

**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.  $\frac{3\pi}{4}$  radians = \_\_\_\_\_.  
(A)  $115^\circ$  (B)  $135^\circ$  (C)  $150^\circ$  (D)  $30^\circ$
2. Through how many non-collinear points can a circle pass?  
(A) one (B) two (C) three (D) four
3. A circle has only one \_\_\_\_\_.  
(A) secant (B) chord (C) diameter (D) centre
4. Out of two congruent arcs of a circle if one arc makes a central angle of  $30^\circ$  then the other arc will subtend the central angle of:  
(A)  $30^\circ$  (B)  $15^\circ$  (C)  $45^\circ$  (D)  $60^\circ$
5. Tangents drawn at the end points of the diameter of a circle are \_\_\_\_\_:  
(A) parallel (B) perpendicular (C) intersecting (D) not parallel
6. How many common tangents can be drawn for two disjoint circles?  
(A) 1 (B) 2 (C) 3 (D) 4
7. Two linear factors of  $x^2 - 15x + 56$  are:  
(A)  $(x - 7), (x + 8)$  (B)  $(x + 7), (x - 8)$  (C)  $(x - 7), (x - 8)$  (D)  $(x + 7), (x + 8)$
8. Roots of the equation  $4x^2 - 5x + 2 = 0$  are:  
(A) Irrational (B) Imaginary (C) Rational (D) Equal
9.  $\alpha^2 + \beta^2$  is equal to:  
(A)  $\alpha^2 - \beta^2$  (B)  $(\alpha + \beta)^2 - 2\alpha\beta$  (C)  $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$  (D)  $\alpha + \beta$
10. Find x in proportion  $4 : x :: 5 : 15$ :  
(A)  $\frac{75}{4}$  (B)  $\frac{4}{3}$  (C)  $\frac{3}{4}$  (D) 12
11. The fourth proportional w of  $x : y :: v : w$  is:  
(A)  $\frac{xy}{v}$  (B)  $\frac{vy}{x}$  (C)  $xyv$  (D)  $\frac{x}{vy}$
12.  $\frac{2x+1}{(x+1)(x-1)}$  is \_\_\_\_\_.  
(A) a proper fraction (B) an equation (C) an improper fraction (D) identity
13. Point  $(-1, 4)$  lies in the quadrant:  
(A) I (B) II (C) III (D) IV
14. A set  $Q = \{\frac{a}{b} / a, b \in \mathbb{Z} \wedge b \neq 0\}$  is called a set of:  
(A) Whole numbers (B) Natural numbers (C) Irrational numbers (D) Rational numbers
15. Sum of the deviations of the variable X from its mean is always \_\_\_\_\_:  
(A) zero (B) one (C) same (D) two

Marks: 60

## SUBJECTIVE TYPE (PART- I)

Time :2.10 Hour

Q2. Write short answers to any SIX (6) questions:

(6×2=12)

- (i) Define exponential equation.
- (ii) Write the quadratic equation  $\frac{x}{x+1} + \frac{x+1}{x} = 6$  in standard form.
- (iii) Find discriminant of the equation  $6x^2 - 8x + 3 = 0$
- (iv) Find the nature of the roots of quadratic equation  $2x^2 + 3x + 7 = 0$
- (v) Evaluate  $(1 - w - w^2)^7$
- (vi) Without solving find sum and product of the roots of the equation  $3x^2 + 7x - 11 = 0$
- (vii) Define Ratio.
- (viii) If  $y \propto \frac{1}{x}$  and  $y = 4$ , when  $x = 3$  find  $x$  when  $y = 24$ .
- (ix) Find a third proportional to  $a^2 - b^2$ ,  $a - b$ .

