HSS

HALY YEARLY EXAMINATION- 2024

10 - Std

MATHEMATICS

TIME : 3.00 Hrs MARKS : 100

PART - I

CHOOSE THE CORRECT ANSWER: 14 X 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. $7^{4k} \equiv$ ____(mod 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) $\frac{1}{3}$

4. If (x - 6) is the HCF of $x^2 - 2x - 24 = 0$ and $x^2 - kx - 6 = 0$ then the value of k is

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

5. $y^2 + \frac{1}{y2}$ is not equal to

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

6. Find the matrix X if $2X + \begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix} = \begin{pmatrix} 5 & 7 \\ 9 & 5 \end{pmatrix}$

(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) $\begin{pmatrix} 2 & 1 \\ 2 & 2 \end{pmatrix}$

7. In the figure if PR is tangent to the circle at P and O is the centre of the circle, then $\angle POQ$ is

(a) 120° (b) 100° (c) 110° (d) 90°

8. The angle of inclination made by the line joining the points (1,-4) and (2, -3) with x- axis is (a) 90° (b) 30° (c) 45° (d) 60°

9. The equation of aline passing through the origin and the perpendicular to the line 7x -3y + 4 = 0 is

(a) 7x - 3y + 4 = 0 (b) 3x -7y + 4 = 0 (c) 3x + 7y = 0 (d) 7x - 3y = 0

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

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

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

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

(a) 1 : 2 : 3 (b) 2 : 1 : 3 (c) 1 : 3 : 2 (d) 3 : 1 : 2

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

(a) 3 (b) 15 (c) 5 (d) 225

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

(a) $\frac{12}{13}$ (b) $\frac{1}{13}$ (c) $\frac{23}{26}$ (d) $\frac{3}{26}$

PART - II

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

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

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

16. Find k if f o f(k) = 5 where f(k) = 2k- 1.

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

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

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

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

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

22. 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.

23. 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 cm^2, 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 X 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 ∩ B) X C = (A X C) ∩ (B X C).

30. If the function f:R→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) $\frac{f(1)-3f(4)}{f(-3)}$.

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 $10^3 + 11^3 + 12^3 + \ldots\ldots + 20^3$

33. If $4x^4 - 12x^3 + 37x^2 + bx + a$ is a perfect square, find the values of a and b .

34. $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 4 & 0 \\ 1 & 5 \end{bmatrix}$ $C = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$ 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).

37. A(-3, 0) B(10, -2) and C (12, 3) are the vertices of ΔABC . Find the equation of the altitude through A and B .

38. 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).

39. 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 ₹40 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 X 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, $\angle A = 60°$ 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) Draw the graph of $y = x^2 + 3x + 2$ and use it solve $x^2 + 2x + 1 = 0$.