

**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 of the type  $3^x + 3^{2-x} + 6 = 0$  is an:  
(A) Exponential equation (B) Reciprocal equation  
(C) Radical equation (D) Quadratic equation
2. Roots of the equation  $4x^2 - 5x + 2 = 0$  are:  
(A) Irrational (B) Imaginary (C) Rational (D) Real
3. If  $\alpha, \beta$  are the roots of  $3x^2 + 5x - 2 = 0$  then  $\alpha + \beta$  is:  
(A)  $\frac{5}{3}$  (B)  $\frac{3}{5}$  (C)  $-\frac{5}{3}$  (D)  $-\frac{2}{3}$
4. Find  $x$  in proportion  $4 : x :: 5 : 15$  :  
(A)  $\frac{75}{4}$  (B)  $\frac{4}{3}$  (C)  $\frac{3}{4}$  (D) 12
5. If  $y^2 \propto \frac{1}{x^3}$ , then: (A)  $y^2 = \frac{k}{x^3}$  (B)  $y^2 = \frac{1}{x^3}$  (C)  $y^2 = x^2$  (D)  $y^2 = kx^3$
6. A fraction in which the degree of the numerator is greater to the degree of the denominator is called:  
(A) A proper fraction (B) An improper fraction (C) An equation (D) An inequation
7. The set having only one element is called:  
(A) Null set (B) Power set (C) Singleton set (D) Sub set
8. If number of element in set A is 3 and in set B is 2, then number of binary relation in  $A \times B$  is:  
(A)  $2^3$  (B)  $2^6$  (C)  $2^8$  (D)  $2^2$
9. In a cumulative frequency polygon frequencies are plotted against:  
(A) Mid Point (B) Upper class boundaries  
(C) Class limits (D) Lower class boundaries
10. The system of measurement in which the angle is measured in radians is called:  
(A) CGS system (B) Sexagesimal system (C) MKS system (D) Circular system
11. Through how many non collinear points, a circle can pass?  
(A) One (B) Two (C) Four (D) Three
12. Tangents drawn at the ends of diameter of a circle are \_\_\_\_\_ to each other.  
(A) Collinear (B) Non-Parallel (C) Parallel (D) Perpendicular
13. An arc subtends a central angle of  $40^\circ$  then the corresponding chord will subtend a central angle of:  
(A)  $40^\circ$  (B)  $20^\circ$  (C)  $60^\circ$  (D)  $80^\circ$
14. The length of the diameter of a circle is how many times the radius of the circle?  
(A) 1 (B) 3 (C) 2 (D) 4
15. How many common tangents can be drawn for two touching circles?  
(A) 2 (B) 5 (C) 4 (D) 3





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Q1.

15

1. A line intersecting a circle is called:  
(A) Radius (B) Tangent (C) Secant (D) Chord
2. Angle inscribed in a semi-circle is:  
(A)  $\frac{\pi}{3}$  (B)  $\frac{\pi}{2}$  (C)  $\frac{\pi}{4}$  (D)  $\frac{\pi}{6}$
3. The solution set of equation  $4x^2 - 16 = 0$  is:  
(A)  $\{\pm 4\}$  (B)  $\{4\}$  (C)  $\{\pm 2\}$  (D)  $\{2\}$
4. Sum of the cube roots of unity is:  
(A) 0 (B) 1 (C) 2 (D) 3
5. If  $b^2 - 4ac < 0$  then the roots of  $ax^2 + bx + c = 0$  are:  
(A) Irrational (B) Rational (C) Real (D) Imaginary
6. Find x in proportion  $4 : x :: 5 : 15$ :  
(A)  $\frac{3}{4}$  (B) 12 (C)  $\frac{4}{3}$  (D)  $\frac{75}{4}$
7. If  $a : b = x : y$  then alternando property is:  
(A)  $\frac{a}{x} = \frac{b}{y}$  (B)  $\frac{a}{b} = \frac{x}{y}$  (C)  $\frac{a+b}{b} = \frac{x+y}{y}$  (D)  $\frac{a-b}{x} = \frac{x-y}{y}$
8.  $\frac{2x+1}{(x+1)(x-1)}$  is:  
(A) An improper fraction (B) A proper fraction (C) An equation (D) An identity
9. A collection of well-defined objects is called:  
(A) Set (B) Subset (C) Powerset (D) Superset
10. If  $A \subseteq B$ , then  $A - B$  is equal to:  
(A) A (B) B (C)  $\phi$  (D)  $B - A$
11. The extent of variation between extreme observations of a data set is measured by:  
(A) average (B) quartiles (C) variance (D) range
12. The union of two non-collinear rays, which have common end point is called:  
(A) an angle (B) a degree (C) a minute (D) a radian
13. A chord passing through the centre of the circle is called:  
(A) radius (B) diameter (C) secant (D) circumference
14. A circle has only one:  
(A) secant (B) chord (C) centre (D) diameter
15. The length of a chord and the radial segment of a circle are congruent the central angle made by the chord will be:  
(A)  $60^\circ$  (B)  $75^\circ$  (C)  $45^\circ$  (D)  $30^\circ$

