

**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. A data in the form of frequency distribution is called:  
 (A) range (B) histogram (C) ungrouped data (D) grouped data
2.  $\frac{3\pi}{4}$  radians is equal to:  
 (A)  $30^\circ$  (B)  $115^\circ$  (C)  $135^\circ$  (D)  $150^\circ$
3. A complete circle is divided into:  
 (A)  $90^\circ$  (B)  $180^\circ$  (C)  $270^\circ$  (D)  $360^\circ$
4. A circle has only one \_\_\_\_\_.  
 (A) centre (B) secant (C) chord (D) diameter
5. A 4cm long chord subtends a central angle of  $60^\circ$ . The radial segment of this circle is:  
 (A) four (B) one (C) two (D) three
6. Tangents drawn at the end points of the diameter of a circle are:  
 (A) parallel (B) perpendicular (C) intersecting (D) non collinear
7. A line intersecting a circle is called:  
 (A) tangent (B) chord (C) secant (D) boundary
8. Standard form of quadratic equation is:  
 (A)  $bx + c = 0, b \neq 0$  (B)  $ax^2 + bx + c = 0, a \neq 0$   
 (C)  $ax^2 = bx, a \neq 0$  (D)  $ax^2 = 0, a \neq 0$
9. Product of cube roots of unity is:  
 (A) 0 (B) 1 (C) -1 (D) 3
10. If  $b^2 - 4ac < 0$ , then the roots of  $ax^2 + bx + c = 0$  are:  
 (A) irrational (B) rational (C) imaginary (D) natural
11. If  $u \propto v^2$  then:  
 (A)  $u = v^2$  (B)  $u = kv^2$  (C)  $uv^2 = k$  (D)  $uv^2 = 1$
12. Find "x" in proportion  $4 : x :: 5 : 15$ :  
 (A)  $\frac{75}{4}$  (B)  $\frac{4}{3}$  (C) 12 (D)  $\frac{3}{4}$
13. Partial fraction of  $\frac{x+2}{(x+1)(x^2+2)}$  are:  
 (A)  $\frac{A}{x+1} + \frac{B}{x^2+2}$  (B)  $\frac{A}{x+1} + \frac{Bx+C}{x^2+2}$  (C)  $\frac{Ax+B}{x+1} + \frac{C}{x^2+2}$  (D)  $\frac{A}{x+1} + \frac{Bx}{x^2+2}$
14. The set  $\{x|x \in W \wedge x \leq 101\}$  is:  
 (A) infinite set (B) sub set (C) null set (D) finite set
15. If the number of elements in set A is 3 and in set B is 4, then number of elements in  $A \times B$  is:  
 (A) three (B) four (C) seven (D) twelve

Marks: 60

**SUBJECTIVE TYPE (PART- I)**

Time :2.10 Hours

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

(6×2=12)

- (i) Define quadratic equation with an example.
- (ii) Solve:  $4 - 32x = 17x^2$
- (iii) Find nature of roots of:  $x^2 - 23x + 120 = 0$
- (iv) Evaluate:  $\omega^{-13} + \omega^{-17}$
- (v) Without solving find the sum and product of:  $3x^2 + 7x - 11 = 0$
- (vi) If  $\alpha, \beta$  are the roots of the equation  $x^2 + px + q = 0$ , then calculate  $\alpha^2 + \beta^2$ .
- (vii) Define direct variation.
- (viii) Find mean proportional between  $20x^3y^5, 5x^7y$
- (ix) If  $A \propto \frac{1}{r^2}$  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 improper fraction.
- (ii) Convert the given improper fraction into proper fraction.  $\frac{3x^2 - 2x - 1}{x^2 - x + 1}$
- (iii) Find a and b if:  $(a - 4, b - 2) = (2, 1)$
- (iv) Find the number of elements in  $Y \times X$  and  $X \times X$  if  $X = \{a, b, c\}, Y = \{d, e\}$
- (v) Define binary relation.
- (vi) Define the bijective function.
- (vii) Define variance.
- (viii) Find the range of given weights of students. 110, 109, 84, 89, 77, 104, 74, 97, 49, 59, 103, 62
- (ix) Find arithmetic mean by direct method for the following set of data.  
220, 225, 350, 375, 270, 320, 290

