Sample Paper  
Class – XI  
Subject – MATHEMATICS

Time Duration: 3 hours  
Marks:100

General Instruction:
- All questions are compulsory.
- The question paper consists of 29 questions divided into three sections A, B, and C.
- Section A comprises of 10 questions of one mark each, section B comprises of 12 questions of four marks each, and section C comprises of 7 questions of six marks each.

Section - A

1) In a circle of diameter 60 cm, the length of a chord is 16 cm. Find the length of the minor arc of the chord.
2) Solve \( \sqrt{5}x^2 + x + \sqrt{5} = 0 \)
3) Solve the inequalities for real x.
4) Find the coefficient of \( a^4 \) in the product \( (1+2a)^4 (2-a)^5 \) using the binomial theorem.
5) In the sequence \( a_n = (-1)^{n+1} n^3 \) find \( a_6 \) and \( a_{10} \).
6) Find the equation of the circle passing through the points (2,3) and (-1,1) and whose center is on the line \( x - 3y - 11 = 0 \).
7) Find the distance between the points (2,3,5) and (4,3,1).
8) Find the derivative of the constant function of \( f(x) = a \) for a fixed real number 'a'.
9) Differentiate the function \( x^3 + 4x^2 + 7x + 2 \) with respect to x. Differentiate the function \( 2x^3 + 6x^2 + 8x + 10 \) with respect to x.
10) Evaluate using the binomial theorem \( (10+4)^2 \).

Section - B

11) Find the domain of the function \( f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4} \).
12) Define the function \( f: \mathbb{R} \rightarrow \mathbb{R} \) by \( y = f(x) = x^2, x \in \mathbb{R} \). Find the domain and range of this function and then draw a graph.
13) What is algebra of functions?
14) Find the modulus and argument of the complex number \( \frac{1+i}{1-i} \).
15) Find the real numbers of x and y if
16) Show that the sum of \( (m+n)^{th} \) and \( (m-n)^{th} \) term of an A.P is equal to twice the \( m^{th} \) term.
17) Solve the system of inequality graphically
   \[-2y \leq 3, \ 3x + 4y \geq 12, x \geq 0, y \geq 1\]
18) When two dice are thrown describe the event of 1) two events which are mutually exclusive 2) three events which are mutually exclusive.

19) The ratio of the sums of m and n terms of an A.P \( m^2:n^2 \). Show that the ratio of \( m^{th} \) and \( n^{th} \) term is \( (2m-1) (2n-1) \).
20) Find the sum of the sequence 9, 99, 999, 9999, ...... to \( n \) terms.
21) Find the equation of the line whose perpendicular distance from the origin is 5 units and the angle which the normal makes with
22) Find the angle between the lines \( y - \sqrt{3}x - 5 = 0 \) and \( \sqrt{3}y - x + 6 = 0 \)

Section C

23) Find the coordinates of the centroid of the triangle whose vertices are \((x_1, y_1, z_1), (x_2, y_2, z_2)\) and \((x_3, y_3, z_3)\)
24) Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and length of the latus rectum of the ellipse \( \frac{x^2}{16} - \frac{y^2}{9} = 1 \)
25) Find the mean deviation about the median of the following data
   \( 3, 5, 6, 7, 8, 9, 10, 12, 16, 20, 22, 23 \)
26) Prove that \( \lim_{x \to 0} x \log(x + 1) = 1 \)
27) Find the value of \( 2e^2 \), round off to the nearest decimal point.
28) Find the square root of \( 1+i \)
29) Find the equation(s) of tangent(s) to the curve \( y = x^3 + 2x + 6 \) which is perpendicular to the line \( x + 14y + 4 = 0 \)