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. **An equation which remains unchanged when "x" is replaced by $\frac{1}{x}$ is called:**
   (A) exponential equation (B) reciprocal equation
   (C) radical equation (D) quadratic equation
2. **If $b^2 - 4ac > 0$ but not a perfect square, then roots of $ax^2 + bx + c = 0$ are:**
   (A) not real (B) rational (C) irrational (D) equal, real
3. **Cube roots of "-1" are:**
   (A) $-1,-\omega,-\omega^2$ (B) $-1,\omega,-\omega^2$ (C) $-1,-\omega,\omega^2$ (D) $1,-\omega,-\omega^2$
4. **If $\frac{a}{b}=\frac{c}{d}$, then componendo property is:**
   (A) $\frac{a-b}{b}=\frac{c-d}{d}$ (B) $\frac{ad}{bc}$ (C) $\frac{a}{a-b}=\frac{c}{c-d}$ (D) $\frac{a}{a+b}=\frac{c}{c+d}$
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. **Partial fractions of $\frac{x+2}{(x+1)(x^2+2)}$ are of the form _____.**
   (A) $\frac{A}{x+1}+\frac{B}{x^2+2}$ (B) $\frac{A}{x+1}+\frac{Bx+C}{x^2+2}$ (C) $\frac{Ax+B}{x+1}+\frac{C}{x^2+2}$ (D) $\frac{A}{x+1}+\frac{Bx}{x^2+2}$
7. **The different number of ways to describe a set are:**
   (A) 1 (B) 2 (C) 3 (D) 4
8. **The relation {(1, 2), (2, 3), (3, 3), (3, 4)} is:**
   (A) onto function (B) into function (C) not a function (D) one one function
9. **A data in the form of frequency distribution is called:**
   (A) grouped data (B) ungrouped data (C) histogram (D) frequency polygon
10. **$\frac{3\pi}{4}$ radian= _____.** (A) 115° (B) 135° (C) 150° (D) 30°
11. **$\operatorname{cosec}^2\theta - \cot^2\theta$ = _____.**
    (A) -1 (B) $\tan\theta$ (C) 0 (D) 1
12. **The right bisector of the chord of a circle always passes through the _____.**
    (A) radius (B) circumference (C) centre (D) diameter
13. **A line which has only two points in common with a circle is called:**
    (A) tangent of a circle (B) cosine of a circle (C) sine of a circle (D) secant of a circle
14. **The arcs opposite to incongruent central angles of a circle are always:**
    (A) congruent (B) incongruent (C) parallel (D) perpendicular
15. **Angle inscribed in a semi circle is:**
    (A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$

Marks: 60 **SUBJECTIVE TYPE (PART- I)** Time :2.10 Hours

Q2. Write short answers to any SIX (6) questions: (6×2=12)

(i) Solve. $\left(2x-\frac{1}{2}\right)^2=\frac{9}{4}$

(ii) Define exponential equation.

(iii) Evaluate: $(2+2\omega-2\omega^2)(3-3\omega+3\omega^2)$

(iv) Write quadratic equation having roots 0, –3.

(v) If α, β are the roots of the equation $x^2+px+q=0$, then evaluate $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$.

(vi) Evaluate: $\omega^{-13}+\omega^{-17}$

(vii) Find a third proportional to: $a^3, 3a^2$

(viii) Find the value of "x" in the continued proportion 8, x, 18.

(ix) Define inverse variation.

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

(i) Define rational fraction.

(ii) Define a subset and give one example.

(iii) If A = {1,3,5,7,9}, B = {1,4,7,10} then find A – B and B – A.

(iv) Find a and b if: (3 – 2a, b – 1) = (a – 7, 2b + 5)

(v) Write all the subsets of the set {a, b}.

(vi) Define arithmatic mean.

(vii) Find geometric mean of the observations 2, 4, 8.

(viii) Define harmonic mean.

(ix) Define measure of dispersion.

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

(i) Express 225° angle into radian.

(ii) Find θ when ℓ = 2cm r = 3.5cm

(iii) Define obtuse angle.

(iv) Define area of circle. What is the area of circle when R is the radius of circle?

(v) What is meant by length of a tangent?

(vi) Define circumference of a circle.

(vii) Define circumangle.

