# Unit 4

# Partial Fractions

#### Q: Define fraction.

The quotient of two numbers or algebraic expressions is called fraction. The quotient is indicated by a (—). For example,  $\frac{x^2+1}{x-2}$ 

## Q: Define a rational fraction. (ALP)

An expression of the form  $\frac{N(x)}{D(x)}$ , where N(x) and D(x) are polynomials in x with real coefficient and  $D(x) \neq 0$ , is called a rational fraction. For example,  $\frac{x+1}{x^2-1}$ 

### Q: What is a proper fraction? (ALP)

A rational fraction  $\frac{N(x)}{D(x)}$ , with  $D(x) \neq 0$  is called proper fraction if degree of the polynomial N(x) in the numerator is less than the degree of the polynomial D(x) in the denominator. For example,  $\frac{x+1}{x^2-1}$ 

## Q: What is an improper fraction? (ALP)

A rational fraction  $\frac{N(x)}{D(x)}$ , with  $D(x) \neq 0$  is called improper fraction if degree of the polynomial N(x) in the numerator is greater or equal to the degree of the polynomial D(x) in the denominator. For example,  $\frac{x}{x+1}$ ,  $\frac{x^3-1}{(x+1)(x-1)}$ 

### Q: What are partial fractions? (ALP)

Decomposition of resultant fraction  $\frac{N(x)}{D(x)}$ , with  $D(x) \neq 0$ , when

- (i) D(x) consist of non-repeated linear factors.
- (ii) D(x) consist of repeated linear factors.
- (iii) D(x) consist of non-repeated irreducible quadratic factors.
- (iv) D(x) consist of repeated irreducible quadratic factors.

#### OR

Every proper fraction  $\frac{N(x)}{D(x)}$ , with  $D(x) \neq 0$  can be resolved into an algebraic sum of components fractions. These components fraction of a resultant fraction are called its partial fractions. For example,

$$\frac{x+2}{x^2} = \frac{1}{x} + \frac{2}{x^2}$$

 $\frac{1}{x}$  and  $\frac{2}{x^2}$  are partial fractions of  $\frac{x+2}{x^2}$ 

### Q: Define identity.

An identity is an equation, which is satisfied all the values of the variables involved. For example, 2(x + 1) = 2x + 2.

#### Q: Define equation.

An equation is equality between two expressions. For example, x + 2 = 1

#### Q: Define resultant fraction.

The single fraction which is the simplified form of given fractions is known as resultant fraction. For example,  $\frac{x+2}{x^2}$  is simplified form of fractions  $\frac{1}{x}$  and  $\frac{2}{x^2}$ .

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Page 1 of 1