CHAPTER – 2
POLYNOMIALS

2.1 INTRODUCTION

An algebraic expression f(x) of the form $(fx) = a_0 + a_1x + a_2x^2 + ...+ a_nx^n$, where $a_0, a_1, a_2.....a_n$ are real numbers and all the index of **x** are non-negative integers is called polynomials in **x** and the highest Index **n** in called the degree of the polynomial, if $a_n \neq 0$.

(a) Zero Degree Polynomial :

Any non-zero number is regarded as a polynomial of degree zero or zero degree polynomial. For example, **f(x) = a,** where $a \neq 0$ is a zero degree polynomial, since we can write **f(x) = a** as **f(x) = ax^0.**

(b) Constant Polynomial :

A polynomial of degree zero is called a constant polynomial. **For example,** f(x) = 7.

(c) Linear Polynomial :

A polynomial of **degree 1** is called a linear polynomial.

For example : p(x) = 4x - 3 and $f(t) = \sqrt{3}t + 5$ are linear polynomials.

(d) Quadratic Polynomial :

A polynomial of **degree 2** is called quadratic polynomial.

For example : $f(x) = 2x^2 + 5x - \frac{3}{5}$ and $g(y) = 3y^2 - 5$ are quadratic polynomials with real coefficients.

IMPORTANT FORMULAE :

$(x + a)^2 = x^2 + 2ax + a^2$

$(x - a)^2 = x^2 - 2ax + a^2$

$x^2 - a^2 = (x + a)(x - a)$

$x^3 + a^3 = (x + a)(x^2 - ax + a^2) = (x + a)^3 - 3xa(x + a)$

$x^3 - a^3 = (x - a)(x^2 + ax + a^2) = (x - a)^3 + 3xa(x - a)$

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

$(a + b)^3 = a^3 + b^3 + 3ab(a + b)$

$(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Special Case : If $a + b + c = 0$ then $a^3 + b^3 + c^3 = 3abc$.