

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 $x^2 - 15x + 56$ 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. Roots of the equation $4x^2 - 4x + 1 = 0$ are:
(A) real, equal (B) real, unequal (C) imaginary (D) irrational
3. The product of cube roots of unity is:
(A) 0 (B) 1 (C) -1 (D) 3
4. In a ratio $x : y$, y is called:
(A) relation (B) antecedent (C) consequent (D) ratio
5. The fourth proportional w of $x : y :: v : w$ is:
(A) $\frac{xy}{v}$ (B) $\frac{vy}{x}$ (C) xyv (D) $\frac{x}{vy}$
6. The identity $(5x + 4)^2 = 25x^2 + 40x + 16$ is true for:
(A) one value of x (B) two values of x (C) all values of x (D) three values of x
7. Power set of an empty set is:
(A) ϕ (B) $\{a\}$ (C) $\{\phi, \{a\}\}$ (D) $\{\phi\}$
8. If number of elements in set A is 3 and in set B is 2, then number of binary relations in $A \times B$ is:
(A) 2^3 (B) 2^6 (C) 2^8 (D) 2^2
9. A frequency polygon is a many sided:
(A) rectangle (B) square (C) closed figure (D) circle.
10. $\frac{1}{2} \operatorname{cosec} 45^\circ = \underline{\hspace{2cm}}$.
(A) $\frac{1}{2\sqrt{2}}$ (B) $\frac{1}{\sqrt{2}}$ (C) $\sqrt{2}$ (D) $\frac{\sqrt{3}}{2}$
11. In which quadrant θ lies when $\cos\theta < 0$; $\tan\theta < 0$:
(A) I (B) II (C) III (D) IV
12. Line segment joining any point of the circle to the centre is called:
(A) circumference (B) diameter (C) radial segment (D) perimeter
13. A line which has 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 length of a chord and the radial segment of a circle are congruent, the central angle, made by chord will be:
(A) 30° (B) 45° (C) 75° (D) 60°
15. The measure of the external angle of a regular hexagon is:
(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{8}$

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

- (i) Solve $x^2 - x - 20 = 0$ (ii) Define radical equation.
 (iii) Find the nature of the roots of quadratic equation. $3x^2 + 7x - 13 = 0$
 (iv) Evaluate: $\omega^{37} + \omega^{38} - 5$
 (v) Write the quadratic equation having roots $3 + \sqrt{2}, 3 - \sqrt{2}$
 (vi) Prove that the sum of all cube roots of unity is zero i.e. $1 + \omega + \omega^2 = 0$
 (vii) Find mean proportional between $20x^3y^5, 5x^7y$ (viii) Find x in proportion $3x - 2 : 4 :: 2x + 3 : 7$
 (ix) Define ratio and give one example.

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

- (i) Resolve the fraction $\frac{x^2+1}{x+1}$ into proper fraction. (ii) Define set.
 (iii) If $A = \{1,2,3\}$, $B = \{2,5\}$ then find $A \times B$ and $B \times A$.
 (iv) If $U = \{1,2,3,\dots,10\}$, $A = \{2,3,5,7\}$, $B = \{3,5,8\}$ find A' and B' .
 (v) Find a and b, if $(a - 4, b - 2) = (2, 1)$ (vi) Define mode.
 (vii) The marks of seven students in mathematics are 45, 60, 74, 58, 65, 63, 49. Calculate the arithmetic mean.
 (viii) Find harmonic mean for the data $\begin{matrix} x & 12 & 5 & 8 & 4 \end{matrix}$
 (ix) Define variance.

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

- (i) convert $\frac{13\pi}{16}$ into degree. (ii) Verify that, $\cot\theta \sec\theta = \operatorname{cosec}\theta$
 (iii) Define obtuse angle.
 (iv) Define circumference of a circle when R is the radius of circle. What is its circumference?
 (v) Define tangent of a circle. (vi) What is meant by segment of circle?
 (vii) Define diameter of circle. (viii) Define radius of circle.
 (ix) Construct a triangle whose sides are 3cm, 4cm and 5cm.

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

- Q5. (a) Solve the equation $4x = \sqrt{13x+14} - 3$ 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) If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$ ($a, b, c, d, e, f, \neq 0$) then show that $\frac{ac+ce+ea}{bd+df+fb} = \left[\frac{ace}{bdf}\right]^{\frac{2}{3}}$ 4
(b) Resolve into partial fractions $\frac{1}{(x+1)(x^2+1)}$ 4
Q7. (a) If $U = \{1,2,3,4,5,6,7,8,9,10\}$, $A = \{1,3,5,7,9\}$, $B = \{1,4,7,10\}$, $C = \{1,5,8,10\}$ prove that $(A \cup B) \cup C = A \cup (B \cup C)$ 4
(b) Find standard deviation 'S' 12, 6, 7, 3, 15, 10, 18, 5 4
Q8. (a) Verify that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \frac{\sin\theta}{1-\cos\theta}$ 4
(b) Circumscribe a circle about an equilateral triangle ABC with each side of length 4cm. 4
Q9. Perpendicular from the centre of a circle on a chord bisects it. 8
(OR) 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.