## Virudhunagar District

Common Quarterly Examination - September 2024

## Standard 10

Time: 3.00 Hrs. **MATHEMATICS** Marks: 100 Choose the best answer: 14×1=14 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 b) 2 2) Let n(A) = m and n(B) = n then the total number of relations that can be defined from A to B is a) m<sup>n</sup> b) n<sup>m</sup> c) 2<sup>mn</sup>-1 d) 2mn 3) If  $f:A \rightarrow B$  is a bijective function and if n(B) = 7 then n(A) is equal to b) 49 c) 1 4). 74k = 1 \_\_\_ (mod 100) a) 1 b) 2 c) 3 d) 4 5) The value of  $(1^3+2^3+3^3+....+15^3) - (1+2+3+....+15)$  is b) 14200 c) 14280 d) 14520 a) 14400 6) If (x-6) is the HCF of  $x^2-2x-24$  and  $x^2-Kx-6$  then the value of K is \_\_\_\_ b) 5 c) 6 7) Which of the following should be added to make  $x^4+64$  a perfect square? a)  $4x^{2}$ b) 16x<sup>2</sup> c) 8x<sup>2</sup> d)  $-8x^{2}$ 8) The number of points of intersection of the quadratic polynomial  $x^2+4x+4$ with the x-axis is b) 1 c) 0 or 1 a) 0 d) 2 9) In  $\triangle$ LMN,  $\angle$ L = 60°,  $\angle$ M = 50°. If  $\triangle$ LMN  $\sim$   $\triangle$ PQR then the value of  $\angle$ R is b) 70° 7 c) 30° d) 110° a) 40° 10) If in  $\triangle ABC$ , DE || BC. AB = 3.6 cm, AC = 2.4 cm and AD = 2.1 cm 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) If slope of the line PQ is  $\frac{1}{\sqrt{3}}$  then slope of the perpendicular bisector of PQ is 13) When proving that a quadrilateral is a parallelogram by using slopes you must find, a) Two sides are parallel b) Two parallel and two non-parallel sides c) Opposite sides are parallel d) All sides are of equal length

- b) 0°
- a) 30°

14) If  $sin\theta = cos\theta$ , then  $\theta = ?$ 

c) 45°

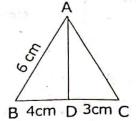
II. Answer any 10 questions: [Q.No. 28 is compulsory]

 $10 \times 2 = 20$ 

- 15) If  $A \times B = \{(3, 2) (3, 4) (5, 2) (5, 4)\}$  then find A and B.
- 16) Show that the function  $f: N \rightarrow N$  defined by  $f(m) = m^2 + m + 3$  is one-one function.
- 17) Let  $f(x) = x^2 1$  find fofof.
- 18) Find the number of terms in the A.P. 3, 6, 9, 12, ...... 111.
- 19) Find the sum of 2+4+6+.....+100.
- 20) Find the LCM of the given expressions  $P^2-3P+2$ ,  $P^2-4$ .
- 21) Determine the nature of roots for the following quadratic equations  $x^2-x-20=0$ .

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22) AD is the bisector of  $\angle A$ . If BD = 4 cm, DC = 3 cm and AB = 6 cm find AC.



- 23) Show that the points P(-1.5, 3), Q(6, -2), R(-3, 4) are collinear.
- 24) Find the slope of a line joining the points ( $sin\theta$ ,  $-cos\theta$ ) and ( $-sin\theta$ ,  $cos\theta$ ).
- 25) Find the intercepts made by the line 4x-9y+36=0 on the coordinate axes.
- 26) Prove that  $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \csc\theta + \cot\theta$ .
- 27) Solve  $5x = 4 \pmod{6}$ .
- 28) Simplify:  $\frac{x}{x-y} + \frac{y}{y-x}$

III. Answer any 10 questions: [Q.No. 42 is compulsory]

- 29) Let  $A = \{4, 5\}$ ,  $B = \{0, 2\}$  and  $C = \{2, 4\}$ . Verify that  $A \times (B \cup C) = (A \times B) \cup (A \times C)$
- 30) If f(x) = 2x+3, g(x) = 1-2x and h(x) = 3x. Prove that fo(goh) = (fog)oh.
- 31) If nine times ninth term is equal to the fifteen times fifteenth term, show that six times twenty fourth term is zero.
- 32) Find the sum to n terms of the series 3+33+333+..... to n terms.
- 33) Find the sum of the following series  $21^2+22^2+....+30^2$ .
- 34) Find the GCD of the polynomials  $x^3+x^2-x+2$  and  $2x^3-5x^2+5x-3$ .
- 35) If  $9x^4+12x^3+28x^2+ax+b$  is a perfect square, find the values of a and b.
- 36) If one root of the equation  $2y^2-ay+64=0$  is twice the other then find the values of a.
- 37) State and prove: Thales theorem
- 38) Find the area of quadrilateral, formed by the points (8, 6), (5, 11), (-5, 12)and (-4, 3).
- 39) If the points A(2, 2), B(-2, -3), C(1, -3) and D(x, y) form a parallelogram then find the value of x and y.
- 40) Find the equation of the perpendicular bisector of the line joining the points A(-4, 2) and B(6, -4).
- 41) Prove that  $\frac{\sin A}{1 + \cos A} + \frac{\sin A}{1 \cos A} = 2 \csc A.$
- 42) A function f is defined by f(x) = 2x-3.

  - i) find  $\frac{f(0) + f(1)}{2}$  ii) find x such that f(x) = 0
  - iii) find x such that f(x) = x
- iv) find x such that f(x) = f(1-x)

IV. Answer the following:

43) Draw a triangle  $\overline{ABC}$  of base  $\overline{BC} = 8$  cm,  $\angle A = 60^{\circ}$  and the bisector of  $\angle A$ meets BC at D such that BD = 6 cm.

(OR)

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  $\frac{7}{3} > 1$ ).

44) Draw the graph of xy = 24, x, y > 0. Using the graph find (i) y when x = 3and (ii) x when y = 6. (OR) Varshika drew 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.