

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. $\sec\theta \cot\theta = \underline{\hspace{2cm}}$.
(A) $\sin\theta$ (B) $\frac{1}{\cos\theta}$ (C) $\frac{1}{\sin\theta}$ (D) $\frac{\sin\theta}{\cos\theta}$
2. If $a : b = x : y$, then alternando 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) $\frac{a-b}{x} = \frac{x-y}{y}$
3. A frequency polygon is a many sided:
(A) closed figure (B) rectangle (C) square (D) circle
4. How many common tangents can be drawn for two disjoint circles?
(A) 1 (B) 2 (C) 3 (D) 4
5. Point $(-1, 4)$ lies in quadrant:
(A) I (B) II (C) III (D) IV
6. The discriminant of $ax^2 + bx + c = 0$ is:
(A) $-b^2 - 4ac$ (B) $b^2 + 4ac$ (C) $-b^2 + 4ac$ (D) $b^2 - 4ac$
7. A circle has only one ;
(A) secant (B) chord (C) diameter (D) centre
8. Cube roots of -1 are:
(A) $-1, \omega, -\omega^2$ (B) $-1, -\omega, -\omega^2$ (C) $1, -\omega, \omega^2$ (D) $1, -\omega, -\omega^2$
9. $(x + 3)^2 = x^2 + 6x + 9$ is:
(A) a linear equation (B) an equation (C) an identity (D) fraction
10. The number of methods to solve a quadratic equation is:
(A) 1 (B) 2 (C) 3 (D) 4
11. The number of elements in a power set $\{1,2,3\}$ is:
(A) 4 (B) 6 (C) 8 (D) 9
12. A pair of chords of a circle subtending two congruent central angles is:
(A) incongruent (B) congruent (C) overlapping (D) parallel
13. If $\tan\theta = \sqrt{3}$ then θ is equal to:
(A) 90° (B) 45° (C) 60° (D) 30°
14. If $u \propto v^2$ then:
(A) $u = v^2$ (B) $u = kv^2$ (C) $uv^2 = k$ (D) $uv^2 = 1$
15. The distance of any point of the circle to its centre is called:
(A) radius (B) diameter (C) a chord (D) an arc

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. Give an example. (ii) Solve by factorization: $5x^2 = 30x$
 (iii) Find the discriminant of the following equation: $2x^2 - 7x + 1 = 0$
 (iv) Write the quadratic equation having roots $-2, 3$
 (v) Discuss the nature of roots of the equation $x^2 + 3x + 5 = 0$
 (vi) Find ω^2 , if $\omega = \frac{-1 + \sqrt{-3}}{2}$
 (vii) Find a, if the ratios $a + 3 : 7 + a$ and $4 : 5$ are equal.

(viii) Define direct variation.

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

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

(6×2=12)

- (i) Define identity. (ii) Define complement of a set.
 (iii) Find $(A \cap B)$ and $(A \cup B)$ when $A = \{2, 3, 5, 7\}$ and $B = \{3, 5, 8\}$
 (iv) Find $(A - B)$ and $(B - A)$ when $A = N$ and $B = W$ (v) Write all subset of $A = \{a, b\}$
 (vi) The sugar contents for a random sample of 6 packs of juice of a certain brand are as given, find the median: 2.3, 2.7, 2.5, 2.9, 3.1 and 1.9
 (vii) Define variance.
 (viii) Find the harmonic mean of a data. 12, 5, 8, 4 (ix) Define mode.

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

(6×2=12)

- (i) Convert $\frac{3\pi}{4}$ to degrees. (ii) Find 'l', when $\theta = 180^\circ$ and $r = 4.9\text{cm}$
 (iii) Define projection. (iv) Define collinear points.
 (v) Define secant. (vi) Define sector of a circle.
 (vii) Define chord of a circle. (viii) Define escribed circle.
 (ix) Define vertices.

(PART - II)

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

(3×8=24)

Q5. (a) Solve the equation. $2x^4 = 9x^2 - 4$ 4

(b) Show that the equation $x^2 + (mx + c)^2 = a^2$ has equal roots if $c^2 = a^2(1 + m^2)$ 4

Q6. (a) Using theorem of componendo-dividendo solve: $\frac{(x+5)^3 - (x-3)^3}{(x+5)^3 + (x-3)^3} = \frac{13}{14}$ 4

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

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

(b) The marks of six students in Mathematics are as follow. Determine variance: 4

Student	1	2	3	4	5	6
Marks	60	70	30	90	80	42

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

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

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

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Q1.

