Total Marks: 100 Marks

Class: 10

# Sri Vinayaga Tuition Centre

## Anaimalai-642104

## PRE HALF YEARLY EXAMINATION -2024-25

**MATHEMATICS** 

Duration: 3 Hrs					
SEC I				1437.1	
CHOOSE THE BEST ANSWER				14 X 1 = 14	
1.	If f: $A \rightarrow B$ is a bijective fu		en n(A) is equal to		
	a) 7	b) 49	c) 1	d) 14	
2.	Let $f(x) = \sqrt{1 + x^2} t h$	hen			
	a) $f(xy) = f(x).f(y)$ c) $f(xy) \le f(x).f(y)$		b) $f(xy) \ge f(x).f(y)$ d) None of these		
3.	, , , , , , , , , , , , , , , , , , , ,	nma, if the cube of any posi	*	then the possible remainders are	
	a) 0, 1, 8	b) 1, 4, 8	c) 0, 1, 3	d) 1, 3, 5	
4.	$7^{4k} \equiv \underline{\qquad} \pmod{100}$	, , ,	, , ,		
	a) 1	b) 2	c) 3	d) 4	
5.	If $(x - 6)$ is the HCF of $x^2$ -	/	· · · · · · · · · · · · · · · · · · ·		
	a) 3	b) 5	c) 6	d) 8	
6.	Transpose of a column mat	,			
	a) unit matrix	b) diagonal matrix	c) column matrix	d) row matrix	
7.	How many tangents can be	, •		, 1, 10	
	a) one	b) two	c) infinite	d) zero	
8.	The point of intersection of	/			
	a) (5, 3)	b) (2, 4)	c) (3, 5)	d) (4, 4)	
9.	If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then slope of the perpendicular bisector of PQ is				
	a) $\sqrt{3}$	3			
	c) $\frac{1}{\sqrt{3}}$		b) $-\sqrt{3}$ d) 0		
10. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}:1$ , then the angle of elevation of the					
	sun has measure		•		
	a) 45°	b) 30°	c) 90°	d) 60°	
11.	a) $45^{\circ}$ The value of $sin^2\theta=\frac{1}{100}$	$\frac{1}{+tan^2\theta}$ is equal to			
	a) $tan^2\theta$		b) 1		
	c) $\cot^2\theta$		d) 0		
12	. The height of a right circu	lar cone whose radius is 5 c	cm and slant height is 13 cm	n will be	
	a) 12 cm	b) 10 cm	c) 13 cm	d) 5 cm	
13	. If the radius of the base of	f a cone is tripled and the he	eight is doubled then the vo	lume is	
	a) made 6 times	b) made 18 times	c) made 12 times	d) unchanged	
14	. Variance of first 20 natura	l numbers is			
	a) 32.25	b) 44.25	c) 33.25	d) 30	
		SEC	H		
	nswer any 10 questions (	$10 \times 2 = 20$			
15. Find $A \times B$ , $A \times A$ and $B \times A$ $A = \{m,n\}$ ; $B = \phi$					
16	Find $f \circ g$ and $g \circ f$ when :	$f(x) = 2x + 1 \text{ and } g(x) = x^2$	- 2		
	17. Which term of an A.P. 16, 11, 6, 1, is -54?				
	18. Find the sum of 1 + 3 + 5 + + 55				
19	19. The father's age is six times his son's age. Six years hence the age of father will be four times his son's age. Find				

the present ages (in years) of the son and father.

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- 20. Find the square root of  $\frac{400x^4y^{12}z^{16}}{100x^8y^4z^4}$
- 21. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.
- 22. If the area of the triangle formed by the vertices A(-1, 2), B(k, -2) and C(7, 4) (taken in order) is 22 sq. units, find the value of k.
- 23. Find the intercepts made by the following line on the coordinate axes 4x + 3y + 12 = 0.
- 24. Prove that  $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}}=\csc\theta+\cot\theta$
- 25. A player sitting on the top of a tower of height 20 m observes the angle of depression of a ball lying on the ground as  $60^{\circ}$ . Find the distance between the foot of the tower and the ball.  $(\sqrt{3} = 1.732)$
- 26. If the base area of a hemispherical solid is 1386 sq. metres, then find its total surface area?
- 27. The volumes of two cones of same base radius are 3600 cm<sup>3</sup> and 5040 cm<sup>3</sup>. Find the ratio of heights.
- 28. A bag contains 5 blue balls and 4 green balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is (i) blue (ii) not blue.

#### **SEC III**

### Answer any 10 questions (Q.no 42 compulsory)

$$10 \times 5 = 50$$

- 29. Let  $A=\{x\in \mathbb{W}|x<2\}$  ,  $B=\{x\in \mathbb{N}|1\leq x<4\}$  and  $C=\{3,5\}$  . Then verify that  $(A\cup B)\times C=(A\times C)\cup (B\times C)$
- 30. Let  $A = \{-1,1\}$ , and  $B = \{0,2\}$ . If the function  $f: A \to B$  defined by f(x) = ax + b is an onto function? Find a and b.
- 31. Find the HCF of 396, 504, 636.
- 32. Find the sum to n terms of the series  $5 + 55 + 555 + \dots$
- 33.  $x^4 8x^2 + mx^2 + nx + 16$  is a perfect square. Find the values of m and n.
- 34.  $If A = \begin{pmatrix} 1 & -1 \\ 2 & 1 \\ 1 & 3 \end{pmatrix} \ and \ C = \begin{pmatrix} 1 & 2 \\ 2 & -1 \end{pmatrix} \text{ Show that(AB) C = A (BC)}.$
- 35. Basic Proportionality Theorem (BPT) or Thales theorem
- 36. Find the equation of a straight line through the point of intersection of the lines 8x + 3y = 18, 4x + 5y = 9 and bisecting the line segment joining the points (5, -4) and (-7, 6).
- 37. Find the area of the quadrilateral formed by the points (8, 6), (5, 11), (-5, 12) and (-4, 3).
- 38. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are 30° and 45° respectively. If the lighthouse is 200 m high, find the distance between the two ships. ( $\sqrt{3} = 1.732$ )
- 39. From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be 30° and 60°. If the height of the lighthouse is h meters and the line joining the ships passes through the foot of the lighthouse, show that the distance between the ships is  $\frac{4h}{\sqrt{3}}m$ .
- 40. A conical flask is full of water. The flask has base radius r units and height h units, the water poured into a cylindrical flask of base radius xr units. Find the height of water in the cylindrical flask.
- 41. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container.
- 42. Three unbiased coins are tossed once. Find the probability of getting atmost 2 tails or atleast 2 heads.

#### **SEC IV**

#### Answer all the questions

$$2 \times 8 = 16$$

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

(Or)

- B) Take a point which is 11 cm away from the centre of a circle of radius 4 cm and draw the two tangents to the circle from that point.
- 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) Draw the graph of  $y = x^2 + x - 2$  and hence solve  $x^2 + x - 2 = 0$ .