

HTM HALF YEARLY EXAMINATION

10 - Std

Time : 3.00Hrs

MATHEMATICS

14 July 2023

--	--	--	--	--	--	--

Marks : 100

Note : i) Answer all the questions. ii) Choose the most suitable answer from the given four alternatives and write the option code on the corresponding answer. iii) Each question carries one mark. $14 \times 1 = 14$

- Let $n(A) = m$ and $n(B) = n$ then the total number of relations that can be defined from A to B is
 - m^n
 - n^m
 - $2^{mn}-1$
 - 2^{mn}
- $f(x) = (x+1)^3 - (x-1)^3$ represents a function which is
 - Linear
 - Cubic
 - reciprocal
 - quadratic
- $74k = \dots \pmod{100}$
 - 1
 - 2
 - 3
 - 4
- The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \dots$ is
 - $1/24$
 - $1/27$
 - $2/3$
 - $1/81$
- If A is 2×3 matrix and B is a 4×2 matrix. how many columns does BA have
 - 3
 - 4
 - 2
 - 5
- Which of the following should be added to make $x^4 + 64$ a perfect square
 - $4x^2$
 - $16x^2$
 - $8x^2$
 - $-8x^2$
- How many tangents can be drawn at any point on a circle?
 - one
 - two
 - infinite
 - zero
- If ΔABC is an isosceles triangle with $\angle C = 90^\circ$ and $AC = 5\text{cm}$, then AB is
 - 2.5cm
 - 5cm
 - 10cm
 - $5\sqrt{2}\text{cm}$
- If $(5, 7)$, $(3, P)$ and $(6, 6)$ are collinear, then the value of P is
 - 3
 - 6
 - 9
 - 12
- If slope of the line PQ is $1/\sqrt{3}$ then slope of the perpendicular bisector of PQ is
 - $\sqrt{3}$
 - $-\sqrt{3}$
 - $1/\sqrt{3}$
 - 0
- 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 measures
 - 45°
 - 30°
 - 90°
 - 60°
- Find the value of the radius of a sphere whose surface is 36π sq.units
 - 3
 - 6
 - 9
 - 5

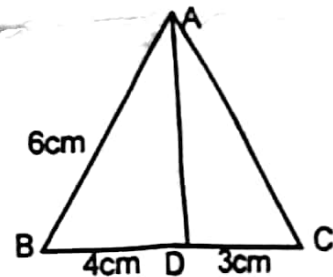
13. The total surface area of a cylinder whose radius is $\frac{1}{3}$ of its height is
 a) $9\pi h^2/8$ sq.units
 b) $24\pi h^2$ sq.units
 c) $8\pi h^2/9$ sq.units
 d) $56\pi h^2/9$ sq.units
14. Variance of first 20 natural number is
 a) 32.25
 b) 44.25
 c) 33.25
 d) 30

PART - II (MARKS : 20)

Note : Answer any 10 questions. Questions No. 28 is compulsory one.
Each question carries two marks. 10 x 2 = 20

15. If $B \times A = \{(-2, 3), (-2, 4), (0, 3), (0, 4), (3, 3), (3, 4)\}$ find A and B.
16. If $f(x) = 2x - 1$, $g(x) = \frac{(x+1)}{2}$, show that $f \circ g = g \circ f = x$.
17. 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find 'a' and 'b'.
18. Find the 12th term from the last term of the A.P. -2, -4, -6, -100.
19. Find the excluded values of the expression $\frac{1}{t^2 - 5t + 6}$.
20. Determine the nature of the roots for the quadratic equation $2x^2 - 2x + 9 = 0$.

21. In the fig AD is the bisector of $\angle A$.
 If $BD = 4$ cm, $DC = 3$ cm and $AB = 6$ cm,
 find $AC = ?$



22. Find the slope of a line joining the given points. $(-6, 1)$ and $(-3, 2)$.
23. Find the intercepts made by the lines on the coordinate axes $3x - 2y - 6 = 0$.
24. From the top of a rock $10\sqrt{3}$ high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the rock.
25. The slant height of a frustum of a cone is 5cm and radii of its ends are 4cm and 1cm. Find the curved surface area.
26. The volumes of two cones of same base radius are 3600cm^3 and 5040cm^3 . Find the ratio of heights.

27. Write the sample space for tossing three coins using tree diagram.

28. If $A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$ prove that $AA^T = I$.

PART - III (MARKS : 50)

III Note : Answer any 10 questions. Question No. 42 is compulsory one.
Each question carries five marks. 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 $A \times (B - C) = (A \times B) - (A \times C)$

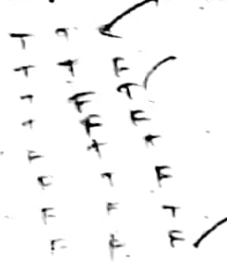
30. Let A = {1, 2, 3, 4} and B = {2, 5, 8, 11, 14} be two sets. Let $f : A \rightarrow B$ be a function given by $f(x) = 3x - 1$. Represent this function

i) by arrow diagram

ii) in a table form

iii) as a set of ordered pairs

iv) in a graphical form



31. Rekha has 15 square colour paper of size 10cm, 11cm, 12cm, 24cm. How much area can be decorated with these colour papers?

32. Find the sum of n terms of the series $7 + 77 + 777 + \dots$

33. Find the GCD of the polynomials $x^3 + x^2 - x + 2$ and $2x^3 - 5x^2 + 5x - 3$.

34. Find the values of m and n if the polynomial is perfect square

$$36x^4 - 60x^3 + 61x^2 - mx + n.$$

35. State and prove pythagorus theorem.

36. Find the area of the quadrilateral formed by the points (8, 6) (5, 11). (-5, 12) and (-4, 3) .

37. Show that the given points form a parallelogram.

$$A(2.5, 3.5), B(10, -4) C(2.5, -2.5) D(-5, 5).$$

38. From the top of a light house, the angle of depression of two ships on the opposite side of it are observed to be 30° and 60° . If the height of the light house is h meters and the line joining the ships passes through the foot of the light house, show that the distance between the ships is $4h\sqrt{3}$ m.

39. If the radii of the circular ends of a frustum which is 45cm high are 28cm and 7cm. Find the volume of the frustum.

40. In an apartment, in selecting a house from door numbers 1 to 100 randomly. Find the probability of getting door number of the house to be an even number a perfect square number or a perfect cube number.
41. Two unbiased dice are rolled once. Find the probability of getting.
- a doublet (equal numbers on both dice)
 - The product as a prime number.
 - The sum as a prime number.
 - The sum as 1
42. The volume of a cone is $1005 \frac{5}{7}$ cu.cm. The area of its base is $201 \frac{1}{7}$ sq.cm. Find the slant height of the cone.

PART - IV (MARKS - 16)

IV Note : Answer the two sums each question carries eight marks. $2 \times 8 = 16$

43. a) Draw a circle of diameter 6cm from a point P, which is 8cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.

(OR)

b) Draw a triangle of base BC = 5.6cm, $\angle A = 40^\circ$ and the bisector $\angle A$ meets BC at D such that CD = 4cm.

44. a) A school announces that for a certain competitions, the cash price will be distributed for all the participation equally as show below.

No.Of participants (x)	2	4	6	8	10
Amount for each participant in Rs. (y)	180	90	60	45	36

(OR)

b) Draw the graph of $y = x^2 + 4x + 3$ and hence find roots of $x^2 + x + 1 = 0$

PA