QL

QUARTERLY EXAMINATION - 2024

10 - Std   MATHS

Time : 3.00 Hrs.   MARKS : 100

PART - A

I **Answer all the questions.**   14 X 1 = 14

Choose the correct answer from the given four alternatives.

1. If there are 1024 relations from a set A = {1,2,3,4,5} to a set B, then the number of elements in B is ....

   a) 3   b) 2   c) 4   d) 8

2. If the ordered pairs (a, -1) and (5, b) belong to {(x,y) / y = 2x + 3}, then the values of `a` and `b` are

   a) (-13, 2)   b) (2, 13)   c) (2, -13)   d) (-2, 13)

3. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is

   a) 2025   b) 5220   c) 5025   d) 2520

4. If t_n is the nth term of an A.P. then $t_{2n} - t_n$ is

   a) nd   b) 2nd   c) 2d   d) 3nd

5. The sequence $\sqrt{11}$, $\sqrt{55}$, $5\sqrt{11}$, $5\sqrt{55}$, $25\sqrt{11}$, ... represents

   a) an A.P. only   b) a G.P. only

   c) neither A.P nor G.P   d) both A.P and G.P

6. If (x - 6) is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is

   a) 3   b) 5   c) 6   d) 8

7. Which of the following should be added to make $x^4 + 64$ a perfect square?

   a) $4x^2$ b) $16x^2$ c) $8x^2$ d) $-8x^2$

8. A quadratic equation whose one zero is 5 and the sum of the zeroes is 0 is given by the equation

   a) $x^2 - 5x = 0$ b) $x^2 - 5x + 5 = 0$ c) $x^2 - 25 = 0$ d) $x^2 - 5 = 0$

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9. The perimeters of two similar triangles $\triangle$ ABC and $\triangle$ PQR are 36cm and 24cm respectively. If PQ = 10 cm, the length of AB is ....

   a) $6\frac{2}{3}$ cm   b) $\frac{10\sqrt{6}}{3}$ cm   c) $66\frac{2}{3}$ cm   d) 15 cm

10. In a $\triangle$ABC , AD is the bisector of $\angle$BAC. If AB = 8cm, BD = 6cm and DC = 3cm. The length of the side AC is ....

   a) 6 cm   b) 4cm   c) 3 cm   d) 8 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. If (5,7), (3, p) and (6, 6) are collinear then the value of p is

   a) 3   b) 6   c) 9   d) 12

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. If 5x = secθ and $\frac{5}{y}$ = tanθ, then $x^2 - \frac{1}{y^2}$ is equal to

   a) 25   b) $\frac{1}{25}$ c) 5   d) 1

PART - B

II   Answer any 10 questions.

Question No. 28 is compulsory.   10 X 2 = 20

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

16. Let f be a function from R to R defined by f(x) = 3x - 5. Find the values of a and b given that (a, 4) and (1, b) belong to f.

17. If f(x) = x^2 - 1, g(x) = x - 2 find a, gof (a) = 1.

18. Solve : 5x $\equiv$ 4 (mod 6)

19. In a G.P. 729, 243, 81, ... find t_7.

20. If 1 + 2 + 3 + ... + k = 325 then find

   $1^3 + 2^3 + 3^3 + \text{.........} + k^3$.

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21. Find the excluded value of the rational expression $\dfrac{t}{t^2-5t+6}$.

22. Simplify : $\dfrac{x^3}{x-y}+\dfrac{y^3}{y-x}$.

23. Determine the nature of the roots of the quadratic equation
    $15x^2 + 11x + 2 = 0$.

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

25. Find the slope of a line joining the points (-6, 1) and (-3, 2).

26. Show that the straight lines x - 2y + 3 = 0, 6x + 3y + 8 = 0 are perpendicular.

27. Prove that $\sqrt{\dfrac{1+\sin\theta}{1-\sin\theta}}=\sec\theta+\tan\theta$.

28. Find the equation of straight line whose slope is -4 and passing through the point (1,2).

PART - C

III Answer any 10 question.

Question No. 42 is compulsory.   10 X 5 = 50

29. Let A = {x ∈ W / x < 2}, B = {x ∈ N / 1 < x ≤ 4} and C = {3, 5} verify that
    A X (B∩C) = (A X B) ∩ (A X C).

30. Let $f:A\to B$ be a function defined by $f(x)=\dfrac{x}{2}-1$, where A = {2,4,6,10,12}, B = {0,1,2,4,5,9}. Represent f by   i) a set of ordered pairs   ii) a table   iii) an arrow diagram   iv) a graph.

31. If f(x) = x², b(x) = 3x and h(x) = x - 2, prove that (fog) oh = fo(foh).

32. The 13th term of a n A.P is 3 and the sum of first 13 terms is 234. Find the common difference and the sum of first 21 terms.

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

34. There are 12 pieces of five, ten and twenty rupee currencies whose total value is Rs. 105. When first 2 sorts are interchanged in their numbers its value will be increased by Rs. 20. Find the number of currencies in each sort.

35. Find the square root of the polynomial 37x² - 28x³ + 4x⁴ + 42x + 9 by division method.

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36. The roots of the equitation $x^2 + 6x - 4 = 0$ are α, β. Find the quadratic equation whose roots are α^2 and β^2.

37. State and prove Thales theorem.

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

39. Find the equation of a straight line passing through (1,-4) and has intercepts which are in the ratio 2 : 5.

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

41. If $\cot\theta + \tan\theta = x$ and $\sec\theta - \cos\theta = y$ then prove that $(x^2y)^{\frac{2}{3}} - (xy^2)^{\frac{2}{3}} = 1$.

42. Swathi has 15 ice cubes of different sizes 9cm, 10cm, 11cm, ... 23cm. How much volume of ice cubes can be used to prepare some fruit juice with these ice cubes?

PART - D

IV   Answer all the questions. $2 \times 8 = 16$

43. a) Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{6}{5}$ of the corresponding sides of the triangle ABC (scale factor $\frac{6}{5} > 1$) **(OR)**

b) Construct a triangle ΔPQR such that QR = 5cm, $\angle P = 30^0$ and the altitude from P to QR is of length 4.2cm.

44. a) A bus is travelling at a uniform speed of 50km/hr. Draw the distance time graph and hence find.

i) the constant of variation.

ii) how for will it travel in 90 minutes?

iii) the time required to cover a distance of 300km from the graph. **(OR)**

b) The following table shows the data about the number of pipes and the time taken to fill the same tank.

No. of pipes (X)	2	3	6	9
Time taken (Y) (in mts)	45	30	15	10

Draw the graph for the above data and hence.

i) Find the time taken to fill the tank when five pipes are used.

ii) Find the number of pipes when the time is 9 minutes.

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