CHAPTER – 2
POLYNOMIALS

NOTES

- **Degree of a polynomial**

  If $p(x)$ is a polynomial in x, the highest exponent of x in $p(x)$ is called degree of $p(x)$.
- A polynomial is called linear, quadratic, cubic or biquadratic according as its degree is one, two, three or four respectively.
- **Working rule to divide a polynomial by another polynomial**
  1. Write the dividend and divisor after arranging the term in the descending order of their degrees.
  2. Divide the highest degree term (first term) of the dividend by the highest degree term (first term) of the divisor to get the first term of the quotient.
  3. Multiply the divisor by the first term of the quotient and subtract this product from the dividend to get the remainder.
  4. Taking the remainder as the new dividend, keeping the divisor same, find the quotient and remainder to get the next quotient term.
  5. Continue the process till the degree of the remainder is less than the degree of the divisor.
- **Division Algorithm for Polynomials**

  If $p(x)$ and $d(x)$ are any two polynomials with $d(x) \neq 0$, then we can find polynomials $q(x)$ and $r(x)$ such that $p(x) = d(x) \times q(x) + r(x)$, where either $r(x) = 0$ or degree of $r(x) <$ degree of $d(x)$.

  In case degree of the dividend $p(x)$ is less than that of the divisor $d(x)$, then we take $q(x) = 0$ and $r(x) = p(x)$.
- **Remainder Theorem**

  Let $p(x)$ be any polynomial of degree greater than or equal to one and let a be any real number. If $p(x)$ is divided by the linear polynomial $x - a$, then the remainder is $p(a)$.
- **Factor Theorem:-** If $p(x)$ is a polynomial of degree ≥ 1 and a is any real number, then $x - a$ is a factor of $p(x)$ if and only if $p(a) = 0$.