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

(6×2=12)

- (i) Define rational fraction.
- (ii) Resolve into partial fraction  $\frac{x-11}{(x-4)(x+3)}$
- (iii) If  $X = \{1,4,7,9\}$  and  $Y = \{2,4,5,9\}$  then find  $X \cap Y$
- (iv) If  $A = \{1,2,3\}$  and  $B = \{2,5\}$  then find  $A \times B$  and  $B \times A$
- (v) Define function.
- (vi) Find  $a$  and  $b$ , if  $(a-4, b-2) = (2, 1)$
- (vii) Define arithmetic mean.
- (viii) Find the geometric mean of the observations 2, 4, 8.
- (ix) Find mode for the data 9,3,8,8,9,8,9,18.

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

(6×2=12)

- (i) Define angle of elevation.
- (ii) Verify the identity  $\frac{\sin\theta + \cos\theta}{\cos\theta} = 1 + \tan\theta$
- (iii) Find area of a sector of a circle of radius 16cm if the angle at the centre is  $60^\circ$ .
- (iv) Define obtuse angle.
- (v) Define circumcircle of a triangle.
- (vi) Define length of a tangent.
- (vii) Define segment of a circle.
- (viii) Define central angle.
- (ix) Define vertices of a polygon.

## (PART - II)

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

(3×8=24)

Q5. (a) Solve the following equation by completing square  $7x^2 + 2x - 1 = 0$

(b) Prove that  $x^3 + y^3 = (x + y)(x + wy)(x + w^2y)$

Q6. (a) If '2' is added in each number of the ratio 3:4, we get a new ratio 5:6. Find the numbers.

(b) Resolve into partial fraction  $\frac{x^2 + 7x + 11}{(x+2)^2(x+3)}$

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

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

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

(b) Draw two circles with radii 2.5cm and 3cm. If their centres are 6.5cm apart, then draw two direct common tangents.

Q9. Prove that "A straight line, drawn from the centre of circle to bisect a chord (Which is not diameter) is perpendicular to the chord."

(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."

**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.  $\frac{3\pi}{4}$  radians = .....
- (A)  $115^\circ$  (B)  $135^\circ$  (C)  $150^\circ$  (D)  $30^\circ$
2. The distance of any point of the circle to its centre is called:  
(A) diameter (B) a chord (C) radius (D) an arc
3. A line which has only one point in common with a circle is called:  
(A) Sin of a circle (B) Tangent of a circle (C) Cosine of a circle (D) Secant of a circle
4. If an arc of a circle subtends a central angle of  $60^\circ$ , then the corresponding chord of the arc will make the central angle of:  
(A)  $20^\circ$  (B)  $40^\circ$  (C)  $60^\circ$  (D)  $80^\circ$
5. A line intersecting a circle is called:  
(A) Tangent (B) Secant (C) Chord (D) Boundary
6. How many common tangents can be drawn for two disjoint circles?  
(A) 2 (B) 3 (C) 4 (D) 1
7. An equation of the type  $3^x + 3^{2-x} + 6 = 0$  is a/an:  
(A) Exponential equation (B) Radical equation  
(C) Reciprocal equation (D) Quadratic equation
8. If  $\alpha, \beta$  are the roots of  $7x^2 - x + 4 = 0$ , then  $\alpha\beta$  is:  
(A)  $-1/7$  (B)  $4/7$  (C)  $7/4$  (D)  $-4/7$
9. Product of cube roots of unity is:  
(A) 0 (B)  $-1$  (C) 1 (D) 3
10. In proportion  $a : b :: c : d$ , b and c are called:  
(A) third proportional (B) extremes (C) fourth proportional (D) means
11. Find x in proportion  $4 : x :: 5 : 15$ :  
(A)  $75/4$  (B)  $4/3$  (C)  $3/4$  (D) 12
12. Partial fractions of  $\frac{x-2}{(x-1)(x+2)}$  are of the form:  
(A)  $\frac{A}{x-1} + \frac{B}{x+2}$  (B)  $\frac{Ax}{x-1} + \frac{B}{x+2}$  (C)  $\frac{A}{x-1} + \frac{Bx+C}{x+2}$  (D)  $\frac{Ax+B}{x-1} + \frac{C}{x+2}$
13. A set with no element is called:  
(A) Subset (B) Empty set (C) Singleton set (D) Super set
14. The number of element in power set  $\{1,2,3\}$ :  
(A) 4 (B) 6 (C) 8 (D) 9
15. A data in the form of frequency distribution is called:  
(A) Grouped data (B) Ungrouped data (C) Histogram (D) Polygon

