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TUITION & TUTORIAL CENTRE



11TH STD

MATHEMATICS

1ST MID TERM EXAM QUESTION PAPER - 2026 & 27



TIME : 1.30 HRS.

MAX. MARKS : 50

DATE : _____

PART - I

Choose the best answer:

10x1=10

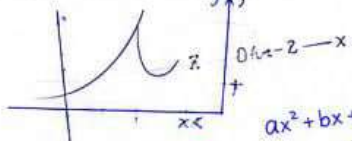
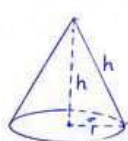
- If $n((A \times B) \cap (A \times C)) = 8$ and $n(B \cap C) = 2$, then $n(A)$ is
a) 6 b) 4 c) 8 d) 16
- The function $f: [0, 2\pi] \rightarrow [-1, 1]$ defined by $f(x) = \sin x$ is
a) one-to-one b) onto
c) bijective d) cannot be defined
- Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = |-x|$. Then the range of f is
a) $\mathbb{R}$ b) $(1, \infty)$ c) $(-1, \infty)$ d) $(-\infty, 1]$
- If $|x+z| \leq 9$, then x belongs to
a) $(-\infty, -7)$ b) $[-11, 7]$ c) $(-\infty, -7) \cup [11, \infty)$ d) $(-11, 7)$
- The value of $\log_a b$, $\log_a \log_a$ is
a) 2 b) 1 c) 3 d) 4
- If a and b are the real roots of the equation $x^2 + kx + c = 0$, then the distance between the points $(a, 0)$ and $(b, 0)$ is
a) $\sqrt{k^2 - 4c}$ b) $\sqrt{4k^2 - c}$ c) $\sqrt{4c - k^2}$ d) $\sqrt{k^2 - 8c}$
- Which of the following is not true?
a) $\sin \theta = -\frac{3}{4}$ b) $\cos \theta = -1$ c) $\tan \theta = 25$ d) $\sec \theta = \frac{1}{4}$
- A wheel is spinning at 2 radians / second. How many seconds will it take to make 10 complete rotations?
a) 10π seconds b) 20π seconds c) 5π seconds d) 15π seconds
- $\frac{\sin 100^\circ - \cos 10^\circ}{\sin 10^\circ - \cos 100^\circ}$ is
a) $\tan 35^\circ$ b) $\sqrt{3}$ c) $\tan 75^\circ$ d) 1
- The maximum value of $4 \sin^2 x + 3 \cos^2 x + \sin \frac{x}{2} + \cos \frac{x}{2}$ is
a) $4 + \sqrt{2}$ b) $3 + \sqrt{2}$ c) 9 d) 4

PART - II

Answer ANY FOUR questions:

4x2=8

- If $f: [-2, 2] \rightarrow B$ is given by $f(x) = 2x^3$, then find B so that f is onto.
- If $n(A \cap B) = 3$ and $n(A \cup B) = 10$, then find $n[P(A \cup B)]$.
- If α and β are the roots of the quadratic equation $x^2 + \sqrt{2}x + 3 = 0$, form a quadratic polynomial with zeroes $\frac{1}{\alpha}, \frac{1}{\beta}$.
- If the logarithm of 324 to base a is 4, then find a .
- Find the principal value of $\sin \theta = -\frac{\sqrt{3}}{2}$.
- Write $\sin 50^\circ + \sin 20^\circ$ as a product.



$$ax^2 + bx + c = 0$$

$$b^2 - 4ac$$



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PART - III

Answer ANY FOUR questions:

4x3=12

- Find the domain of $f(x) = \frac{1}{1 - 2 \cos x}$.
- Check the relation: $R = \{(1, 1), (2, 2), (3, 3), \dots, (n, n)\}$ defined on the set $S = \{1, 2, 3, \dots, n\}$ for the three basic relations.
- Simplify: $\frac{\sin 75^\circ - \sin 15^\circ}{\cos 75^\circ - \cos 15^\circ}$
- If $\cos \theta = -\frac{1}{2}$, θ lies in the III quadrant, then find the values of other five trigonometric functions.
- Prove that $\log \frac{75}{16} - 2 \log \frac{5}{9} + \log \frac{32}{243} = \log 2$.
- Prove that $\sqrt{3}$ is an irrational number.



$$(a+b)^2 = a^2 + 2ab + b^2$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

PART - IV

Answer ANY FOUR questions:

4x5=20

- On the set of natural numbers let R be the relation defined by aRb if $2a + 3b = 30$. Write down the relation by listing all the pairs. Check whether R is (i) reflexive (ii) symmetric (iii) transitive (iv) equivalence.
- State and prove Napier's formula.
- If $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = 2x - 3$ prove that f is a bijection and find its inverse.
- Resolve into partial fractions: $\frac{x^2 + x + 1}{x^2 - 5x + 6}$
- Construct a cubic polynomial function having zeros at $x = \frac{2}{5}, 1 + \sqrt{3}$ such that $f(0) = -8$.
- Prove that $\cot(A+B) = \frac{\cot A \cot B - 1}{\cot A + \cot B}$.



