VIII – Mathematics Assignment – Algebraic Expressions and Identities

Basic Concepts

We have already studied in the earlier classes about algebraic expressions. In this chapter, we will revise all these in brief and also learn division of polynomials.

Algebraic Expressions: A Combination of Constants and variables connected by the basic four operations $+, -, \times, \div$ is known as an algebraic expression.

examples: $x^3 + 3x^2 + 5x + 6$, $3x^2 - 5xy + 7$, $\frac{1}{2}x^2 - \frac{1}{3}y^2 + 7$, $5xy - 3yz$ etc are examples of algebraic expression.

Constants and Variables: A symbol having a fixed numerical value is called a Constant, such as π, 5, -3, $\frac{5}{6}$, $\frac{7}{8}$ etc. are examples of Constant.

A Symbol which takes on various numerical values is known as a variable.

Cont-Pg-2

eg.

As we know that circumference of a circle is $2\pi r$

$\therefore C = 2\pi r$

Here C and r are variables and $2, \pi$ are constant.

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

Examples:

$3 - 4x + 7x^2 + 5x^3$ is a polynomial in one variable only.

$6x^2y + 8xy - 3y + 7$ is a polynomial in two variables x & y.

Note

$3 + 3x^{\frac{2}{3}} + 5x^2 + 6x^3$ is an algebraic expression but not a polynomial since it contains the term to the power of $2/3$ where $\frac{2}{3}$ is not a non-negative integer.

Cont-Pg-3

Degree of a polynomial in one variable :- In a polynomial of one variable, the highest power of the variable is called the degree of the polynomial.

example: The degree of $4x^3 - 3x^2 + 5x + 6$ is 3

The degree of $5x^4 - 7x^2 - \frac{7}{9}$ is 4.

etc.

Polynomial of Various Degrees:

(a) **Linear Polynomial :** A polynomial of degree one called a linear polynomial.

example: $3 + \frac{2}{3}x$, $4x - 5$, . . .

(b) **Quadratic Polynomial:** A polynomial of degree two is called a quadratic polynomial

example: $3x^2 - 5x + 2$; $2 - y + (y^2 + 5)$

(c) **Cubic Polynomial :** A polynomial of degree three is called a Cubic polynomial

example : $4x^3 + 3x^2 + 5x - 7$, . .

Cont-Pg-4

Types of Polynomial: A polynomial is said to be monomial, binomial or a trinomial according as it contains 1, 2, 3 terms respectively.

Examples:

Monomials : $3, 7x, \frac{5}{9}x^2, \ldots$

Binomials : $(3+7x), (5x^2+6x), \ldots$

Trinomials : $(5x^3+6x-7), (3x^3-5x+7) \ldots$

Constant Polynomial: A polynomial containing one term consisting of a constant is called a constant polynomial such as 3, 7, −5, −4 etc.

Ascending order of a polynomial: A polynomial is said to be in ascending order if the terms of the polynomial are in increasing order in respect of their degrees.

Example: $3+7x+5x^2-8x^3+4x^4$;

$3x^4y+2x^3y^3-5x^2y^{12}+2xy^{16}$

Cont-Pg 5

Descending order of a polynomial: A polynomial is in descending order if the terms of the polynomial are in descending order in respect of their degrees.

Example: $x^5 - x^4 + x^3 - x^2 + 5x + 6$,

$3x^4y - 2x^3y + 5x^2y^2 - 15xy$

Like Terms: Terms with same variables and their same exponents are called like or similar terms, otherwise they are called unlike or dissimilar terms

Example

$3x^2$, $\frac{1}{2}x^2$, $-7x^2$ are similar terms

x^2y, $3xy^2$, $-5x^2y^2$ are unlike terms.

Identity: It is an equality which is true for all values of the variables in the equality

Note: An equation is true for certain values of its variable. It is not an identity

Cont-Pg-6

Following are the standard identities

(a) $(a+b)^2 = a^2 + 2ab + b^2$

(b) $(a-b)^2 = a^2 - 2ab + b^2$

(c) $a^2 - b^2 = (a+b)(a-b)$

(d) $(x+a)(x+b) = x^2 + (a+b)x + ab$

Note: In a polynomial, we have

dividend = (divisor × quotient) + remainder

$$g(x) \overline{)\, f(x)} \quad q(x)$$

$$\underline{\quad\quad}$$

$$r(x)$$

We have

$$f(x) = g(x) \times q(x) + r(x)$$

Where $r(x) = 0$ or degree of $r(x) <$ degree of $g(x)$