CBSE SAMPLE PAPER
Class XI Mathematics
Paper 1(Questions)

Time: 3 hrs **Total marks: 100**

General Instructions:

1. All questions are compulsory.
2. The questions paper consists of 29 questions.
3. Questions 1 – 4 in Section A are very short answer type questions carrying 1 mark each.
4. Questions 5 – 12 in Section B are short-answer type questions carrying 2 marks each.
5. Questions 13 – 23 in Section C are long-answer type I questions carrying 4 marks each.
6. Questions 24 – 29 in Section D are long-answer type II questions carrying 6 marks each.

SECTION - A

1. Find the value of x, when $\sin(\sin^{-1}\frac{3}{5} + \cos^{-1} x) = 1$.

2. Express $(3 + 7i)^2$ in the form of $a + ib$.

3. Evaluate: $\begin{vmatrix} \cos 18° & \sin 18° \\ \sin 72° & \cos 72° \end{vmatrix}$

OR

If $\begin{vmatrix} x & 10 \\ 5 & 2x \end{vmatrix} = 0$, then find the value of x.

4. Evaluate: $\lim_{x \to 1} \frac{x^{45}-1}{x^{40}-1}$.

SECTION - B

5. What is the value of x, when $\tan^{-1}\frac{1}{\sqrt{3}} + \cot^{-1} x$ is $\frac{\pi}{2}$?

6. Simplify: $\sec\theta \begin{bmatrix} \sec\theta & \tan\theta \\ \tan\theta & \sec\theta \end{bmatrix} - \tan\theta \begin{bmatrix} \tan\theta & \sec\theta \\ \sec\theta & \tan\theta \end{bmatrix}$.

OR

If $A = \begin{bmatrix} \alpha & 1 \\ 1 & \alpha \end{bmatrix}$ and $|A^3| = 512$, then, find the value of α.

7. How many terms are there in the AP: $32,36,40,44, \ldots\ldots,320$?

OR

Find n , if $(n+2)! = 90 \times n!$.

8. Express $\frac{6+\sqrt{5}i}{1-\sqrt{5}i}$ in the form of $a + ib$.

9. If $f(x) = 256x^4$ and $g(x) = x^{\frac{1}{4}}$, then find $gof(x)$.

OR

If g is the inverse function of f and $f'(x) = \frac{1}{1+x^{19}}$, then, find the value of $g'(x)$.

10. If the Cartesian equation of the line is $\frac{5-x}{7} = \frac{y}{4} = \frac{3-z}{4}$. Find

1. Direction ratio of the line and

2. Direction cosine of the line is

11. Expand $(x^3 + 4y)^4$ by the binomial theorem.

12. Find the equation of a line for which $\tan\theta = \frac{1}{5}$ and $x - intercept$ is equal to 6 units.

SECTION - C

13. If $f : R \rightarrow R$ is given by $f(x) = 11x - 13$, then find $f^{-1}(x)$.

14. Find the intervals in which the function $f(x) = \frac{6}{4}x^4 - 2x^3 - 6x^2 + 32$ is

1. Strictly increasing
2. Strictly decreasing

15. How many different words can be formed with the letter of the word 'PUNAM', if begin with P and does not end with M?

16. What is the co-efficient of x^4 in the given expansion of the product $(1 + 3x)^6(1 - x)^7$?

17. Find the distance of the point $(1, -3, 6)$ from the plane $x - y + z = 6$ measured along the line $x = y = z$.

18. Find the equation of the ellipse for which $e = \frac{3}{5}$ and whose vertices are $(0, \pm 5)$.

19. Using properties of determinants, prove that

$$\begin{vmatrix} x+\lambda & 6x & 6x \\ 6x & x+\lambda & 6x \\ 6x & 6x & x+\lambda \end{vmatrix} = (13x + \lambda)(\lambda - 5x)^2.$$

OR

If $A = \begin{bmatrix} 2 & 6 \\ 6 & 8 \end{bmatrix}$ and $A^2 - kA - 20I_2 = 0$, then find the value of k.

20. Prove that $\cos^{-1}\frac{12}{13} + \tan^{-1}\frac{4}{3} = \tan^{-1}\frac{63}{16}$.

OR

Solve for x, $\tan^{-1}(x+3) + \tan^{-1}(x-3) = \tan^{-1}\frac{2}{3}, x > 0$.

21. Find the value of x, when $1 + 21 + 41 + 61 + \cdots + x = 622500$

OR

Find the complex root of x, when the given quadratic equation is $x^2 + 3x + 3 = 0$.

22. The Boolean expression $\sim (m \vee n) \vee (\sim m \wedge n)$ is equivalent to:

23. Raju and Akash are given to solve a mathematical problem. The probability that they will solve this problem is $\frac{1}{3}$ and $\frac{3}{4}$ respectively. Then, find the probability that both, Raju and Akash will solve any random mathematical problem given to them after sufficient time?

SECTION - D

24. Find the value of $g'(0)$, when $f(x) = |\log 11 - \sin x|$ and $g(x) = f(f(x))$ for all $x \in R$.

OR

If the function

$$f(x) = \begin{cases} (1 + |sin\theta|^{\frac{a}{|sin\theta|}}, -\frac{\pi}{6} < \theta < 0 \\ b \quad , \theta < 0 \\ e^{tan\,7\theta/tan\,8\theta}, 0 < \theta < \frac{\pi}{6} \end{cases}$$ is continuous at $x = 0$. Then, find the value of a and b.

25. The sum of an infinite geometric series is 8 and the sum of the squares of infinite term is 4, then, find the first term and common ratio.

26. Using elementary row transformation, find the inverse of matrix

$$\begin{bmatrix} -3 & 3 & 6 \\ 3 & 6 & 9 \\ 9 & 3 & 3 \end{bmatrix}.$$

27. If $(\tan x)^y = (\tan y)^x$, prove that $\frac{dy}{dx} = \frac{(\tan y)\left((\tan x)\cdot\log(\tan y) - y\cdot\sec^2 x\right)}{(\tan x)\left((\tan y)\cdot\log(\tan x) - x\cdot\sec^2 x\right)}$.

OR

Using mathematical induction, show that $51^n - 14^n$ is multiple of 37, $\forall n \in N$.

28. Let f be the function defined by $f(x) = x^3 - 2x + 9$ is neither increasing nor decreasing in $(-1,1)$, then, prove that $f(x)$ is increasing or decreasing $(-1,1)$. Also, find the interval in which $f(x)$ is:

1. Strictly increasing
2. Strictly decreasing

29. Find the area (in sq units) bounded by the curves $y = \sqrt{x}$, $y - x + 2 = 0$, $X - axis$ and lying in the first quadrant.

OR

Find the value of λ, so that following lines are perpendicular to each other $\frac{x-1}{2} = \frac{y-3}{\lambda} = \frac{z+1}{-1}$ and $\frac{x+1}{\lambda} = \frac{y-1}{2} = \frac{z-2}{2}$.