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PART - I

10 x 1 = 10

I. Choose the best answer:

- If $A = \{(x, y) : y = e^{-x}, x \in R\}$ and $B = \{(x, y) : y = e^{-x}, x \in R\}$ then $n(A \cap B)$ is
(a) Infinity (b) 0 (c) 1 (d) 2
- If $n((A \times B) \cap (A \times C)) = 8$ and $n(B \cap C) = 2$, then $n(A)$ is
(a) 16 (b) 24 (c) 8 (d) 16
- The number of relation on a set containing 3 elements is
(a) 9 (b) 81 (c) 512 (d) 1024
- Let $X = \{1, 2, 3, 4\}$ and $R = \{(1, 1), (1, 2), (1, 3), (2, 2), (3, 3), (2, 1), (3, 1), (1, 4), (4, 1)\}$. Then R is
(a) reflexive (b) symmetric (c) transitive (d) equivalence
- The range of the function $f(x) = |x| - x, x \in R$ is
(a) $[0, 1]$ (b) $[0, \infty)$ (c) $[0, 1)$ (d) $(0, 1)$
- If $|x + 2| \leq 8$, then x belongs to
(a) $(-\infty, -6)$ (b) $[-10, 6]$ (c) $(-\infty, -6) \cup [10, \infty)$ (d) $(-10, 6)$
- The value of $\log_{\sqrt{2}} 512$ is
(a) 16 (b) 18 (c) 9 (d) 12
- The value of $\log_a b \log_b c \log_c a$ is
(a) 2 (b) 1 (c) 3 (d) 4
- If $\frac{kx}{(x+2)(x-1)} = \frac{2}{x+2} + \frac{1}{x-1}$, then the value of k is
(a) 1 (b) 2 (c) 3 (d) 4
- Let $f : R \rightarrow R$ be defined by $f(x) = |x| - 5$. Then the range of f is
(a) R (b) $[5, \infty)$ (c) $(-5, \infty)$ (d) $(-\infty, 5]$

PART - II

3 x 2 = 6

II. Answer any 3 of the following. Q.No 11 to 15 compulsory

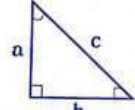
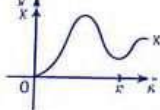
- If $n(A \cap B) = 3$ and $n(A \cup B) = 10$, then find $n(P(A \cup B))$.
- If $P(A)$ denotes the power set of A , then find $n(P(P(P(\phi))))$.
- Find the number of subsets of A if $A = \{x : x = 4n + 1, 2 \leq n \leq 5, n \in N\}$.
- Prove that $\log_4 2 - \log_8 2 + \log_8 2 - \dots$ is $1 - \log_e 2$.
- Find the square root of $7 - 4\sqrt{3}$.

PART - III

3 x 3 = 9

III. Answer any 3 of the following. Q.No 20 compulsory

- If $n(P(A)) = 1024$, $n(A \cup B) = 15$ and $n(P(B)) = 32$, then find $n(A \cap B)$.
- If $A \times A$ has 16 elements, $S = \{a, b\} \in A \times A : a < b; (-1, 2)$ and $(0, 1)$ are two elements of S , then find the remaining elements of S .
- Find the range of the function $f(x) = \frac{1}{1 - 3\cos x}$.
- Draw the graph of (i) $y = x^2$ (ii) $y = x^2 + 1$ (iii) $y = (x + 1)^2$.
- If $x^2 + x + 1$ is a factor of the polynomial $3x^3 + 8x^2 + 8x + a$, then find the value of a .



PART - IV

4 x 5 = 20

IV. Answer the following

21. Write the values of f at $-3, 5, 2, -1, 0$ if

$$f(x) = \begin{cases} x^2 + x - 5 & \text{if } x \in (-\infty, 0) \\ x^2 + 3x - 2 & \text{if } x \in (3, \infty) \\ x^2 & \text{if } x \in (0, 2) \\ x^2 - 3 & \text{otherwise} \end{cases}$$

(OR) If one root $k(k - 1) = 5x - 7$ is double the other root, show that $k = 2$ or -25 .

22. In a survey of 5000 persons in a town; it was found that 45% of the persons know Language A, 25% know Language B, 10% know Languages C, 5% know Languages A and B, 4% know Languages B and C, and 4% know Languages A and C. If 3% of the persons know all the three Languages, find the number of persons who knows only Language A.

(OR) Resolve into partial fraction : $\frac{10x + 30}{(x + 7)(x^2 - 9)}$

23. In the set Z of integers, define mRn if $m - n$ is a multiple of 12. Prove that R is an Equivalence relation.

(OR) Resolve into partial fraction : $\frac{x + 12}{(x - 1)(x^2 - x - 2)}$

24. Let $f, g : R \rightarrow R$ be defined as $f(x) = 2x - |x|$ and $g(x) = 2x + |x|$. Find $f \circ g$ and $g \circ f$.

(OR) Solve $\sqrt{x + 5} + \sqrt{x + 21} = \sqrt{6x + 40}$.



INSTRUCTIONS

- ★ All questions are compulsory.
- ★ Each part has internal choice as specified.
- ★ Clearly write the question number before answering.
- ★ Write neat and legible.
- ★ Use of calculator is not allowed.



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