

**Sample Paper-05 (unsolved)**  
**Mathematics**  
**Class - XI**

Time allowed: 3 hours

Maximum Marks: 100

**General Instructions:**

- a) All questions are compulsory.
- b) The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.
- c) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
- d) Use of calculators is not permitted.

**Section A**

1. List the elements of the following set  $B = \{x \in A, 10 + x = 7\}$  where  $A = \{1, 2, 3, 4, 5, \dots\}$
2. Represent the function  $(1+x)^{50}$  as the sum of an even function and an odd function
3. Find the greatest and the least value of the function  $f(x) = \cos x^3$
4. Solve for  $x$  if  $x - x = 1 + 2i$
5. Five geometric means are inserted between 8 and 512. Find the fifth term in the series.
6. Find  $x$  for which the function  $ax^2 + bx + c, a > 0$  assumes the least value

**Section B**

7. For what values of  $b$  the for which the curve  $y = x^2 + bx + 25$  touches the x-axis
8. Find the area of the parallelogram bounded by the lines  $x=3, x=5, 3x-2y+4=0$  and  $3x-2y+1=0$
9. Solve the inequality  $\frac{1}{x} - 2 < 5$
10. Determine whether the graphs of the equation  $y = x$  and  $y = x$  is symmetric about x-axis, y-axis, or about the origin

11. Find  $f(x) + f(1-x)$  if  $f(x) = \frac{10^x}{100^x + 10}$
12. Evaluate  $\cos(2 \tan^{-1}(-7))$
13. Find the limit  $\lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{2h}$  if  $f(a) = 0$  and  $f'(a) = 6$
14. Find  $f^{-1}(x)$  if  $f(x) = 1 + \log_e(x+5)$
15. Find  $c$  in the equation  $x^2 - 4x + c = 0$  if it is known that the sum of squares of the roots is equal to 16
16. The vertices of a triangle are A (-6, -2), B (6, -5), and C (2, -8). Find a point inside the triangle which is equidistant from all the sides.
17. Prove that  $\cos(A+B) + \sin(A-B) = 2 \sin(45+A) \cos(45+A)$
18. Prove by mathematical induction that  $2^n > 2n+1$  for all values of  $n \geq 3$
19. Using properties of set prove that  $A - (B - C) = (A - B) \cup (A \cap C)$

### Section C

20. Prove that  $a_1 - 3a_2 + 3a_3 - a_4 = 0$  if  $a_1, a_2, a_3, a_4$  are in AP
21. If four coins are tossed, find the probability that there should be two heads and two tails.
22. Find  $n$  if the coefficient of the second term in the expansion of  $(x - \frac{1}{4})^n$  is equal to 31
23. Find  $\frac{dy}{dx}$  given that  $y = (\sin x)^x$
24. Find an AP whose first term is unity and the second, tenth and 34th term form a GP
25. A tangent to the parabola  $y^2 = 12x$  is making an angle  $45^\circ$  with the straight line  $y = 3x + 5$ . Find its equation and point of contact.
26. Calculate the mean deviation about the median for the distribution given below

Age	10-20	21-31	32-42	43-53	54-64	65-75	76-86
No of persons	15	14	30	20	10	7	4