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. $(\boldsymbol{ALP})$

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? $(\boldsymbol{ALP})$

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? $(\boldsymbol{ALP})$

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? $(\boldsymbol{ALP})$

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 $\frac{2}{x^2}$.