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Tamilnadu Board

Quarterly Exam Question Paper

2023-24



CLASS : 10

Register Number | | | | | | |

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 $1^3 + 2^3 + 3^3 +$ ..... $+ n^3$ = ----------
   a) K^3 b) K^2 c) $\frac{k(k+1)}{2}$ d) $(k+1)^3$
7. $y^2 + \frac{1}{y^2}$ is not equal to
   a) $\frac{y^4+1}{y^2}$ b) $\left(y+\frac{1}{y}\right)^2$ c) $\left(y-\frac{1}{y}\right)^2 + 2$ d) $\left(y+\frac{1}{y}\right)^2 - 2$
8. The solution of $(2x - 1)^2 = 9$ is equal to
   a) -1 b) 2 c) -1, 2 d) None of these
9. If ΔABC is an isosceles triangle with $\angle C = 90^\circ$ and AC = 5 cm, then AB is
   a) 2.5 cm b) 5 cm c) 10 cm d) $5\sqrt{2}$ cm
10. If in ΔABC, 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) $\frac{b}{a}$ b) $\frac{a}{b}$ c) $-\frac{b}{a}$ d) $-\frac{a}{b}$
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. $\tan\theta \operatorname{cosec}^2\theta - \tan\theta$ equal to
    a) $\sec\theta$ b) $\cot^2\theta$ c) $\sin\theta$ d) $\cot\theta$.

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 $f(x^2) = [f(x)]^2$.
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 $13824 = 2^a \times 3^b$ then find a and b.
19. Find a_8 and a_{15} whose n^{th} term is

$$a_n = \begin{cases} \frac{n^2-1}{n+3} ; & n \text{ is even, } n \in N \\ \frac{n^2}{2n+1} ; & n \text{ is odd, } n \in N \end{cases}$$

20. Find the sum $3 + 1 + {}^{1}/_{3} + \ldots\ldots\infty$.

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 ΔABC is similar to ΔDEF such that BC = 3 cm, EF = 4 cm and area of $\Delta ABC = 54\ cm^2$. Find the area of ΔDEF.

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 $-{}^{1}/_{2}$. 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 $\sqrt{\dfrac{1 + \cos\theta}{1 - \cos\theta}} = \operatorname{cosec}\theta + \cot\theta$

28. If the points $(p^2, 0)$, $(0, q^2)$ 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 $A = \{ x \in W \mid x<2\}$, $B = \{x \in N \mid 1<x\leq 4\}$ and $C = \{3, 5\}$. Verify that $Ax(B \cup C) = (AxB) \cup (AxC)$.

30. If the function $f: R \to R$ is defined by $f(x) = \begin{cases} 2x + 7; & x < -2 \\ x^2 - 2; & -2 \leq x < 3 \\ 3x - 2; & x \geq 3 \end{cases}$ 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 $h(x) = x^2$. Prove that $(f \circ g) \circ h = f \circ (g \circ h)$.

32. In an A.P, sum of four consective 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 $36x^4 - 60x^3 + 61x^2 - mx + n$ is a perfect square, find the values of m and n.

37. Prove that the equation $x^2(p^2 + q^2) + 2x(pr + qs) + r^2 + s^2 = 0$ 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 ${}^{7}/_{3}$ of the corresponding sides of the ΔPQR (scale factor ${}^{7}/_{3} < 1$)

(OR)

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

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