Digital (8-10 marks)

- Number Systems
- Boolean algebra.
- Logic gates.
- K-map
- Combinational ckts.
- Sequential ckt.
- A/D and D/A converters.
- Logic families

NUMBER SYSTEMS

10^3 10^2 10^1 10^0

6 4 8 9

Base (or) radix (γ): The no. of different symbols used to rep. a no. is called base.

$$N(\gamma) = \underbrace{d_n \gamma^n \; d_{n-1} \gamma^{n-1} \; d_{n-2} \gamma^{n-2} \ldots d_1 \gamma^1 \; d_0 \gamma^0}_{\text{Integer}} \; . \; \underbrace{d_{-1} \gamma^{-1} \; d_{-2} \gamma^{-2} \ldots d_{-m} \gamma^{-m}}_{\text{Fraction}}$$

↓ radix pt.

γ^n — weight of the position or positional weight.

$d_n \gamma^n$ — weighted value of digit in that position.

Decimal ($\gamma = 10$) (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)

Binary ($\gamma = 2$) (0, 1)

Octal ($\gamma = 8$) (0, 1, 2, 3, 4, 5, 6, 7)

Hexadecimal ($\gamma = 16$) (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F)

In a s/m. the decimal equivalence are ~~varying~~ ranging from 0 to $r-1$. in base r.

$$q : 0 \longrightarrow r-1$$

The base value is rep. ~~in~~ 10 coith 10 in base r.

$$r : (10)_r$$

Notes:

Base(r) radix of number s/m

The no. of different symbol used to rep a no. in a ~~no~~ number system. is called base or radix of number s/m.

Number consisting of 2 parts: integer and fraction seperated by radix pt.

$$(N)_r = \underbrace{d_n\, d_{n-1}\, d_{n-2} \cdots d_1\, d_0}_{\text{Integer}} \;\underset{\text{Radix point.}}{\downarrow}\; \underbrace{d_{-1}\, d_{-2} \cdots d_{-m}}_{\text{Fraction}}$$

r^n - weight of the position or positional weight

$d_n r^n$ - weighted value of digit in that position.

The decimal equivalence of the symbol ranging from 0 to $r-1$ in base r ~~radix is~~.

In a no. s/m with base 'r' the base ~~'r'~~ value 'r' is rep. with 10 in base 'r'.

Base Conversions

Decimal to any base.

To get integer part in the reqd base take sucessive divisions of decimal ~~part~~ integer part coith the reqd base and accumulate remainders in the reverse order.

To get the fraction part in the reqd base take sucessive multiplication of decimal fraction part coith the reqd base and accumulate integers in the ~~original~~ same order.

Find binary, octal, hexadecimal and base-1 equivalen also.

1. $(319.6875)_{10}$.

2	319	1
2	159	1
2	79	1
2	39	1
2	19	1
2	9	1
2	4	0
2	2	0
	1	

$.6875 \times 2 = 1.375$

$.375 \times 2 = 0.75$

$.875 \times 2 = 1.5$

$0.5 \times 2 = 1.$

Ans: $(100111111.1011)_2$