

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. Point $(-1, 4)$ lies in the quadrant:
(A) I (B) II (C) III (D) IV
2. If $A \subseteq B$ then $A - B$ is equal to:
(A) A (B) B (C) ϕ (D) $B - A$
3. $\frac{2x+1}{(x+1)(x-1)}$ is a/an:
(A) improper fraction (B) equation (C) proper fraction (D) identity
4. If $u \propto v^2$ then:
(A) $u = v^2$ (B) $u = kv^2$ (C) $uv^2 = k$ (D) $uv^2 = 1$
5. In a continued proportion $a : b = b : c$, c is said to be _____ proportional to a and b .
(A) third (B) fourth (C) means (D) fifth
6. Sum of the cube roots of unity is:
(A) 0 (B) 1 (C) -1 (D) 3
7. Roots of the equation $4x^2 - 5x + 2 = 0$ are:
(A) irrational (B) imaginary (C) rational (D) natural
8. The 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 $(x + 8)$
9. Angle inscribed in a semi circle is:
(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{5}$
10. The portion of a circle between two radii and an arc is called:
(A) sector (B) segment (C) chord (D) radius
11. An arc subtends a central angle of 40° then the corresponding chord will subtend a central angle of:
(A) 40° (B) 20° (C) 60° (D) 80°
12. Locus of all points in a plane equidistant from a fixed point is called:
(A) radius (B) circumference (C) diameter (D) circle
13. A circle has only one:
(A) secant (B) chord (C) diameter (D) centre
14. $\text{Cosec}^2\theta - \text{Cot}^2\theta = ?$
(A) -1 (B) 0 (C) $\text{Tan}\theta$ (D) 1
15. The spread or scatterness of observations in a data set is called:
(A) average (B) dispersion (C) central tendency (D) range

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) Define reciprocal equation.
- (ii) Solve by factorization. $5x^2 = 15x$
- (iii) Define symmetric function.
- (iv) Evaluate $(9 + 4\omega + 4\omega^2)^3$
- (v) If α, β are the roots of the equation $4x^2 - 5x + 6 = 0$ then find the value of $\alpha^2 \times \beta^2$.
- (vi) Find the discriminant of the following quadratic equation $4x^2 - 7x - 2 = 0$.
- (vii) Define inverse proportion.
- (viii) Find the third proportional to $(x - y)^2, x^3 - y^3$
- (ix) If $Z \propto XY$ and $z = 36$ when $x = 2, y = 3$ then find z .

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

(6×2=12)

- (i) What is proper fraction.
- (ii) Resolve $\frac{1}{x^2 - 1}$ into partial fraction.
- (iii) Define One-One function.
- (iv) If $L = \{a, b, c\}, M = \{3, 4\}$ then find two binary relations of $L \times M$.
- (v) Find a and b if $(a - 4, b - 2) = (2, 1)$
- (vi) If $A = \{1, 2, 3, 4, 5, 6\}, B = \{2, 4, 6, 8\}$ prove that $A \cap B = B \cap A$
- (vii) What is cumulative frequency?
- (viii) The salaries of five teachers in rupees are given below, find range:
11500, 12400, 15000, 14500, 14800
- (ix) Find arithmetic mean by direct method. 12, 14, 17, 20, 29, 35, 45

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

(6×2=12)

- (i) Convert 135° into radian.
- (ii) Define Degree.
- (iii) Prove that: $\frac{\sin\theta + \cos\theta}{\cos\theta} = 1 + \tan\theta$
- (iv) Define right angle.
- (v) Define interior of a circle.
- (vi) What is meant by length of tangent?
- (vii) Define circumference of a circle.
- (viii) Define central angle.
- (ix) Define radius.

(PART - II)

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

(3×8=24)

Q5. (a) Solve the given equation by using quadratic formula $5x^2 + 8x + 1 = 0$

4

(b) Prove that: $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x + \omega y + \omega^2 z)(x + \omega^2 y + \omega z)$

4

Q6. (a) Using componendo - dividendo theorem, solve the equation $\frac{(x-2)^2 - (x-4)^2}{(x-2)^2 + (x-4)^2} = \frac{12}{13}$

4

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

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

4

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

4

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

4

(b) Draw two common tangents to two touching circles of radii 2.5 cm and 3.5 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 opposite angles of any quadrilateral inscribed in a circle are supplementary.