15

1. $\frac{3\pi}{4}$ radians = ____.
(A) 115° (B) 135° (C) 150° (D) 30°
2. The third proportional of x^2 and y^2 is:
(A) $\frac{y^2}{x^2}$ (B) x^2y^2 (C) $\frac{y^4}{x^2}$ (D) $\frac{y^2}{x^4}$
3. A histogram is a set of adjacent:
(A) squares (B) rectangles (C) circles (D) triangles
4. How many common tangents can be drawn for two touching circles?
(A) 1 (B) 2 (C) 3 (D) 4
5. Power set of an empty set is:
(A) ϕ (B) $\{a\}$ (C) $\{\phi, \{a\}\}$ (D) $\{\phi\}$
6. Two square roots of unity are:
(A) 1, -1 (B) 1, ω (C) 1, $-\omega$ (D) ω, ω^2
7. A circle has only one ____.
(A) secant (B) chord (C) diameter (D) centre
8. The number of methods to solve a quadratic equation is:
(A) 1 (B) 2 (C) 3 (D) 4
9. A fraction in which the degree of the 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
10. Sum of cube roots of unity is:
(A) 0 (B) 1 (C) -1 (D) 3
11. If A and B are disjoint sets, then $A \cup B$ is equal to:
(A) A (B) B (C) ϕ (D) $B \cup A$
12. The length of a chord and the radial segment of a circle are congruent, then the central angle made by the chord will be:
(A) 30° (B) 45° (C) 60° (D) 75°
13. $\frac{1}{1 + \sin\theta} + \frac{1}{1 - \sin\theta}$:
(A) $2\sec^2\theta$ (B) $2\cos^2\theta$ (C) $\sec^2\theta$ (D) $\cos\theta$
14. In a ratio a : b, a is called:
(A) relation (B) antecedent (C) consequent (D) proportion
15. The symbol for a triangle is denoted by:
(A) \angle (B) Δ (C) \perp (D) \odot

Marks: 60

SUBJECTIVE TYPE (PART- I)

Time :2.10 Hours

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

(6×2=12)

- (i) Define reciprocal equation. (ii) Solve by factorization: $5x^2 = 15x$
(iii) Find discriminant of the quadratic equation: $4x^2 - 7x - 2 = 0$
(iv) Evaluate: $(9 + 4\omega + 4\omega^2)^3$ (v) Write the quadratic equation having roots 4, 9.
(vi) Using synthetic division, divide $p(x) = x^4 - x^2 + 15$ by $x + 1$
(vii) If $3(4x - 5y) = 2x - 7y$, find the ratio $x : y$.
(viii) Find the fourth proportional to: 8, 7, 6 (ix) Define joint variation.

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

(6×2=12)

- (i) Define fraction. (ii) Define De-Morgan's laws.
(iii) If $A = \{1,3,5,7,9\}$ and $B = \{1,4,7,10\}$ then find $(A - B)$
(iv) If $A = \{a,b\}$ and $B = \{c,d\}$ then find $A \times B$ and $B \times A$
(v) Find domain and the range of $R = \{(1,1), (2,3), (3,4), (4,3), (5,4)\}$
(vi) Define arithmetic mean and give an example.
(vii) Find range for the weights of students: 110,109,84,89,77,104,74,97,49,59,103,62
(viii) On 5 terms test in mathematics a student has made marks of 82, 93, 86, 92 and 79. Find the median for the marks.

- (ix) For the following data, find the harmonic mean

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

(6×2=12)

- (i) Define an angle. (ii) Convert $\frac{3\pi}{4}$ to degrees.
(iii) Define projection. (iv) Define circle.
(v) Define secant. (vi) Define circumference of a circle.
(vii) Define sector of a circle. (viii) Define radius of a circle.
(ix) Define circum circle.

(PART - II)

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

(3×8=24)

Q5. (a) Solve the equation by completing square: $7x^2 + 2x - 1 = 0$ 4

(b) For what value of k, the expression $k^2x^2 + 2(k + 1)x + 4$ is perfect square. 4

Q6. (a) If $a : b = c : d$ ($a,b,c,d \neq 0$) by sing k-method, show that $\frac{a}{b} = \sqrt{\frac{a^2 + c^2}{b^2 + d^2}}$ 4

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

Q7. (a) If $U = \{1,2,3,4,\dots,10\}$, $A = \{1,3,5,7,9\}$ and $B = \{2,3,4,5,8\}$ then prove that $(B - A)' = B' \cup A$ 4

(b) Find standard deviation 'S': 9,3,8,8,9,8,9,18 4

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

(b) Two equal circles are at 8cm apart. Draw two direct common tangents of this pair of circles. 4

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

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