Q1. 15

1. $\dfrac{2\pi}{3}$ radians = _____ .

 (A) 60°   (B) 90°   (C) 120°   (D) 150°

2. If $\tan\theta = \sqrt{3}$, then θ is equal to:

 (A) 90°   (B) 45°   (C) 30°   (D) 60°

3. A complete circle is divided into:

 (A) 360°   (B) 90°   (C) 180°   (D) 270°

4. Tangents drawn at the ends of diameter of a circle are _____ to each other:

 (A) perpendicular   (B) parallel   (C) non-parallel   (D) collinear

5. A pair of chords of a circle subtending two congruent central angles is:

 (A) congruent   (B) incongruent   (C) over lapping   (D) parallel

6. The measure of the external angle of a regular octagon is:

 (A) $\dfrac{\pi}{2}$ (B) $\dfrac{\pi}{3}$ (C) $\dfrac{\pi}{4}$ (D) $\dfrac{\pi}{6}$

7. The number of terms in a standard quadratic equation $ax^2 + bx + c = 0$ is:

 (A) 1   (B) 2   (C) 3   (D) 4

8. If $b^2 - 4ac < 0$, then the roots of $ax^2 + bx + c = 0$ are:

 (A) rational   (B) irrational   (C) real   (D) imaginary

9. If α, β are the roots of the equation $2x^2 - 3x - 5 = 0$ then $\alpha\beta$ is:

 (A) 5/2   (B) −5/2   (C) 3/2   (D) −3/2

10. The third proportional of 28 and 4 is:

 (A) 4/7   (B) 7/4   (C) 1/7   (D) 2/7

11. Find x in proportion 6 : x :: 3 : 5:

 (A) 15   (B) 10   (C) 9   (D) 18

12. $\dfrac{2x^2}{x} = 2x$ is _____ .

 (A) a linear equation   (B) an equation   (C) an identity   (D) an inequaion

13. The sent having only one element is called:

 (A) null set   (B) power set   (C) subset   (D) singleton set

14. Point (-1, 4) lies in the quadrant:

 (A) I   (B) II   (C) III   (D) IV

15. A histogram is a set of adjacent:

 (A) rectangles   (B) squares   (C) circles   (D) triangles

Q2. Write short answers to any SIX (6) questions: $(6\times2=12)$

(i)   Solve by factorization $3y^2 - y(y - 5)$ (ii)   Write equation in standard form: $\dfrac{x^2+4}{3} - \dfrac{x}{7} = 1$

(iii)   Evaluate: $(1 - \omega - \omega^2)^7$ (iv)   Write the quadratic equation having roots 1, 5.

(v)   Find sum and the product of the roots of the quadratic equation $px^2 - qx + r = 0$.

(vi)   If α, β are the roots of the equation $x^2 + px + q = 0$ then find the value of $\alpha^2 + \beta^2$.

(vii)   Define direct variation.

(viii)   Find x in the proportion $(3x - 2) : 4 :: (2x + 3) : 7$

(ix)   Find a fourth proportional to 5, 8, 15.

Q3. Write short answers to any SIX (6) questions: $(6\times2=12)$

(i)   Resolve into partial fraction. $\dfrac{1}{x^2 - 1}$ (ii)   Describe difference of two sets with an example.

(iii)   If $A = \{1,2,3,4,5,6\}$, $B = \{2,4,6,8\}$ and $C = \{1,4,8\}$ then find $A \cap (B \cup C)$.

(iv)   Find a and b if $(a - 4, b - 2) = (2, 1)$ (v)   Write all the subsets of set $\{a, b\}$

(vi)   Define median.

(vii)   Define range.

(viii)   Find range of the following weights of students 110, 109, 84, 89, 77, 104, 74, 97, 49, 59, 103, 62

(ix)   What is histogram?

Q4. Write short answers to any SIX (6) questions: $(6\times2=12)$

(i)   Find 'θ' if $\ell = 2$ cm, $r = 3.5$cm   (ii)   Verify that $\cot\theta . \sec\theta = \csc\theta$

(iii)   What is meant by the projection of a given point?

(iv)   Differentiate between minor arc and major arc of a circle.

(v)   How length of a tangent is measured?   (vi)   Define an arc of a circle.

(vii)   Define in-centre.   (viii) Define circum circle.

(ix)   Define a polygon.

(PART - II)

Note: Attempt any THREE questions. Question number 9 is compulsory. $(3\times8=24)$

Q5. (a)   Solve the equation by completing square. $x^2 + 17x + \dfrac{33}{4} = 0$ 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)   If $\dfrac{a}{b} = \dfrac{c}{d} = \dfrac{e}{f}$ $(a, b, c, d, e, f \neq 0)$, show that $\dfrac{a}{b} = \sqrt{\dfrac{a^2 + c^2 + e^2}{b^2 + d^2 + f^2}}$ 4

     (b)   Resolve into partial fractions. $\dfrac{9}{(x - 1)(x + 2)^2}$ 4

Q7. (a)   If $U = \{1,2,3,\ldots,20\}$, $X = \{1,3,7,9,15,18,20\}$ and $Y = \{1,3,5,\ldots,17\}$ then show that   4
         $X - Y = X \cap Y'$

     (b)   Find the standard deviation 'S' of set of numbers: 9, 3, 8, 8, 9, 8, 9, 18   4

Q8. (a)   Verify that $\sqrt{\dfrac{1 + \cos\theta}{1 - \cos\theta}} = \dfrac{\sin\theta}{1 - \cos\theta}$ 4

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

Q9. Prove that two chords of a circle which are equidistant from the centre are congruent.   8.

