QUARTERLY EXAMINATION - 2023
MATHEMATICS

CLASS : 10

TIME : 3.00

MARKS : 100

PART - I

Note : i) Answer all the questions. ii) Choose the most appropriate answer from the given four alternatives and write the option code an the corresponding answer.

14 X 1 = 14

1. The HCF of numbers of the form 2^m and 3^n is
   a) 1   b) 2   c) 3   d) 2^m an 3^n

2. If a,b,c ......are in G.P then 2a, 2b, 2c .... are in ......
   a) Arithmetic progression   b) Geometric progression   c) Arithmetic progression an Geometric progression   d) None of these

3. If $\{(a,8), (6, b)\}$ represents an identify function then the value of a an b are respectively
   a) (8, 6)   b) (8, 8)   c) (6, 8)   d) (6, 6)

4. If $f(x) = 2x^2$ and $g(x)= 1/3x$ then fog is.
   a) $3/2x^3$ b) $2/3x^2$ c) $2/9x^2$ d) $1/6x^2$

5. The value of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are
   a) 100, 120   b) 10, 12   c) -120, 100   d) 12, 10

6. If $3\sqrt{x} =9$ then the value of x is .... a) 3   b) 9   c) 18   d) 27

7. A tangent is perpendicular to the radius at the
   a) Centre   b) Point of contract   c) infinity   d) chord

8. The straight line given by the quation x = 11 is
   a) parallel to x axis   b) parallel to y axis   c) passing through the orgin   d) passing through the point (0,11)

9. If $\triangle ABC$ is an isosceles triangle with $\angle C =90°$ and AC = 5 cm, then AB is ....
   a) 2.5 cm   b) 5 cm   c) 10 cm   d) 5 cm

10. The slope of the line which is perpendicular to a line joining the points (0,0) and (-8,8) is
    a) -1   b) 1   c) 1/3   d) -8

11. If the given line $y/2 = x - p$ is passess through the point (4, -4) then the value of P is ...
    a) -4   b) -6   c) 0   d) 8

12. 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

13. If $x = a\tan\theta$ and $y = b\sec\theta$ then
    a) $y^2/b^2 - x^2/a^2 = 1$ b) $x^2/a^2 - y^2/b^2 = 1$
    c) $x^2/a^2 + y^2/b^2 = 1$ d) $x^2/a^2 - y^2/b^2 = 0$

14. Euclid's division lemma states that for positive integers a and b, there exist unique integers q and r such that a = bq+r, where r must satisfy
    a) $1 < r < b$ b) $0 < r < b$ c) $0 \leq r < b$ d) $0 < r \leq b$

PART - II

II Note : Answer any 10 questions. Question No.28 is compulsory. 10 X 2 = 20

15. Represent the function f = $\{(1, 2), (2,2), (3,2), (4, 3), (5, 4)\}$ through (i) an arrow diagram (ii) a table form (iii) a graph

16. If f (x) = 2x - k, g(x) = x+1/2 show that fog = gof = x.

17. If A = $\{1, 3, 5\}$ B = $\{2, 3\}$ then show that n (A X B) = n (B X A) = n (A) X n (B).

18. Find the greatest number that will divided 445 and 572 leaving remainders 4 and 5 respectively.

19. If 3+k, 18 -k, 5k + 1 are in A.P then find K.

20. Compute x, such that $10^4 \equiv x \pmod{10}$

21. Find the excluded value of the expression x+10/8x .

22. Determine the quadratic equations, whose sum and product of roots are -5/3 and -4 respectively.

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23. Find the square root of $\dfrac{144a^8 b^{12} c^{16}}{81 f^{12} g^4 h^{14}}$

24. If $\triangle ABC$ is similar to $\triangle DEF$ such that $BC = 3cm$, $EF = 4$ cm and area of $ABC = 54cm^2$ find the area of $\triangle DEF$.

25. If α and β are the roots of $x^2 + 7x + 10 = 0$ find the value of $\alpha^2 + \beta^2$.

26. Find the area of the triangle whose vertices are $(-3,2)$ $(-1, 1)$ and $(1,2)$.

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

28. Find the rational form of the number 0.6666 ....

PART - III

Note: Answer any 10 questions. Question No.42 is compulsory.　　　　$10 \times 5 = 50$

29. If the function $f : R \longrightarrow R$ 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) $\dfrac{f(1) - 3f(4)}{f(-3)}$.

30. Find the HCF of 396, 504, 636.

31. Let $A = \{x \in w / x < 3\}$, $B = \{x \in N/1 \le x \le 5\}$ and $C = \{2,5\}$ verify that
    $A \times (B \cap C) = (A \times B) \cap (A \times C)$

32. In an A.P the sum of first n terms is $\dfrac{5n^2}{2} + \dfrac{3n}{2}$. Find the 17th term.

33. Discuss the nature of solutions of the following system of equation.
    $x + 2y - z = 5$; $x - y + z = -2$, $-5x - 4y + z = -11$

34. In a G.P the 9th term 32805 and 6th term is 1215. Find the 12th term.

35. State and prove the Thales theorem.

36. Find the area of the quadrilateral formed by the points $(9, 7)$, $(6, 12)$ $(-6,13)$ and $(-5, 4)$

37. Find the square root of $x - 12x^3 + 42x^2 - 36x + 9$.

38. Without using pythagoras theorem show that the points $(1,-4)$, $(2, -3)$ and $(4, -7)$ form a right angled triangle.

39. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$. Prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$.

40. If $f(x) = x - 1$, $g(x) = 3x + 1$ and $h(x) = x^2$ show that $(fog) oh = fo (goh)$.

41. $A(-3,0)$ $B(10,-2)$ and $C(12, 3)$ are the vertices of $\triangle ABC$. Find the equation of the altitude through A and B.

42. If the roots of the equation $(c^2 - ab) x^2 - 2 (a^2 - b) x + b^2 - ac = 0$ are real and equal. Prove that either $a = 0$ (or) $a^3 + b^3 + c^3 = 3abc$.

PART - IV

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

43. a) Construct a triangle similar to a given triangle ABC with its sides of the triangle ABC (Scale factor $6/5 > 1$)
    (OR)
    b) Draw a triangle ABC of base BC = 8 cm, $\angle A = 60°$ and the bisector of $\angle A$ meets BC at D such that BD = 6cm.

44. a) Draw the graph of $xy = 24$, $x,y > 0$. Using the graph find (i) y when x=3 and (ii) x when y = 6.
    (OR)
    b) Varshika draw 6 circles with different sizes. Draw a graph for the relationship between the diameter and circumference (approximately related) of each circle as shown in the table and use it to find the circumference of a circle when its diameter is 6 cm.

Diameter (x) cm	1	2	3	4	5
Circumference (y) cm	3.1	6.2	9.3	12.4	15.5

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