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. _____ common tangents can be drawn for two touching circles.
   (A) 2 (B) 5 (C) 4 (D) 3
2. A tangent line intersects the circle at _____.
   (A) three points (B) two points (C) single point (D) no point at all
3. $\text{cosec}^2\theta - \cot^2\theta =$ _____.
   (A) 1 (B) –1 (C) 0 (D) $\tan\theta$
4. Sum of the deviations of the variable X from its mean is always equal to:
   (A) zero (B) one (C) same (D) two
5. If $A \subseteq B$ then $A - B$ is equal to:
   (A) ϕ (B) B (C) A (D) B – A
6. If $\frac{u}{v} = \frac{v}{w} = k$ then:
   (A) $u = wk^2$ (B) $u = vk^2$ (C) $u = w^2k$ (D) $u = v^2k$
7. If α, β are the roots of $x^2 - x - 1 = 0$, then the product of the roots 2α and 2β is:
   (A) –2 (B) 2 (C) 4 (D) –4
8. If number of elements in a set A is 3 and in set B is 2, then number of binary relations in A × B is:
   (A) 2^3 (B) 2^6 (C) 2^8 (D) 2^2
9. The semi-circumference and the diameter of a circle both subtend a central angle of _____:
   (A) 90° (B) 360° (C) 270° (D) 180°
10. Locus of a point in a plane equidistant from a fixed point is called:
    (A) radius (B) circle (C) circumference (D) diameter
11. 20° = _____
    (A) 360' (B) 630' (C) 1200' (D) 3600'
12. An equation which remains unchanged when x is replaced by $\frac{1}{x}$ is called a/an ___ equation:
    (A) exponential (B) reciprocal (C) radical (D) linear
13. Partial fractions of $\frac{x^2+1}{(x+1)(x-1)}$ are of _____ form.
    (A) $\frac{A}{x+1} + \frac{B}{x-1}$ (B) $1 + \frac{A}{x+1} + \frac{Bx+C}{x-1}$ (C) $1 + \frac{A}{x+1} + \frac{B}{x-1}$ (D) $\frac{Ax+B}{x+1} + \frac{C}{x-1}$
14. 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) $\frac{y^2}{x^4}$
15. Product of cube roots of unity is:
    (A) 0 (B) 1 (C) –1 (D) 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 radical equation and give one example.

(ii) Solve $x^2 + 2x - 2 = 0$

(iii) Find the discriminant of the equation $x^2 - 5x + 5 = 0$

(iv) Evaluate $(1 - \omega - \omega^2)^7$

(v) If α, β are the roots of the equation $2x^2 + 3x + 4 = 0$ then find the value of $\alpha + \beta$ and $\alpha\beta$.

(vi) Define simultaneous equations.

(vii) Define inverse variation.

(viii) If $A \propto \frac{1}{r^2}$, $A = 2$ when $r = 3$, then find r when $A = 72$.

(ix) Find a mean proporational between 20, 45.

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

(i) Resolve $\frac{7x - 9}{(x+1)(x-3)}$ into partial fractions.

(ii) Find (B – A) and (A – B) when A = {1,2,3,4,5}, B = {2,4,5,6,8}

(iii) Find A × B when A = {1,2,3}, B = {2,5}

(iv) Find A^c when U = {1,2,3,...,10}, A = {2,3,5,7}

(v) Find domain and range of R: R = {(b,a), (c,a),(d,a)}

(vi) Find arithmetic mean for the data: 200,225,350,375,270,320,290

(vii) Define Harmonic Mean.

(viii) Define Variance.

(ix) The salaries of five teachers are as follows, find its range. 11500,12400,15000,14500,14800

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

(i) Convert $\frac{7\pi}{8}$ into degrees.

(ii) Find θ, when : $\ell = 4.5$m and $r = 2.5$m

(iii) Define right angle.

(iv) Define circular area of circle.

(v) Define the length of a tangent.

(vi) Define segment of a circle.

(vii) Define circum-angle.

(viii) Define arc.

(ix) Define regular polygon.

(PART - II)

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

Q5. (a) Solve the equation: $2x + 5 = \sqrt{7x + 6}$ 4

(b) Solve the simultaneous equations: $x + y = 5 : x^2 - 2y - 14 = 0$ 4

Q6. (a) Using componendo-dividendo theorem, solve the equation. $\frac{(x+3)^2 - (x-5)^2}{(x+3)^2 + (x-5)^2} = \frac{4}{5}$ 4

(b) Resolve $\frac{3x - 1}{x^2 - 1}$ **into partial fraction.** 4

Q7. (a) If U = {1,2,3,4,...,10}, A = {1,3,5,7,9} and B = {1,4,7,10} then verify B – A = B∩A' 4

(b) Calculate variance for the data: 10, 8, 9, 7, 5, 12, 8, 6, 8, 2 4

Q8. (a) Prove that: $\frac{1 + \cos\theta}{\sin\theta} + \frac{\sin\theta}{1 + \cos\theta} = 2\operatorname{cosec}\theta$ 4

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

Q9. Prove that the perpendicular from the cnetre of a circle on a chord bisect it. 8

(OR) Prove that any two angles in the same segment of a circle are qual.

