## Dr. A. Vennila, Principal, Kumbakonam - Thanjan HALY YEARLY EXAMINATION- 2024 HSS

10 - Std

**MATHEMATICS** 

TIME: 3.00 Hrs

**MARKS: 100** 

PART - I

### CHOOSE THE CORRECT ANSWER:

 $14 \times 1 = 14$ 

- 1. If the ordered pairs (a+2, 4) and (5, 2a+b) are equal then (a,b) is
  - (a)(2,-2)
- (b) (5,1)
- (c)(2,3)
- (d)(3,-2)

- 2.  $7^{4k} \equiv \pmod{100}$ 
  - (a) 1
- (b) 2

- (c)3
- (d) 4
- 3. The sum of infinite terms of a G.P is 12 and the first term is 8 then the fourth term of the G.P is
  - (a)  $\frac{8}{27}$  (b)  $\frac{4}{27}$
- (c)  $\frac{8}{20}$  (d)  $\frac{1}{2}$
- If (x 6) is the HCF of  $x^2 2x 24 = 0$  and  $x^2 kx 6 = 0$  then the value of k is 4.
  - (a) 3
- (b) 5

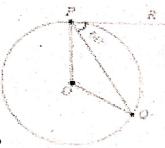
- (c) 6
- (d) 8

 $y^2 + \frac{1}{y^2}$  is not equal to 5.

(a) 
$$\frac{y^4 + 1}{y^2}$$

- (a)  $\frac{y^4 + 1}{v^2}$  (b)  $\left(y + \frac{1}{v}\right)^2$  (c)  $\left(y \frac{1}{v}\right)^2 + 2$
- $(d)\left(y+\frac{1}{y}\right)^2-2$

- Find the matrix X if 2X +  $\begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix} = \begin{pmatrix} 5 & 7 \\ 9 & 5 \end{pmatrix}$ 6.
  - (a)  $\begin{pmatrix} -2 & -2 \\ 2 & -1 \end{pmatrix}$  (b)  $\begin{pmatrix} 2 & 2 \\ 2 & -1 \end{pmatrix}$  (c)  $\begin{pmatrix} 1 & 2 \\ 2 & 2 \end{pmatrix}$
- $(d)\begin{pmatrix}2&1\\2&2\end{pmatrix}$
- In the figure if PR is tangent to the circle at P and O is the 7. centre of the circle, then  $\angle POO$  is



- (a) 120°
- (b) 100°
- (c) 110°
- (d) 90°
- The angle of inclination made by the line joining the points (1,-4) and (2, -3) with 8. x- axis is (a) 90° (b) 30° (c) 45° (d) 60°
- The equation of aline passing through the origin and the perpendicular to the line 9. 7x - 3y + 4 = 0 is
  - (a) 7x 3y + 4 = 0
- (b) 3x 7y + 4 = 0
- (c) 3x + 7y = 0
- (d) 7x 3y = 0

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10. If 
$$\sin\theta = \cos\theta$$
, then 2  $\tan^2\theta + \sin^2\theta - 1$  is equal to

(a) 
$$\frac{-3}{2}$$

(b) 
$$\frac{3}{2}$$

(c) 
$$\frac{2}{3}$$

(b) 
$$\frac{3}{2}$$
 (c)  $\frac{2}{3}$  (d)  $\frac{-2}{3}$ 

The difference between the CSA and TSA of a right circular cylinder is \_\_\_\_\_(sq.units) 11.

(a) 
$$\pi r^2$$

(b) 
$$3 \pi r^2$$
 (c)  $2\pi r^2$  (d)  $4\pi r^2$ 

(c) 
$$2\pi r^2$$

(d)
$$4\pi r^2$$

The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same 12. diameter and same height is

The standard deviation of a data is 3. If each value is multiplied by 5 then the new 13. variance is

If a letter choosen at random from the English alphabets {a,b,c,...z}, then the probability 14. that the letter chosen procedes x

(a) 
$$\frac{12}{13}$$

(b) 
$$\frac{1}{13}$$
 (c)  $\frac{23}{26}$ 

(c) 
$$\frac{23}{26}$$

$$(d)\frac{3}{26}$$

PART - II

ANSWER ANY 10 QUESTIONS. QUESTION NO.28 IS COMPULSORY: 10 X 2 = 20

Let  $A = \{1, 2, 3, 7\}$  and  $B = \{3, 0, -1, 7\}$ , which of the following are relation from A to B? 15.