Q2. Write short answers to any SIX (6) questions:

(6×2=12)

- (i) Write the quadratic equation  $\frac{x^2+4}{3} - \frac{x}{7} = 1$  in the standard form.
- (ii) Define radical equation.
- (iii) Find the discriminant of the given quadratic equation  $9x^2 - 30x + 25 = 0$
- (iv) Without solving, find the sum and product of the roots of the quadratic equation  $Px^2 - qx + r = 0$
- (v) If  $\alpha, \beta$  are the roots of the equation  $4x^2 - 5x + 6 = 0$ , then find the value of  $\alpha^2 \beta^2$ .
- (vi) Form a quadratic equation whose roots are  $-2, 3$ .
- (vii) Define joint variation.
- (viii) Find third proportional  $a^2 - b^2, a - b$
- (ix) If  $3(4x - 5y) = 2x - 7y$ , find the ratio  $x:y$ .

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

(6×2=12)

- (i) Define identity.
- (ii) Resolve the fraction  $\frac{x^3 - x^2 + x + 1}{x^2 + 5}$  into proper fraction.
- (iii) If  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ,  $A = \{1, 3, 5, 7, 9\}$ ,  $B = \{2, 3, 5, 7\}$  then verify that  $(A \cup B)' = A' \cap B'$
- (iv) Define intersection of two sets.
- (v) If  $L = \{a, b, c\}$  and  $M = \{d, e, f, g\}$  then find two binary relation in  $L \times M$ .
- (vi) Suppose  $R = \{(2, 4), (3, 6), (4, 8)\}$  find (i) Domain of R (ii) Range of R.
- (vii) Define class limits in frequency distribution.
- (viii) Find median of 2.3, 2.7, 2.5, 2.9, 3.1, 1.9
- (ix) Find arithmetic mean by direct method of the following data 12, 14, 17, 20, 24, 29, 35, 45

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

(6×2=12)

- (i) Define quadrantal angle.
- (ii) Find "r" when  $\ell = 4\text{cm}$ ,  $\theta = \frac{1}{4}$  radian.
- (iii) Prove that  $\cot\theta \sec\theta = \text{cosec}\theta$
- (iv) Define acute angle.
- (v) Define circumcircle.
- (vi) Define length of a tangent.
- (vii) Define circum angle.
- (viii) Define perimeter.
- (ix) Define diameter.

**(PART - II)**

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

(3×8=24)

Q5. (a) Solve the equation  $x^2 - 2x - 195 = 0$  by completing the square.

4

(b) If  $\alpha, \beta$  are the roots of the equation  $x^2 - 3x + 6 = 0$ , form equation whose roots are  $\frac{\alpha}{\beta}, \frac{\beta}{\alpha}$ 

4

Q6. (a) Using theorem of componendo-dividendo find the value of  $\frac{m+5n}{m-5n} + \frac{m+5P}{m-5P}$  if  $m = \frac{10nP}{n+P}$ 

4

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

4

Q7. (a) If  $A = \{1, 2, 3, 4, 5, 6\}$ ,  $B = \{2, 4, 6, 8\}$ ,  $C = \{1, 4, 8\}$  prove that  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ 

4

(b) The marks of six students in mathematics are as follows. 60, 70, 30, 90, 80, 42 find variance.

4

Q8. (a) Verify the identity  $\tan\theta + \cot\theta = \sec\theta \text{cosec}\theta$ 

4

(b) Draw two circles with radii 3.5cm and 2cm. If their centres are 6cm apart, then draw two transverse common tangents.

4

Q9. Prove that perpendicular from the centre of a circle on a chord bisects it.

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."