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 number of elements in the power set {1,2,3} is:**
   (A) 4 (B) 6 (C) 8 (D) 9
2. **In a proportion a : b : : c : d, "a" and "d" are called:**
   (A) mean (B) extreme (C) third proportional (D) fourth proportional
3. **Locus of a point in a plane equidistant from a fixed point is called:**
   (A) circle (B) radius (C) diameter (D) circumference
4. $\frac{2x+1}{(x-1)(x+2)}$ **is:**
   (A) improper fraction (B) proper fraction (C) identity (D) equation
5. **A line intersecting a circle is called:**
   (A) tangent (B) secant (C) chord (D) boundary
6. **The distance between the centres of two congruent touching circles externally is:**
   (A) the diameter of each circle (B) the radius of each circle
   (C) of zero length (D) twice the diameter of each circle
7. **The discriminant of the equation $ax^2 + bx + c = 0$ is:**
   (A) $b^2 - 4ac$ (B) $b^2 + 4ac$ (C) $\sqrt{b^2 + 4ac}$ (D) $\sqrt{b^2 - 4ac}$
8. **The factors of $x^2 - 15x + 56$ are:**
   (A) $(x - 7)(x + 8)$ (B) $(x + 7)(x - 8)$ (C) $(x - 7)(x - 8)$ (D) $(x + 7)(x + 8)$
9. **The semi circumference and the diameter of a circle both subtend a central angle of:**
   (A) 90° (B) 180° (C) 270° (D) 360°
10. **The terminal side of angle 235° lies in _____ quadrant.**
    (A) I (B) II (C) III (D) IV
11. **Two square roots of unity are:**
    (A) 1, –1 (B) 1, ω (C) 1, –ω (D) ω, ω^2
12. **In the proportion 7 : 4 : : P : 8 the value of P is:**
    (A) 4 (B) 7 (C) 8 (D) 14
13. **If the number of elements in set A is 3 and in set B is 4 then the number of elements in A × B is:**
    (A) 3 (B) 4 (C) 7 (D) 12
14. **$\sec\theta \cot\theta$ = _____.**
    (A) $\sin\theta$ (B) $\frac{1}{\cos\theta}$ (C) $\frac{1}{\sin\theta}$ (D) $\frac{\sin\theta}{\cos\theta}$
15. **The mean is affected by change in:**
    (A) place (B) value (C) ratio (D) scale

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

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

(i) Solve the equation $x^2 + 2x - 2 = 0$ (ii) Define reciprocal equation.

(iii) Evaluate: $(1 - \omega - \omega^2)^7$

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

(v) Using synthetic division, show that $(x - 2)$ is the factor of $x^3 + x^2 - 7x + 2$

(vi) Define symmetric function.

(vii) Find the cost of 8kg of mangoes, if the cost of 5kg of mangoes, is Rs. 250.

(viii) If $y \propto x$, $y = 7$ and $x = 3$ then find 'y' in terms of 'x'.

(ix) Define proportion.

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

(i) Define improper fraction.

(ii) If $U = \{1,2,3,4,...,10\}$, $A = \{1,3,5,7,9\}$ and $B = \{1,4,7,10\}$ then find $(A - B)'$

(iii) Define function.

(iv) Find 'a' and 'b' if $(2a + 5, 3) = (7, b - 4)$

(v) If set M has 5 elements then find number of binary relations in M.

(vi) Define harmonic mean.

(vii) Define range.

(viii) Find arithmatic mean by direct method: 12, 14, 17, 20, 24, 29, 35, 45

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

x	12	5	8	4

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

(i) Express 300° angle into radian. (ii) Find r when $\ell = 52$, $\theta = 45°$

(iii) Define projection. (iv) Define circle.

(v) Define length of tangent. (vi) Define arc of a circle.

(vii) Define central angle. (viii) Define perimeter.

(ix) Define polygon.

(PART - II)

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

Q5. (a) Solve the equation: $\sqrt{3x + 100} - x = 4$ 4

(b) Find the value of "h" using synthetic division, if 1 is the zero of polynomial $x^3 - 2hx^2 + 11$ 4

Q6. (a) If $a : b = c : d$, then prove that: $\frac{2a + 9b}{2a - 9b} = \frac{2c + 9d}{2c - 9d}$ 4

(b) Resolve $\frac{9}{(x - 1)(x + 2)^2}$ into pratial fractions. 4

Q7. (a) If $X = \{1,3,5,7,...,19\}$, $Y = \{0,2,4,6,8,...,20\}$ and $Z = \{2,3,5,7,11,13,17,19,23\}$ then find $(X \cap Y) \cup (X \cap Z)$ 4

(b) Calculate variance for the data: 10, 8, 9, 7, 5, 12, 8, 6, 8, 2 4

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

(b) Circumscribe a circle about an equilateral triangle ABC with each side of length 4 cm. 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 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.