

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. An equation of the type $3^x + 3^{2-x} + 6 = 0$ is a/an:
(A) exponential equation (B) reciprocal equation (C) radical equation (D) linear equation
2. Product of cube roots of unity is:
(A) 0 (B) 1 (C) -1 (D) 3
3. If α, β are the roots of equation $Px^2 + qx + r = 0$, then the sum of the roots 2α and 2β is:
(A) $-\frac{q}{p}$ (B) $\frac{r}{p}$ (C) $-\frac{2q}{p}$ (D) $\frac{q}{-2p}$
4. The fourth proportional "w" of $x : y :: v : w$ is:
(A) $\frac{xy}{v}$ (B) $\frac{vy}{x}$ (C) xyv (D) $\frac{x}{vy}$
5. If $a : b = x : y$ then invertendo property is:
(A) $\frac{a}{a-b} = \frac{x}{x-y}$ (B) $\frac{a}{x} = \frac{b}{y}$ (C) $\frac{a+b}{b} = \frac{x+y}{y}$ (D) $\frac{b}{a} = \frac{y}{x}$
6. $\frac{2x+1}{(x+1)(x-1)}$ is a _____.
(A) An Improper Fraction (B) An Equation (C) A Proper Fraction (D) An Identity
7. If $A \subseteq B$ then $A \cup B$ is equal to:
(A) B (B) A (C) ϕ (D) $A \times B$
8. If number of elements in set A is 3 and in set B is 4, then the number of elements in $A \times B$ is:
(A) 3 (B) 4 (C) 12 (D) 7
9. The most frequent occurring observation in a data is called:
(A) Median (B) Harmonic Mean (C) Geometric Mean (D) Mode
10. $\frac{3\pi}{4}$ radian = :
(A) 115° (B) 135° (C) 150° (D) 30°
11. Locus of a point in a plane equidistant from a fixed point is called _____.
(A) radius (B) diameter (C) radial segment (D) circle
12. 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
13. A pair of chords of a circle subtending two congruent central angles is:
(A) congruent (B) overlapping (C) incongruent (D) parallel
14. The tangent and radius of a circle at a point of contact are:
(A) parallel (B) not perpendicular (C) perpendicular (D) equal
15. The measure of the external angles of a regular octagon is:
(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{8}$ (D) $\frac{\pi}{3}$

Marks: 60

SUBJECTIVE TYPE (PART- I)

Time :2.10 Hours

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

(6×2=12)

- (i) Define by factorization. $5x^2 = 15x$
- (ii) Define quadratic equation.
- (iii) Find the discriminant of the equation $2x^2 + 3x - 1 = 0$
- (iv) Without solving find the sum and the product of the roots of the quadratic equation $x^2 - 5x + 3 = 0$
- (v) Define synthetic division.
- (vi) Form the quadratic equation with roots 3 and 4.
- (vii) Define ratio and give one example.
- (viii) Find the fourth proportional of 8, 7, 6.
- (ix) Define mean proportional.

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

(6×2=12)

- (i) What is improper fraction?
- (ii) Resolve into partial fractions. $\frac{x-11}{(x-4)(x+3)}$
- (iii) Write all the subsets of the set {a,b}.
- (iv) If X = set of prime numbers less than or equal to 17 and Y = set of first 12 natural numbers, then find the $X \cap Y$.
- (v) If $A = \{a,b\}$ and $B = \{c,d\}$, then find $A \times B$ and $B \times A$.
- (vi) If $U = \{1,2,3,\dots,10\}$, $A = \{2,3,5,7\}$, $B = \{3,5,8\}$ then find A' and B' .
- (vii) Define range.
- (viii) Find range for the following weights of students. 110,109,84,89,77,104,74,97,49,59,103,62
- (ix) Find the modal size of shoes for the following data: 4,4,5,5,6,6,6,7,7,5,7,5,8,8,8,6,5,6,5,7

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

(6×2=12)

- (i) Define an angle of depression.
- (ii) Find "r" when $\ell = 56\text{cm}$, $\theta = 45^\circ$
- (iii) Prove that: $\frac{\sin\theta + \cos\theta}{\cos\theta} = 1 + \tan\theta$
- (iv) Define zero dimension.
- (v) Differentiate between minor arc and major arc of a circle.
- (vi) Define tangent to a circle.
- (vii) Define segment of a circle.
- (viii) Define circumangle.
- (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 given equation by completing square. $x^2 + 17x + \frac{33}{4} = 0$

4

(b) Prove that: $x^3 + y^3 + z^3 - 3xyz = (x+y+z)(x+wy+w^2z)(x+w^2y+wz)$

4

Q6. (a) If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$ ($a, b, c, d, e, f \neq 0$) then show that by using "K" method: $\frac{a}{b} = \sqrt{\frac{a^2 + c^2 + e^2}{b^2 + d^2 + f^2}}$

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 prove that $A - B = A \cap B'$

4

(b) Find standard deviation "S" of: 12,6,7,3,15,10,18,5

4

Q8. (a) Prove that: $\frac{1 + \cos\theta}{\sin\theta} + \frac{\sin\theta}{1 + \cos\theta} = 2\text{Cosec}\theta$

4

(b) Draw two common tangents to two touching circles of radii 2.5cm and 3.5cm.

4

Q9. Prove that A straight line drawn from the centre 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.