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. A collection of well defined distinct objects is called:
 (A) subset (B) powerset (C) set (D) union set
2. Partial fraction of $\frac{x+2}{(x+1)(x^2+2)}$ are of the form:
 (A) $\frac{A}{x+1} + \frac{B}{x^2+2}$ (B) $\frac{A}{x+1} + \frac{Bx}{x^2+2}$ (C) $\frac{Ax+B}{x+1} + \frac{C}{x^2+2}$ (D) $\frac{A}{x+1} + \frac{Bx+c}{x^2+2}$
3. If $u \propto v^2$ then:
 (A) $u = v^2$ (B) $uv^2 = k$ (C) $u = kv^2$ (D) $uv^2 = 1$
4. Roots of the equation $4x^2 - 5x + 2 = 0$ are:
 (A) irrational (B) imaginary (C) rational (D) equal
5. Find x in the proportion $4 : x :: 5 : 15$:
 (A) $\frac{75}{4}$ (B) $\frac{4}{3}$ (C) $\frac{3}{4}$ (D) 12
6. If α, β are the roots of $7x^2 - x + 4 = 0$ then $\alpha\beta$ is:
 (A) $\frac{-1}{7}$ (B) $\frac{4}{7}$ (C) $\frac{7}{4}$ (D) $\frac{-4}{7}$
7. 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) $x = \frac{b \pm \sqrt{b^2 + 4ac}}{2a}$
8. A histogram is a set of adjacent:
 (A) rectangles (B) squares (C) circles (D) triangles
9. $20^\circ =$ _____ :
 (A) $360'$ (B) $630'$ (C) $1200'$ (D) $3600'$
10. The distance of any point of the circle to its centre is called:
 (A) radius (B) diameter (C) a chord (D) an arc
11. A circle has only one:
 (A) centre (B) diameter (C) chord (D) secant
12. A 4cm long chord subtends a central angle of 60° . The radius of this circle is:
 (A) 1 (B) 2 (C) 3 (D) 4
13. The measure of external angle of a regular hexagon is:
 (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{2}$
14. How many tangents can be drawn from a point outside the circle?
 (A) 1 (B) 2 (C) 3 (D) 4
15. Power set of an empty set is:
 (A) ϕ (B) $\{a\}$ (C) $\{\phi, \{a\}\}$ (D) $\{\phi\}$

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 $x^2 - 11x = 152$
 (iii) Find the discriminant of the equation $2x^2 - 7x + 1 = 0$.
 (iv) Evaluate $(9 + 4\omega + 4\omega^2)^3$
 (v) If α, β are the roots of the equation $x^2 + px + q = 0$ then evaluate $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
 (vi) Write the quadratic equation having roots -2, 3.
 (vii) Find x in the given proportion $x - x : 11 - x :: 16 - x : 25 - x$
 (viii) $A \propto \frac{1}{r^2}$ and $A = 2$ when $r = 3$, Find r when $A = 72$.

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

(6×2=12)

- (i) Define proper fraction. (ii) Resolve $\frac{1}{x^2 - 1}$ into partial fraction.
 (iii) Define one-one function.
 (iv) If $X = \{1,4,7,9\}$ and $Y = \{2,4,5,9\}$ then find $Y \cap X$.
 (v) If $A = \{0,2,4\}$, $B = \{-1,3\}$ then find $A \times B$.
 (vi) Find the sets X and Y if $X \times Y = \{(a,a),(b,a),(c,a),(d,a)\}$.
 (vii) Define Median.
 (viii) Find arithmetic mean of the following data by direct method. 12,14,17,20,24,29,35,45
 (ix) The marks obtained by seven students in mathematics are as follows. Calculate arithmetic mean.

No. of Students	1	2	3	4	5	6	7
Marks obtained	45	60	74	58	65	63	49

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

(6×2=12)

- (i) What is quadrantal angle? (ii) Prove that: $\frac{\sin^2\theta}{\cos\theta} + \cos\theta = \sec\theta$
 (iii) Find r when $l = 4\text{cm}$. $\theta = \frac{1}{4}$ (iv) Define obtuse angle.
 (v) What is circumcircle? (vi) Define tangent of circle.
 (vii) What is segment of a circle? (viii) What is cyclic quadrilateral? (ix) Define In-circle.

(PART - II)

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

(3×8=24)

Q5. (a) Solve the quadratic equation by using quadratic formula. $2 + 9x = 5x^2$ 4

(b) Solve the simultaneous equation $x^2 + 2y^2 = 22$; $5x^2 + y^2 = 29$ 4

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

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

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

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

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

(b) Draw two common tangents to two touching circles of radii 2.5 cm and 3.5 cm. 4

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