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

(6×2=12)

- (i) Define quadrantal angle.
- (ii) Convert  $\frac{13\pi}{16}$  into degrees.
- (iii) Find  $\theta$ , when  $\ell = 2\text{cm}, r = 3.5\text{cm}$
- (iv) What is meant by zero dimension?
- (v) Define collinear points.
- (vi) Define tangent of a circle.
- (vii) Define chord of a circle.
- (viii) Define sector of a circle.
- (ix) Define regular polygon.

**(PART - II)**

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

(3×8=24)

**Q5. (a) Solve the equation.  $\sqrt{x+3} = 3x - 1$  4**

**(b) Find the value of h using synthetic division if 3 is the zero of the polynomial.  $2x^3 - 3hx^2 + 9$  4**

**Q6. (a) Using componendo-dividendo theorem solve the equation.  $\frac{(x+5)^3 - (x-3)^3}{(x+5)^3 + (x-3)^3} = \frac{13}{14}$  4**

**(b) Resolve into partial fractions.  $\frac{x-5}{x^2+2x-3}$  4**

**Q7. (a) Verify that:  $(A \cap B) \cap C = A \cap (B \cap C)$ , if  $U = \{1,2,3,4,\dots,10\}, A = \{1,3,5,7,9\}, B = \{1,4,7,10\}, C = \{1,5,8,10\}$  4**

**(b) The marks of the six students in the mathematics are as follows. Determine "variance". 4**

Student No.	1	2	3	4	5	6
Marks	60	70	30	90	80	42

**Q8. (a) Verify that:  $\frac{1 + \sin\theta}{1 - \sin\theta} - \frac{1 - \sin\theta}{1 + \sin\theta} = 4\tan\theta\sec\theta$  4**

**(b) Inscribe a circle in a triangle ABC with sides given below. Also measure its in-radius. 4**  
 $|AB| = 5\text{cm}, |BC| = 3\text{cm}, |CA| = 3\text{cm}$

**Q9. Prove that "perpendicular from the centre of a circle on a chord bisects it." 8**

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



**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 length of a chord and the radial segment of a circle are congruent, the central angle made by the chord will be:  
 (A)  $30^\circ$  (B)  $45^\circ$  (C)  $75^\circ$  (D)  $60^\circ$
2. How many common tangents can be drawn from two touching circles?  
 (A) 1 (B) 2 (C) 4 (D) 3
3. How many tangents can be drawn from a point outside the circle?  
 (A) 1 (B) 4 (C) 3 (D) 2
4. 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)  $x = \frac{b \pm \sqrt{b^2 + 4ac}}{2a}$
5.  $\alpha^2 + \beta^2$  is equal to: (A)  $\alpha^2 - \beta^2$  (B)  $\frac{1}{\alpha^2 + \beta^2}$  (C)  $(\alpha + \beta)^2 - 2\alpha\beta$  (D)  $\alpha + \beta$
6. If  $\alpha, \beta$  are the roots of  $x^2 - x - 1 = 0$  then product of the roots  $2\alpha$  and  $2\beta$  is:  
 (A) -2 (B) 2 (C) 4 (D) -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. In a proportion  $a : b :: c : d$ , "a" and "d" are called:  
 (A) means (B) extremes (C) third proportional (D) fourth proportional
9. Partial fractions of  $\frac{x+2}{(x+1)(x^2+2)}$  are of the form:  
 (A)  $\frac{A}{x+1} + \frac{B}{x^2+2}$  (B)  $\frac{A}{x+1} + \frac{Bx+C}{x^2+2}$  (C)  $\frac{Ax+B}{x+1} + \frac{C}{x^2+2}$  (D)  $\frac{A}{x+1} + \frac{Bx}{x^2+2}$
10. In number of elements in set "A" is 3 and in set "B" is 4, then number of elements in  $A \times B$  is:  
 (A) 3 (B) 4 (C) 12 (D) 7
11. The number of elements in set "A" is 3 and in set "B" is 2, then the number of binary relations in  $A \times B$  is:  
 (A)  $2^3$  (B)  $2^6$  (C)  $2^8$  (D)  $2^2$
12. A frequency polygon is a many sided:  
 (A) closed figure (B) rectangle (C) square (D) triangle
13.  $20^\circ$  is equal to:  
 (A)  $360'$  (B)  $630'$  (C)  $1200'$  (D)  $3600'$
14. Locus of a point in a plane equidistant from a fixed point is called:  
 (A) radius (B) circle (C) circumference (D) diameter
15. Tangents drawn at the ends of diameter of a circle are \_\_\_\_\_ to each other.  
 (A) parallel (B) non-collinear (C) collinear (D) perpendicular