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. Two linear factors of $x^2 - 15x + 56$ are:
(A) $(x - 7)$ and $(x + 8)$ (B) $(x + 7)$ and $(x - 8)$ (C) $(x - 7)$ and $(x - 8)$ (D) $(x + 7)$ and $(x + 8)$
2. If $y^2 \propto \frac{1}{x^3}$ then:
(A) $y^2 = \frac{1}{x^3}$ (B) $y^2 = x^2$ (C) $y^2 = Kx^3$ (D) $y^2 = \frac{K}{x^3}$
3. The discriminant of equation $ax^2 + bx + c = 0$ is:
(A) $b^2 - 4ac$ (B) $b^2 + 4ac$ (C) $-b^2 + 4ac$ (D) $-b^2 - 4ac$
4. If α, β are the roots of equation $7x^2 - x + 4 = 0$, then $\alpha\beta$ is:
(A) $\frac{-1}{7}$ (B) $\frac{4}{7}$ (C) $\frac{7}{4}$ (D) $\frac{-4}{7}$
5. If $\frac{u}{v} = \frac{v}{w} = K$, then:
(A) $u = wK^2$ (B) $u = vk^2$ (C) $u = w^2k$ (D) $u = v^2K$
6. Power set of an empty set is:
(A) ϕ (B) $\{\phi\}$ (C) $\{\phi, \{a\}\}$ (D) $\{a\}$
7. The set $\{x \mid x \in W \wedge x \leq 101\}$ is:
(A) infinite set (B) subset (C) null set (D) finite
8. $(x + 3)^2 = x^2 + 6x + 9$ is a _____.
(A) a linear equation (B) an equation (C) an identity (D) standard equation
9. The most frequent occurring observation in a data set is called:
(A) mode (B) median (C) harmonic (D) arithmetic
10. A circle has only one:
(A) secant (B) chord (C) centre (D) diameter
11. The measure of the external angles of a regular octagon is:
(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{8}$ (D) $\frac{\pi}{3}$
12. $\frac{3\pi}{4}$ radian = _____.
(A) 115° (B) 135° (C) 150° (D) 30°
13. The arcs opposite to incongruent central angles of a circle are always _____.
(A) congruent (B) incongruent (C) parallel (D) perpendicular
14. How many common tangents can be drawn for two touching circles?
(A) 1 (B) 2 (C) 4 (D) 3
15. A complete circle is divided into:
(A) 90° (B) 180° (C) 270° (D) 360°

Marks: 60

SUBJECTIVE TYPE (PART- I)

Time :2.10 Hours

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

(6×2=12)

- (i) What is meant by quadratic equation? (ii) Solve. $x^2 - x - 20 = 0$
(iii) Find the discriminant of $2x^2 - 7x + 1 = 0$
(iv) Prove that the product of three cube roots of unity is one.
(v) Define simultaneous equations. (vi) Evaluate. $(2 + 2w - 2w^2)(3 - 3w + 3w^2)$
(vii) Find a third proportional to 28, 4. (viii) Define ratio with one example.
(ix) Find "x". $3x - 2 : 4 :: 2x + 3 : 7$

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

(6×2=12)

- (i) Define fraction.
(ii) Resolve into partial fractions. $\frac{7x-9}{(x+1)(x-3)}$
(iii) Define union of sets.
(iv) If $X = \{1, 4, 7, 9\}$ and $Y = \{2, 4, 5, 9\}$, then find $X \cap Y$.
(v) If $X = \{2, 4, 6, \dots, 20\}$ and $Y = \{4, 8, 12, \dots, 24\}$ then find $X - Y$.
(vi) If $A = \{a, b\}$ and $B = \{c, d\}$ then find $A \times B$ and $B \times A$.
(vii) Define arithmetic mean.
(viii) On 5 terms test in mathematics, a student has made marks of 82, 93, 86, 92 and 79. Find the median of the marks.
(ix) Find the modal size of shoes for the following data: 4, 4, 5, 5, 6, 6, 6, 7, 7, 5, 7, 5, 8, 8, 8, 6, 5, 6, 5, 7

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

(6×2=12)

- (i) Define degree measure of an angle. (ii) Express $\frac{2\pi}{3}$ radian to degree.
(iii) Find "θ" when $\ell = 2\text{cm}$ and $r = 3.5\text{cm}$ (iv) Define obtuse angle.
(v) Define collinear points. (vi) Define tangent of a circle.
(vii) Define sector of a circle. (viii) Define cyclic quadrilateral.
(ix) Define inscribed circle.

(PART - II)

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

(3×8=24)

Q5. (a) Solve the equation $6x^2 - 3 - 7x = 0$ by using quadratic formula.

4

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

4

Q6. (a) If $a:b = c:d$ ($a, b, c, d \neq 0$) then show that by using "K" method:

$$\frac{4a-9b}{4a+9b} = \frac{4c-9d}{4c+9d}$$

4

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

4

Q7. (a) If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{1, 3, 5, 7, 9\}$, $B = \{2, 3, 5, 7\}$ then verify that $(A \cup B)' = A' \cap B'$

4

(b) Find the standard deviation "S": 12, 6, 7, 3, 15, 10, 18, 5

4

Q8. (a) Verify that: $\sec\theta - \cos\theta = \tan\theta \sin\theta$

4

(b) Inscribe a circle in a triangle ABC with sides $|AB| = 5\text{cm}$, $|BC| = 3\text{cm}$, $|CA| = 3\text{cm}$

4

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

8

(OR) Prove that the measure of central angle of a minor arc of a circle is double that of angle subtended by the corresponding major arc.