (vii) Define inverse variation.
- (viii) Find a third proportional to $a^2 - b^2, a - b$.
- (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) Define proper fraction with example.
- (ii) If $X = \{1,4,7,9\}$, $Y = \{2,4,5,9\}$ find $X \cup Y, X \cap Y$.
- (iii) Define set with an example.
- (iv) Find a and b if $(a - 4, b - 2) = (2, 1)$
- (v) Write all the subsets of the set $\{a, b\}$
- (vi) Define arithmetic mean.
- (vii) Find range from the given data: 11500, 12400, 15000, 14500, 14800
- (viii) Find arithmetic mean: 12,14,17,20,24,29,35,45
- (ix) Define mode.

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

(6×2=12)

- (i) Convert $\frac{7\pi}{8}$ into degree
- (ii) Verify the identity. $\tan\theta + \cot\theta = \sec\theta \operatorname{cosec}\theta$
- (iii) Define acute angle.
- (iv) Define sector of a circle.
- (v) Define chord of a circle.
- (vi) Define arc of circle.
- (vii) Define diameter of circle.
- (viii) Define inscribed circle.
- (ix) Define polygon.

(PART - II)

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

(3×8=24)

Q5. (a) Solve the given equation by completing square: $11x^2 - 34x + 3 = 0$

4

(b) If α, β are the roots of the equation $x^2 + px + q = 0$ form equation whose roots are $\frac{\alpha}{\beta}, \frac{\beta}{\alpha}$

4

Q6. (a) Solve the equation by using componendo dividendo theorem. $\frac{(x+5)^3 - (x-3)^3}{(x+5)^3 + (x-3)^3} = \frac{13}{14}$

4

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

4

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

4

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

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

4

Q8. (a) Find angle of elevation of the sun if a 6 feet man casts a 3.5 feet shadow.

4

(b) For an arc draw two perpendicular bisectors of the chords \overline{PQ} and \overline{QR} of this arc, construct a circle through P, Q and R.

4

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

8

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