Marks: 60

**SUBJECTIVE TYPE (PART- I)**

Time :2.10 Hours

(6×2=12)

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

- (i) Solve the quadratic equation.  $3x^2 - 7x - 20 = 0$
- (ii) Define exponential equation.
- (iii) Evaluate:  $\omega^{-13} + \omega^{-17}$
- (iv) If  $\alpha, \beta$  are the roots of the equation  $4x^2 - 5x + 6 = 0$ , then find the value of  $\frac{1}{\alpha} + \frac{1}{\beta}$ .
- (v) Write the quadratic equation having roots 2, -6.
- (vi) Use synthetic division to find the quotient and remainder when:  $(4x^3 - 5x + 15) \div (x + 3)$
- (vii) Define inverse variation.
- (viii) Find a third proportional of  $x + y$  and  $x^2 - y^2$ .
- (ix) If  $y \propto x^3$  and  $y = 81$  when  $x = 3$ , find  $y$  when  $x = 5$ .

(6×2=12)

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

- (i) Resolve into proper fraction.  $\frac{6x^3 + 5x^2 - 7}{3x^2 - 2x - 1}$
- (ii) Resolve into partial fractions  $\frac{1}{x^2 - 1}$ .
- (iii) Define one-one function.
- (iv) If  $M = \{d, e, f, g\}$ , then find two binary relation in  $M \times M$ .
- (v) Find "a" and "b" if:  $(2a + 5, 3) = (7, b - 4)$
- (vi) Write dom f and range f if:  $f = \{(0, 1), (1, 2), (2, 3), (3, 4)\}$
- (vii) Define mode.
- (viii) Find the geometric mean of the observations by using basic formula 2, 4, 8.
- (ix) Find mean (arithmetic mean) of the observations. 34, 34, 34, 34, 34, 34

(6×2=12)

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

- (i) Define an angle.
- (ii) Convert  $25^\circ 30'$  to decimal degrees.
- (iii) Find the distance travelled by a cyclist moving on a circle of radius 15m, if he makes 3.5 revolutions.
- (iv) Define projection of a point.
- (v) Define a circle.
- (vi) Define secant of a circle.
- (vii) Define arc of a circle.
- (viii) Define chord of a circle.
- (ix) Define polygon.

**(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.  $\frac{2x+1}{x+2} - \frac{x-2}{x+4} = 0$**  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:  $\frac{\sqrt{x^2+2} + \sqrt{x^2-2}}{\sqrt{x^2+2} - \sqrt{x^2-2}} = 2$**  4

**(b) Resolve into partial fractions:  $\frac{7x+4}{(3x+2)(x+1)^2}$**  4

**Q7. (a) Prove that:  $(A \cap B)' = A' \cup B'$ , if:  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ,  $A = \{1, 3, 5, 7, 9\}$ ,  $B = \{2, 3, 5, 7\}$**  4

**(b) The marks of the six students in mathematics are as follows. Determine "variance".** 4

No. of Students	1	2	3	4	5	6
Marks	60	70	30	90	80	42

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

**(b) Draw two circles with radii 2.5cm and 3cm. if their centres are 6.5cm apart, then draw two direct common tangents.** 4

**Q9. Prove that "a straight line drawn from the centre of a circle to bisect the chord (which is not a diameter) is perpendicular to the chord."** 8

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