

CBSE Board
Class XI Mathematics
Sample Paper – 4

Time: 3 hrs

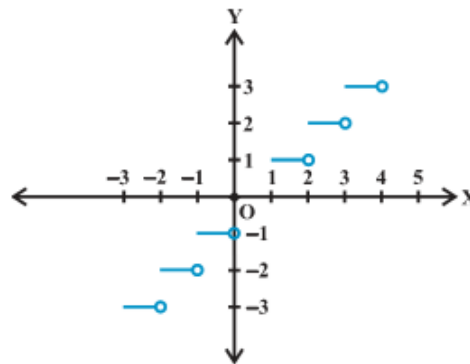
Total Marks: 100

General Instructions:

1. All questions are compulsory.
2. The question paper consist 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 mark each.
5. Questions 13 – 23 in Section C are long-answer I type questions carrying 4 mark each.
6. Questions 24 – 29 in Section D are long-answer type II questions carrying 6 mark each.

SECTION – A

1. Identify the function which the given graph represents.



2. If $4x + i(3x - y) = 3 + i(-6)$, where x and y are real numbers, then find x and y .
3. Let $A = \{1, 2\}$ and $B = \{3, 4\}$. Find the number of relations from A to B .

OR

Find x and y if $(x + 3, 5) = (6, 2x + y)$

4. Write the negation of statement : "Australia is a continent."

SECTION - B

5. If $f : \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = x/(x^2-1)$, find $f(f(2))$.

OR

If $f(x) = 3x^4 - 5x^2 + 9$ find $f(x - 1)$.

6. Solve : $\cos 3\theta + 8\cos^3\theta = 0$

7. Show that the roots of equation $(a^2+b^2)x^2-2b(a+c)x+(b^2+c^2)=0$ are real and equal if a,b,c are in GP.

8. Draw the graph of the function $|x + 2| - 1$.

9. Find the co-ordinates of the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$

OR

If the latus rectum of an ellipse is equal to half of minor axis, find its eccentricity.

10. In a survey of 600 students in a school, 150 students drink tea and 225 drink coffee, and 100 drink both tea and coffee. Find how many students drink neither tea nor coffee?

OR

In a group of 800 people, 550 can speak Hindi and 450 can speak English. How many can speak both Hindi and English?

11. Let $A = \{1, 2, 3, 4, 6\}$. Let R be the relation on A defined by $\{(a, b) : a, b \in A, a \text{ divides } b\}$

(i) Write in the roster form

(ii) Find the domain of R

(iii) Find the range of R

12. $f(x) = -1$ if $x < 0$

$= 1$ if $x > 0$

Draw the graph of the above function

SECTION - C

13. Represent the complex number $z = 1 + i\sqrt{3}$ in the polar form.

OR

Solve the following $\left[i^{18} + \frac{1}{i^{25}} \right]^2$

14. Find n given that, ${}^n P_3 : {}^n P_4 = 1 : 9$
15. Solve the given equation $2\cos^2 x + 3\sin x = 0$
16. Prove that $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$
17. The income of a person is Rs. 3, 00, 000, in the first year and he receives an increment of Rs. 10, 000 to his income per year for the next 19 years. Find the total amount, he received in 20 years.
18. Insert three numbers between 1 and 256 so that the resulting sequence is a G.P.

OR

Find the sum of the n terms of the series $5 + 11 + 19 + 29 + \dots$

19. Find the equation of a circle which passes through the points $(2, -2)$, and $(3, 4)$ and whose centre lies on the line $x + y = 2$.
20. Solve $\sqrt{5}x^2 + x + \sqrt{5} = 0$.
21. Find the r^{th} term from the end in the expansion of $(x + a)^n$.

OR

Find the coefficient of x^6y^3 in the expansion of $(x + 2y)^9$.

22. Prove by induction that the sum, $S = n^3 + 3n^2 + 5n + 3$, is divisible by 3 for all $n \in \mathbb{N}$.
23. Prove that $2\cos\frac{\pi}{13}\cos\frac{9\pi}{13} + \cos\frac{3\pi}{13} + \cos\frac{5\pi}{13} = 0$

SECTION – D

24. Find the solution region for the following system of inequations:
 $x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$

25. Find the mean deviation about the mean for the following continuous frequency distribution, using the short cut method for finding mean.

Marks Obtained	Number of Students
0 – 10	12
10 – 20	18
20 – 30	27
30 – 40	20
40 – 50	17
50 – 60	6

OR

The scores of 48 children in an intelligence test are shown in the following frequency table.

Calculate the variance σ^2 and find out the percentage of children whose scores lie between $\bar{x} - \sigma$ and $\bar{x} + \sigma$

Score	Frequency
71	4
76	3
79	4
83	5
86	6
89	5
92	4
97	4
101	3
103	3
107	3
110	2
114	2

26. Find the equations of the lines through the point (3, 2) which are at an angle of 45° with the line $x - 2y = 3$.

OR

The mid points of the sides of a triangle are (2, 1), (-5, 7) and (-5, -5). Find the equations of the sides of the triangle.

27. Find the derivative using the first principle of $f(x)$, where $f(x)$ is given by $f(x) = x + \frac{1}{x}$

28. For all $n \geq 1$, prove using Principle of Mathematical Induction

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}$$

29. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will be

- (i) A diamond
- (ii) An ace
- (iii) A black card
- (iv) Not a diamond
- (v) Not a black card
- (vi) Not an ace

OR

A committee of two persons is to be selected from two men and two women.

What is the probability that the committee will have (a) no man (b) one man (c) two men?