CBSE Sample Paper Class 11
Maths Set 7

CBSE Board
Class XI Mathematics

Time: 3 hrs   **Total Marks: 100**

General Instructions:
1. All questions are compulsory.
2. The question paper consist of 26 questions divided into three sections A, B and C. Section A comprises of 06 questions of one mark each, section B comprises of 13 questions of four marks each and section C comprises of 07 questions of six marks each.
3. All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
4. There is no overall choice. However, internal choice has been provided in 04 questions of four marks each and 02 questions of six marks each. You have to attempt only one of the alternatives in all such questions.
5. Use of calculators is not permitted.

SECTION – A

1. Find the derivative of $\sin(x + 1)$.

2. Find the truth value of p: 'Every real number is either prime or composite.'

3. Simplify: $\dfrac{1+3i}{1-2i}$

4. A coin is tossed twice. Find the probability of getting atleast one head.

5. Find the new co-ordinates of the point (9, 4) if the origin is shifted to the point (1, 2) by translation of axes.

6. Identify the conic section represented by the equation $4x^2 + y^2 = 100$ and draw its rough graph.

SECTION – B

7. A and B are two sets such that $n(A - B) = 14 + x$, $n(B - A) = 3x$ and $n(A \cap B) = x$, draw a Venn diagram to illustrate the information. If $n(A) = n(B)$, then find the value of x .

8. If the power sets of two sets are equal, then show that the sets are also equal.

9. If f and g are two functions: $R \rightarrow R$; $f(x) = 2x - 1$, $g(x) = 2x + 3$, then evaluate

   (i) $(f + g)(x)$ (ii) $(f - g)(x)$ (iii) $(fg)(x)$ (iv) $\left(\dfrac{f}{g}\right)(x)$

10. Let R be a relation from N to N defined by $R = \{(a, b) \in N \text{ and } a = b^4\}$. Determine if the relation is

    (i) Reflexive   (ii) Symmetric   (iii) Transitive   (iv) Equivalence

11. In a $\triangle ABC$, if $a = 3$, $b = 5$, $c = 7$, find $\cos A$, $\cos B$ and $\cos C$.

12. Find the square root of the complex number $5 - 12i$.

13. Find the probability such that when 7 cards are drawn from a well shuffled deck of 52 cards, all the aces are obtained.

14. Find the sum to infinity of the series: $\dfrac{1}{3} + \dfrac{1}{5^2} + \dfrac{1}{3^3} + \dfrac{1}{5^4} + \dfrac{1}{3^5} + \dfrac{1}{5^6} + \dots$

15. In how many ways can the letters of the word 'Mathematics' be arranged so that the (i) vowels are together (ii) vowels are not together

    OR

    In how many ways can 5 girls and 3 boys be seated in a row with 11 chairs so that no two boys sit together?

16. A point M with x-coordinate 4 lies on the line segment joining the points P(2, –3, 4) and Q (8, 0, 10). Find the co-ordinates of the point M.

    OR

    Find the equation of the set of points such that the sum of the square of its distance from the points (3, 4, 5) and (–1, 3,–7) is a constant.

17. Solve for x: $\tan 2x + \sec^2 2x - 1 = 0$

    OR

    Solve for x: $\sin x + \sin 2x + \sin 3x = 0$

18. Evaluate: $\displaystyle \lim_{x \to 0} \dfrac{\log 10 + \log\left(x + \dfrac{1}{10}\right)}{x}$

    OR

    Find the derivative of the given function

    $y = \dfrac{x}{\sin^n x}$

19. Write down the binomial expression $(1 + x)^{n+1}$, when x = 8. Deduce that $9^{n+1} - 8n - 9$ is divisible by 64, when n is an integer.

SECTION – C

20. If $\frac{\pi}{2} \le x \le \pi$ and $\tan x = -\frac{4}{3}$, find $\sin\frac{x}{2}$, $\cos\frac{x}{2}$, $\tan\frac{x}{2}$.

21. Find the mean deviation about the median for the following data:

Marks	No. of students
0–10	5
10–20	10
20–30	20
30–40	5
40–50	10

22. Prove by the principle of Mathematical Induction that every even power of every odd integer greater than one when divided by 8 leaves one as the remainder.

23. Solve the following system of inequalities graphically:
x + 2y ≤ 10; x + y ≥ 1; x – y ≤ 0; x ≥ 0; y ≥ 0

OR

For the purpose of an experiment an acid solution between 4% and 6% is required. 640 liters of 8% acid solution and a 2% acid solution are available in a laboratory. How many liters of the 2% solution needs to be added to the 8% solution?

24. The first three terms in the binomial expansion of $(a + b)^n$ are given to be 729, 7290 and 30375 respectively. Find a, b and n.

25. A student wants to buy a computer for Rs. 12,000. He has saved up to Rs. 6000 which he pays as cash. He is to pay the balance in annual installments of Rs. 500 plus an interest of 12% on the unpaid amount. How much will the computer cost him?

OR

Find the value of $\dfrac{1\times 2^2 + 2\times 3^2 + 3\times 4^2 + ...\text{uptill the nth term}}{1^2\times 2 + 2^2\times 3 + 3^2\times 4 + ...\text{uptill the nth term}}$

26. Show that the equation of the line passing through the origin and making an angle of θ

with the line y= mx + c is $\dfrac{y}{x} = \dfrac{m+\tan\theta}{1-m\tan\theta}$ or $\dfrac{y}{x} = \dfrac{m-\tan\theta}{1+m\tan\theta}$