**CLASS : 10**

# COMMON QUARTERLY EXAMINATION-2023-24

**MATHEMATICS**

Time Allowed : 3.00 Hours]

[Max. Marks : 100

## SECTION – I

**I.   Answer all of the following:**

14x1=14

1. If n (A x B) = 6 and A = {1, 3} then n (B) is ---------
   a)   1                   b)   2                   c)   3                   d)   6

2. If { (a, 8), (6, b) } represents an identity function then the value of a and b are respectively
   a)   (8, 6)              b)   (8, 8)             c)   (6, 8)             d)   (6, 6)

3. f(x) = (x+1)³ - (x-1)³ represents a function which is ----------
   a)   Linear             b)   Cubic             c)   Reciprocal        d)   Quadratic

4. If the HCF of 65 and 117 is expressible in the form of 65m - 117. Then the value of  m is ---------
   a)   4                   b)   2                   c)   1                   d)   3

5. $7^{4k} \equiv$ ------------- (mod 100)
   a)   1                   b)   2                   c)   3                   d)   4

6. If 1 + 2 + 3 + .......... + n = k then 1³ + 2³ + 3³ + ......... + n³ = ------------
   a)   K³                  b)   K²                c)   $\dfrac{k(k+1)}{2}$        d)   (k+1)³

7. $y^2 + \dfrac{1}{y^2}$   is not equal to
   a)   $\dfrac{y^4 + 1}{y^2}$        b)   $\left(y + \dfrac{1}{y}\right)^2$        c)   $\left(y - \dfrac{1}{y}\right)^2 + 2$        d)   $\left(y + \dfrac{1}{y}\right)^2 - 2$

8. The solution of (2x - 1)² = 9 is equal to
   a)   -1                  b)   2                  c)   -1, 2              d)   None of these

9. If ∆ABC is an isosceles triangle with ∠C = 90º and AC = 5 cm, then AB is
   a)   2.5 cm             b)   5 cm              c)   10 cm             d)   5√2 cm

10. If in ∆ABC, DE∥BC, AB = 3.6 cm, AC = 2.4 cm and AD = 2.1cm then the length of AE is
    a)   1.4 cm            b)   1.8 cm            c)   1.2 cm            d)   1.05 cm

11. The straight line given by the equation x = 11 is
    a)   Parallel to X axis                       b)   Parallel to Y axis
    c)   Passing through the origin              d)   Passing through the point (0, 11)

12. Slope of line ax + by + c = 0 is ---------
    a)   $\dfrac{b}{a}$        b)   $\dfrac{a}{b}$        c )   $\dfrac{-b}{a}$        d)   $\dfrac{-a}{b}$

13. (2, 1) is the point of intersection of two lines
    a)   x - y - 3 = 0; 3x - y - 7 = 0           b)   x + y = 3; 3x + y = 7
    c)   3x + y = 3; x + y = 7                    d)   x + 3y - 3 = 0; x - y - 7 = 0.

14. tanθ cosec²θ - tanθ equal to
    a)   secθ              b)   cot²θ             c)   sinθ              d)   cotθ

## SECTION - II

**II.   Answer any 10 questions. Question No.  28  is compulsory.**

10x2=20

15. A Relation R is given by the set { (x, y) / y = x+3 x ∈ {0, 1, 2, 3, 4, 5}. Determine its domain and range.

16. A function f is defined by f(x) = 3 - 2x. Find x such that f(x²) = [f(x)]².

17. Let f be a function f : N → N be defined by f(x) = 3x + 2, x ∈ N (i)  Find the images of 1 and 2
    ii)  Find the pre-images of 29 and 53.