(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 by factorization. $\frac{x+1}{x}+\frac{x}{x+1}=\frac{25}{12}$ 4

(b) Solve the using synthetic division if "2" is the root of the euqation. $x^3-28x+48=0$ 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. $\frac{3x+7}{(x^2+1)(x+3)}$ 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 prove that $(A \cap B)' = A' \cup B'$ 4

(b) The marks of six students in mathematics are as follows. Determine "variance". 4

Students No.	1	2	3	4	5	6
Marks	60	70	30	90	80	42

Q8. (a) Verify that: $(\tan\theta+\cot\theta)(\cos\theta+\sin\theta)=\sec\theta+\operatorname{cosec}\theta$ 4

(b) Inscribe a circle with regard to a right angle triangle with sides 3cm, 4cm and 5cm. 4

Q9. Prove that perpendicular from the centre of a circle on a chord bisects it. 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. **The measure of the external angle of a regular hexagon is:**
   (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{8}$
2. **A pair of chords of a circle subtending two congruent central angles is:**
   (A) congruent (B) incongruent (C) overlaping (D) parallel
3. **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
4. **Locus of a point in a plane equidistant from a fixed point is called _____:**
   (A) radius (B) circle (C) circumference (D) diameter
5. **Conversion of 135° into radian is:**
   (A) $\frac{3\pi}{4}$ (B) $\frac{5\pi}{4}$ (C) $\frac{5\pi}{3}$ (D) $\frac{7\pi}{4}$
6. **$\sec^2\theta$ = _____.**
   (A) $1 - \sin^2\theta$ (B) $1 + \tan^2\theta$ (C) $1 + \cos^2\theta$ (D) $1 - \tan^2\theta$
7. **A cumulative frequency table is also called:**
   (A) frequency distribution (B) data
   (C) Less than cumulative Frequency distribution (D) rectangle
8. **A set $Q = \left\{\frac{a}{b} / a, b \in Z \wedge b \neq 0\right\}$ is called a set of:**
   (A) whole numbers (B) natural numbers (C) irrational numbers (D) rational numbers
9. **If $A \subseteq B$ then $A - B$ is equal to:**
   (A) A (B) B (C) $B - A$ (D) ϕ
10. $\frac{2x+1}{(x+1)(x-1)}$ **is a _____ fraction.**
    (A) an improper fraction (B) an equation (C) a proper fraction (D) discriminant
11. **A third proportional of x^2 and y^2 is:**
    (A) $\frac{y^2}{x^2}$ (B) x^2y^2 (C) $\frac{y^2}{x^4}$ (D) $\frac{y^4}{x^2}$
12. **In a ratio a : b "a" is called:**
    (A) relation (B) antecedent (C) consequent (D) none of these
13. **If $b^2 - 4ac < 0$, then the roots of equation $ax^2 + bx + c = 0$ are:**
    (A) irrational (B) rational (C) imaginary (D) discriminant
14. **The discriminant of the equation $ax^2 + bx + c = 0$ is:**
    (A) $b^2 - 4ac$ (B) $b^2 + 4ac$ (C) $-b^2 + 4ac$ (D) $-b^2 - 4ac$
15. **The number of methods to solve a quadratic equation are:**
    (A) 1 (B) 2 (C) 3 (D) 4

Roll No.(in Figures): ..... (in Words): .....

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. $3y^2 = y(y-5)$

(ii) Define reciprocal equation.

(iii) Find the nature of the roots of the given equation. $x^2 - 23x + 120 = 0$

(iv) Evaluate. $\omega^{37} + \omega^{38} - 5$

(v) Write the quadratic equation having given roots 4, 9.

(vi) Define simultaneous equations.

(vii) Define direct variation.

(viii) Find the fourth proportional to: 5, 8, 15

(ix) Find the value of "p" in the continued proportion. 5, p, 45

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

(i) Define improper fraction.

(ii) Define union of sets.

(iii) If A = {a, b}, B = {c, d} then find A × B and B × A.

(iv) Find "a" and "b" if: (a – 4, b – 2) = (2, 1)

(v) Define one-one function.

(vi) Define standard deviation.

(vii) Find the geometric mean of the observations 2, 4, 8.

(viii) Define harmonic mean.

(ix) Find range for the following weights of students: 110, 109, 84, 89, 77, 104, 74, 97, 49, 59, 103, 62

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

(i) Express 315° angle into radian.

(ii) Verify the identity. $(\tan\theta + \cot\theta)\tan\theta = \sec^2\theta$

(iii) What is meant by right angle?

(iv) Define circle.

(v) Define chord of a circle.

(vi) Define tangent of a circle.

(vii) What is meant by segment of a circle?

(viii) Define inscribed circle.

(ix) Define perimeter.

(PART - II)

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

Q5. (a) Solve the given equation. $\frac{x}{x-3} + 4\left(\frac{x-3}{x}\right) = 4$ 4

(b) If α, β are the roots of the equation $lx^2 + mx + n = 0$ $(l \neq 0)$ then find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ 4

Q6. (a) If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$ (a, b, c, d, e, f, ≠ 0) then show that $\frac{ac}{bd} + \frac{ce}{df} + \frac{ea}{fb} = \frac{a^2}{b^2} + \frac{c^2}{d^2} + \frac{e^2}{f^2}$ 4

(b) Resolve into partial fractions. $\frac{3x-11}{(x+3)(x^2+1)}$ 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 prove that $(A \cup B)' = A' \cap B'$ 4

(b) Find the 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) Inscribe a circle in an equilateral triangle ABC with each side of length 5cm. 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 opposite angles of any quadrilateral inscribed in a circle are supplementary.