(i) 
$$R_1 = \{(2, 1), (7, 1)\}$$
 (ii)  $R_2 = \{(-1, 1)\}$ 

(ii) 
$$R_2 = \{(-1, 1)\}$$

Find k if  $f \circ f(k) = 5$  where f(k) = 2k - 1. 16.

Which term of an A.P 16, 11, 6, 1, ... is -54? 17.

Find the 10 th term of a G.P whose 8th term is 768 and the common ration is 2. 18.

19. Simplify 
$$\frac{p^2-10p+21}{p-7} \times \frac{p^2+p-12}{(p-3)^2}$$
.

Determine the nature of roots for the quadratic equation  $2x^2 - 2x + 9 = 0$ . 20.

21. If 
$$A = \begin{pmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{pmatrix}$$
 then verify  $(A^T)^T = A$ 

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- What length of ladder is needed to reach a height of 7 ft along the wall when the base of the ladder is 4 ft from the wall? Round off your answer to the next tenth place.
- The line through the points (-2, a) and (9, 3) has slope  $\frac{-1}{2}$ . Find the value of a.
- 24. Show that  $\frac{1 + \tan^2 A}{1 + \cot^2 A} = \left(\frac{1 \tan A}{1 \cot A}\right)^2$
- 25. If the total surface area of a cone of radius 7cm is 704 cm², then find its slant height.
- 26. Find the range and co-efficient of range of the following data 63, 89, 98,125,79,108,117,68
- 27. What is the probability that a leap year selected at random will contain 53 Saturdays.
- 28. A solid metallic spherical ball of diameter 6cm is melted and recast into a cone with diameter of the base as 12 cm. Find the height of the cone.

# PART - III

ANSWERANY 10 QUESTIONS. QUESTION NO.42 IS COMPULSORY:

 $10 \times 5 = 50$ 

- 29. Let A = The set of all natural numbers less than 8, B= The set of all prime numbers less than 8, C = The set of even prime number. Verify that  $(A \cap B) \times C = (A \times C) \cap (B \times C)$ .
- 30. If the function f:R $\rightarrow$ R is defined by f(x) =  $\begin{cases} 2x + 7 & \text{; } x < -2 \\ x^2 2 & \text{; } -2 \le x < 3 \\ 3x 2 & \text{; } x \ge 3 \end{cases}$ 
  - then find the values of (i) f (4) (ii) f (-2) (iii) f (4) + 2f (1) (iv)  $\frac{f(1)-3f(4)}{f(-3)}$ .
- 31. The product of three consecutive terms of a Geometric Progression is 343 and their sum is  $\frac{91}{3}$ . Find the three terms.
- 32. Find the sum of the series  $10^3 + 11^3 + 12^3 + \dots + 20^3$
- 33. If  $4x^4 12x^3 + 37x^2 + bx + a$  is a perfect square, find the values of a and b.
- 34.  $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 4 & 0 \\ 1 & 5 \end{bmatrix} \quad C = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix} \quad \text{show that A (B C) = (A B) C}.$
- 35. State and prove Basic Proportionality Theorem.
- 36. Find the value of k if the area of a quadrilateral is 28 sq.unitswhose vertices are (-4, -2), (-3, k), (3, -2) and (2, 3).

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- 37. 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.
- To a man standing outside his house, the angles of elevation of the top and bottom of a window are 60° and 45° respectively. If the height of the man is 180 cm and if he is 5 m away from the wall, what is the height of the window? ( $\sqrt{3} = 1.732$ ).
- A container open at the top is in the form of a frustum of a cone of height 16cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of 1240 per litre.
- 40. A teacher asked the students to complete 60 pages of a record note book. Eight students have completed only 32, 35, 37, 30, 33, 36, 35 and 37 pages. Find the standard deviation of the pages completed by them.
- 41. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.
- 42. Find the GCD of If  $13m^3 + 13m^2 13m + 26$  and  $22m^3 55m^2 + 55m 33$ .

## PART - IV

#### ANSWER ALL THE QUESTIONS:

 $2 \times 8 = 16$ 

- 43. (a) Draw the two tangents from a point which is 10 cm away from the centre of a circle of radius 5 cm. Also measure the lengths of the tangents. (OR)
  - (b) 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 = 6cm.
- (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  $y = x^2 + 3x + 2$  and use it solve  $x^2 + 2x + 1 = 0$ .

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