Number system.

(1) **Decimal system:** Number system which we use in our daily life is the decimal system. In decimal system we use the digits namely 0, 1, 2,.....8, 9 and with the help of these 10 digits we are able to write any rational number. The decimal system is a place-value system, meaning thereby that the value represented by a digit depends upon the place of the digit within the numeral. The value assigned to consecutive places in the decimal system are $10^4, 10^3, \ldots\ldots 10^0, 10^{-1}, 10^{-2}\ldots\ldots$ (from left to right)

Example: Number 3864. 342 can be written as

$3864.342 = 3 \times 10^3 + 8 \times 10^2 + 6 \times 10^1 + 4 \times 10^0 + 3 \times 10^{-1} + 4 \times 10^{-2} + 2 \times 10^{-3}$

As ten basic symbols are used for representing the numbers, ten is called the base of the system and the system is called base-ten system or decimal system.

(2) **Binary number system:**The number system for which the base is two is called the binary system. In this system numbers are represented with the help of two basic symbols namely 0 and 1. The values assigned to consecutive places in the system are (when expressed in the decimal system)..... $2^4, 2^3, 2^2, 2^1, 2^0, 2^{-1}, 2^{-2}\ldots$. Where 2^0 place is the unit place. The binary numeral can be converted into the decimal numeral and vice-versa.

(3) **Octal number system:** As the name implies this is base eight (2^3) system. The numerals are written with the help of eight basic symbols namely 0, 1, 2,.....,7. The value (expressed in the decimal system) assigned to consecutive places are ..... $8^3, 8^2, 8^1, 8^0, 8^{-1}, 8^{-2}\ldots\ldots$, where 8^0 place is the unit's place. The procedures for converting a decimal numeral into an octal numeral and the other way round are similar to the procedures discussed in connection with binary system.

(4) **Hexadecimal system:** As the name implies, this is the base sixteen system. The numerals are written with the help of sixteen symbols, namely 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. Note that the symbol A represents ten (in decimal system). Similarly B, C, D, E, F represent respectively the numbers 11, 12, 13, 14 and 15. The value assigned to consecutive places are ....., $16^2, 16^1, 16^0, 16^{-1}\ldots\ldots$ (as expressed in decimal system), where 16^0 place is unit's place.