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  $\omega^{37} + \omega^{38} - 5$
- (iv) If  $\alpha, \beta$  are the roots of the equation  $x^2 + px + q = 0$  then evaluate  $\alpha^2 + \beta^2$ .
- (v) Write the quadratic equation having roots 2, -6.
- (vi) Use synthetic division to find the quotient and remainder when  $(x^2 + 7x - 1) \div (x + 1)$ .
- (vii) Find third proportional to 28 and 4. (viii) If  $3(4x - 5y) = 2x - 7y$ , find the ratio  $x : y$ .
- (ix) Define proportion.

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

(6×2=12)

- (i) Define a rational fraction. (ii) What is proper fraction?
- (iii) If  $X = \{2, 4, 6, \dots, 20\}$ ,  $Y = \{4, 8, 12, \dots, 24\}$  then find  $X - Y$ .
- (iv) If  $A = \{1, 2, 3, 4, 5, 6\}$ ,  $B = \{2, 4, 6, 8\}$  then prove that  $A \cap B = B \cap A$ .
- (v) Find a and b if  $(3 - 2a, (b - 1)) = (a - 7, 2b + 5)$
- (vi) What is bijective function?
- (vii) Define mode.
- (viii) Write the formula to find median of grouped data.
- (ix) Find arithmetic mean of given data. 200, 225, 350, 375, 270, 320, 290

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

(6×2=12)

- (i) Define coterminal angles. (ii) Convert  $\frac{7\pi}{8}$  to degrees.
- (iii) Verify that:  $\cot\theta \sec\theta = \operatorname{cosec}\theta$
- (iv) Whether the triangle with sides 5cm, 7cm, 8cm is right angled triangle.
- (v) Define circum circle of a triangle. (vi) Define secant of a circle.
- (vii) Define chord of a circle. (viii) Define cyclic quadrilateral.
- (ix) Define in-circle of a triangle.

## (PART - II)

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

(3×8=24)

- Q5. (a) Solve the following equation by completing square  $11x^2 - 34x + 3 = 0$ . 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 theorem of componendo-dividendo find the value of  $\frac{x+2y}{x-2y} + \frac{x+2z}{x-2z}$  if  $x = \frac{4yz}{y+z}$  4
- (b) Resolve into partial fractions  $\frac{x-5}{x^2+2x-3}$  4
- Q7. (a) If  $U = N$ ,  $A = \phi$ ,  $B = P$  then verify that  $(A \cap B)' = A' \cup B'$  4
- (b) The marks of six students in Mathematics are as follows, Determine variance 4  
60, 70, 30, 90, 80, 42
- Q8. (a) Verify that  $\frac{\sin\theta + \cos\theta}{\tan^2\theta - 1} = \frac{\cos^2\theta}{\sin\theta - \cos\theta}$  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.