Polynomials

NOTES

FUNDAMENTALS

An algebraic expression in which the variables involved have only non – negative integral powers is called a polynomial.

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MATHEMATICS

GENERAL FORM OF A POLYNOMIALS

> $P(x) = a_0 + a_1 x + a_2 x^2 + ... + a_n x^n$ is a polynomials in variable x, where $a_0, a_1, a_2, a_3, ..., a_n$ are real numbers and n is a non - negative integer.

Examples:- (i) $7x^3 + 4x^2 + 6x - 2$ is a polynomial in one variable x.

(ii) $3 + 2x^3 - 5x^2y + 6xy^2$ is a polynomial in two variables x and y.

Coefficients:- In the polynomials $5x^3 - 3x^2 + 2x - 7$, coefficients of x^3 , x^2 and x are 5, -3, and 2 respectively and -7 is the constant term in it.

DEGREE OF A POLYNOMIAL IN TWO OR MORE VARIABLES

- ➤ Variables:- In case of polynomials in more than one variable, the sum of the powers of the variable in each term is taken up and the highest sum so obtained is called the degree of polynomials.
 Example:- $7x^3 5x^2y^2 + 3xy + 7y + 9$ is a polynomial in x and y of degree 4.
- > Linear polynomial:- A polynomial of degree 1 is called a linear polynomial.
- > Quadratic polynomial:- A polynomial of degree 2 is called a quadratic polynomial.
- > Cubic Polynomial:- A polynomial of degree 3 is called a cubic polynomial
- **Biquadratic polynomial:-** A polynomial of degree 4 is called a biquadratic polynomial.
 - Monomial:- A polynomial containing one non-zero term.
 - Binomial:- A polynomial containing two non-zero terms.
 - Trinomial:- A polynomial containing three non-zero terms.
 - Constant polynomial:- A polynomial containing one term only consisting of a constant term is called a constant polynomial.
- Zero polynomial:- A polynomial consisting of one term namely zero is called a zero polynomial. The degree of a zero polynomial is not defined.
- **Remainder theorem:-** Let f(x) be a polynomial of degree $x \ge 1$ and let a be the any real number. When f(x) is divided by (x a), then the remainder is f(a).
- Factor theorem:- Let f(x) be a polynomial of degree greater than or equal to 1 and a be a real number such that p(a) = 0, then (x-a) is a factor of f(x).

- GCD:- The GCD of two polynomials P(x) and q(x) is that common divisor which has the highest degree among all common divisors and the coefficient of the highest degree term is positive.
- LCM:- The LCM of two polynomials p(x) and q(x) is a polynomial of lowest degree of which p(x) and q(x) are multiples.