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

Q1. 15

1. $\dfrac{3\pi}{4}$ radians = _____.   (A) 135°   (B) 125°   (C) 150°   (D) 30°

2. $\dfrac{1}{1+\sin\theta}+\dfrac{1}{1-\sin\theta}=$ _____.   (A) $2\cos^2\theta$ (B) $\sec^2\theta$ (C) $\cos\theta$ (D) $2\sec^2\theta$

3. A complete circle is divided into:
   (A) 90°   (B) 180°   (C) 270°   (D) 360°

4. Two tangents drawn to a circle from a point outside it are of _____ in length:
   (A) half   (B) equal   (C) double   (D) triple

5. If an arc of a circle subtends a central angle of 60° then the corresponding chord of the arc will make the central angle of:
   (A) 20°   (B) 40°   (C) 60°   (D) 80°

6. How many tangents can be drawn from a point outside circle?
   (A) 2   (B) 1   (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. If α,β are the roots of the equation $7x^2-x+4=0$ then $\alpha\beta$ is:
   (A) $\dfrac{-1}{7}$ (B) $\dfrac{-4}{7}$ (C) $\dfrac{7}{4}$ (D) $\dfrac{4}{7}$

9. Roots of the equation $4x^2-4x+1=0$ are:
   (A) real, equal   (B) real, unequal   (C) imaginary   (D) irrational

10. The fourth proportional w of $x:y::v:w$ is:
    (A) $\dfrac{xy}{v}$ (B) $\dfrac{vy}{x}$ (C) xyv (D) $\dfrac{x}{vy}$

11. If $\dfrac{a}{b}=\dfrac{c}{d}$, then componendo property is:
    (A) $\dfrac{a}{a+b}=\dfrac{c}{c+d}$ (B) $\dfrac{a}{a-b}=\dfrac{c}{c-d}$ (C) $\dfrac{ad}{bc}$ (D) $\dfrac{a-b}{b}=\dfrac{c-d}{d}$

12. $\dfrac{x^3+1}{(x-1)(x+2)}$ is _____.
    (A) a proper fraction   (B) an improper fraction   (C) an identity   (D) a constant term

13. The set $\{x\mid x\in W\wedge x\le 101\}$ is:
    (A) infinite set   (B) subset   (C) null set   (D) finite set

14. The relation $\{(1,2),(2,3),(3,3),(3,4)\}$ is:
    (A) onto function   (B) into function   (C) not a function   (D) one-one function

15. The spread or scatterness of observations in a data set is called:
    (A) average   (B) dispersion   (C) central tendency   (D) median

Q2. Write short answers to any SIX (6) questions: $(6\times2=12)$

(i)   Define exponential equation.

(ii)   Write the quadratic equation $\dfrac{x}{x+1}+\dfrac{x+1}{x}=6$ in the standard form:

(iii)   Find the discriminant of the quadratic equation $6x^2 - 8x + 3 = 0$

(iv)   Evaluate $(1 - 3\omega - 3\omega^2)^5$

(v)   Write the quadratic equation having roots $-1, -7$

(vi)   Define synthetic division.

(vii)   Find the value of P, if the ratios $2P + 5 : 3P + 4$ and $3 : 4$ are equal.

(viii) Find a third proportional to 28, 4

(ix)   Define inverse variation.

Q3. Write short answers to any SIX (6) questions: $(6\times2=12)$

(i)   Resolve into partial fractions. $\dfrac{x-11}{(x-4)(x+3)}$

(ii)   Find $(A - B)$ and $(B - A)$ when $A = \{1,2,3,4,5\}$, $B = \{2,4,5,6,8\}$

(iii)   Define subset.

(iv)   Find $L \times M$ when $L = \{a, b, c\}$ and $M = \{3, 4\}$

(v)   Find domain and range of R when $R = \{(1,1),(2,2),(3,3)\}$

(vi)   Find arithmetic mean for the data: 12,14,17,20,24,29,35,45

(vii)   Define range.

(viii) Find the mode of size of shoe for the following data: 4,4,5,5,6,6,6,7,7,5,7,5,8,8,8,6,5,6,5,7

(ix)   Define median.

Q4. Write short answers to any SIX (6) questions: $(6\times2=12)$

(i)   Express $135°$ into radians.   (ii)   Find θ, when $\ell = 2cm$, $r = 3.5cm$

(iii)   Define zero dimension.   (iv)   Define circumference of a circle.

(v)   Define tangent of a circle.   (vi)   Define chord of a circle.

(vii) Define central angle.   (viii) Define a polygon.

(ix)   Define incircle.

(PART - II)

Note: Attempt any THREE questions. Question number 9 is compulsory. $(3\times8=24)$

Q5. (a)   Solve the equation using quadratic formula. $4x^2 - 14 = 3x$ 4

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

Q6. (a)   Using theorem of componendo-dividendo, find the value $\dfrac{x + 2y}{x - 2y}+\dfrac{x + 2z}{x - 2z}$ if $x = \dfrac{4yz}{y+z}$ 4

     (b)   Resolve into partial fraction $\dfrac{3x + 3}{(x - 1)(x + 2)}$ 4

Q7. (a)   If $U = \{1,2,3,....,20\}$, $X = \{1,3,7,9,15,18,20\}$ and $Y = \{1,3,5,...,17\}$ then show that   4
       $X - Y = X \cap Y'$

     (b)   Find the standard deviation 'S' for the data: 9, 3, 8, 8, 9, 8, 9, 18   4

Q8. (a)   A tree casts a 40 meter shadow when the angle of elevation is $25°$. Find the height of the tree. 4

     (b)   Escribe a circle opposite to vertex A to a triangle ABC with sides   4
       $|AB| = 6cm$, $|BC| = 4cm$, $|CA| = 3cm$

Q9. Prove that: one and only one circle can pass through three non-collinear points.   8

(OR) Prove that: the opposite angles of any quadrilateral inscribed in a circle are supplementary.