18. If 13824 = 2ᵃ x 3ᵇ then find a and b.

19. Find $a_8$ and $a_{15}$ whose nth term is
    $$a_n = \begin{cases} \dfrac{n^2-1}{n+3} \ ; \ n \text{ is even, } n \in N \\ \dfrac{n^2}{2n+1} \ ; \ n \text{ is odd, } n \in N \end{cases}$$

CH / 10 / Mat / 1

20. Find the sum $3 + 1 + \frac{1}{3} + \dots\dots\infty$.

21. Find the excluded values of $\dfrac{x^3 - 27}{x^3 + x^2 - 6x}$.

22. Determine the quadratic equation whose sum and product of -9 and 20.

23. If $\triangle ABC$ is similar to $\triangle DEF$ such that BC = 3 cm, EF = 4 cm and area of $\triangle ABC = 54$ cm². Find the area of $\triangle DEF$.

24. In ABC, D and E are points on the sides AB and AC respectively such that DE||BC. If $\dfrac{AD}{DB} = \dfrac{3}{4}$ and AC = 15 cm find AE.

25. The line through the points (-2, a) and (9, 3) has slope $-\frac{1}{2}$. Find the value of a.

26. Find the intercepts made by the line 4x - 9y + 36 = 0 on the co-ordinate axis.

27. Prove that $\sqrt{\dfrac{1 + \cos\theta}{1 - \cos\theta}} = \csc\theta + \cot\theta$

28. If the points (p², 0), (0, q²) and (1,1) are straight line. Then prove that $\dfrac{1}{p^2} + \dfrac{1}{q^2} = 1$

## SECTION - III

III.  **Answer the following any 10 questions. Q.No.42 is compulsory.**                 10x5=50

29. Let A = { x∈W | x<2}, B = {x∈N | 1<x≤4} and C = {3, 5}. Verify that Ax(B∪C) = (AxB) ∪ (AxC).

30. If the function f:R→R is defined by $f(x) = \begin{cases} 2x + 7; & x < -2 \\ x^2 - 2; & -2 \le x < 3 \\ 3x - 2; & x \ge 3 \end{cases}$ then find the values of

   i)  f(4)          ii)  f(-2)          iii)  f(4) + 2f(1)          iv)  $\dfrac{f(1) - 3f(4)}{f(-3)}$

31. If f(x) = x-1, g(x) = 3x+1 and h(x) = x². Prove that (f∘g)∘h = f∘(g∘h).

32. In an A.P, sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers

33. Find the sum to n terms of 3 + 33 + 333 + ...........

34. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm.....24cm. How much area can be decorated with these colour papers?

35. Solve : x+y+z=5; 2x-y+z=9; x-2y+3z=16.

36. If 36x⁴ - 60x³ + 61x² - mx + n is a perfect square, find the values of m and n.

37. Prove that the equation x² (p² + q²) + 2x (pr + qs) + r² + s² = 0 has no real roots. If ps = qr then show that the roots are real and equal.

38. State and prove Angle bisector theorem.

39. Find the area of the quadrilateral formed by the points (8,6), (5,11), (-5,12) and (-4,3).

40. Find the equation of perpendicular bisector of line joining the points A (-4, 2) and B (6, -4).

41. If $\dfrac{\cos\theta}{1+\sin\theta} = \dfrac{1}{a}$ then prove that $\dfrac{a^2 - 1}{a^2 + 1} = \sin\theta$

42. The sum of the reciprocals of (x+2) and (x-2) is equal to 6 times of the reciprocal of 4x+7. Find the value of x.

## SECTION - IV

IV.  **Answer the following.**                                                         2x8=16

43. a)  A bus is travelling at a uniform speed of 50 km/hr. Draw the distance - time graph and hence find i) the constant of variations ii) how far will it travel in 90 minutes? iii) the time required to cover a distance of 300 km from the graph.

**(OR)**

   b)  Draw the graph of xy = 24, x,y>0 using the graph find  (i)  y when x=3 and (ii)  x when y = 6.

43. a)  Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the $\triangle PQR$ (scale factor $\frac{7}{3} < 1$)

**(OR)**

   b)  Construct a $\triangle PQR$ such that QR = 6.5 cm, $\angle P = 60^\circ$ and the altitude from P to QR is of length 4.5 cm

                                                                              CH / 10 / Mat / 2