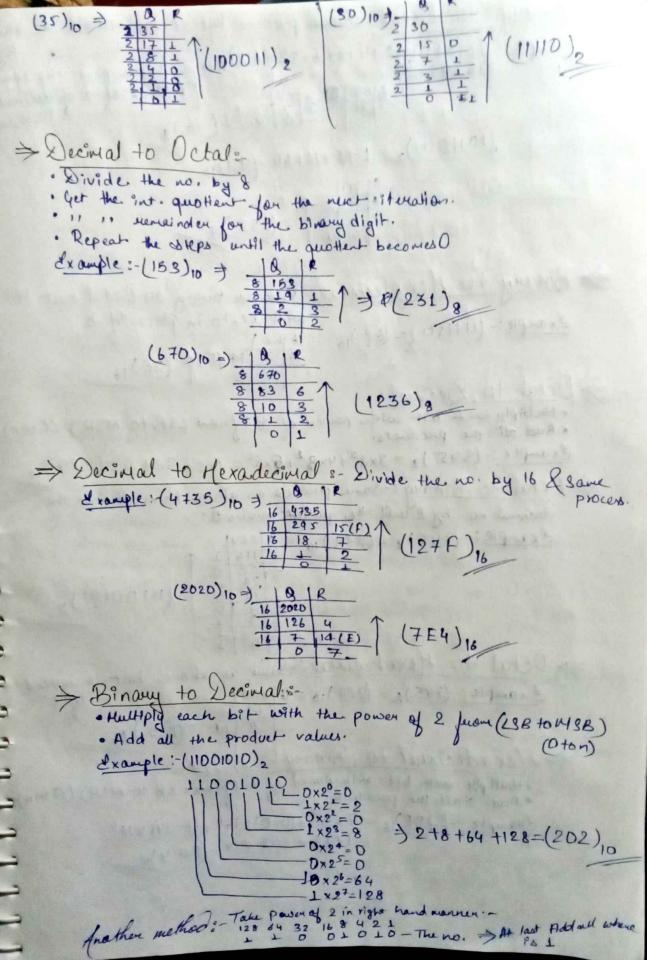
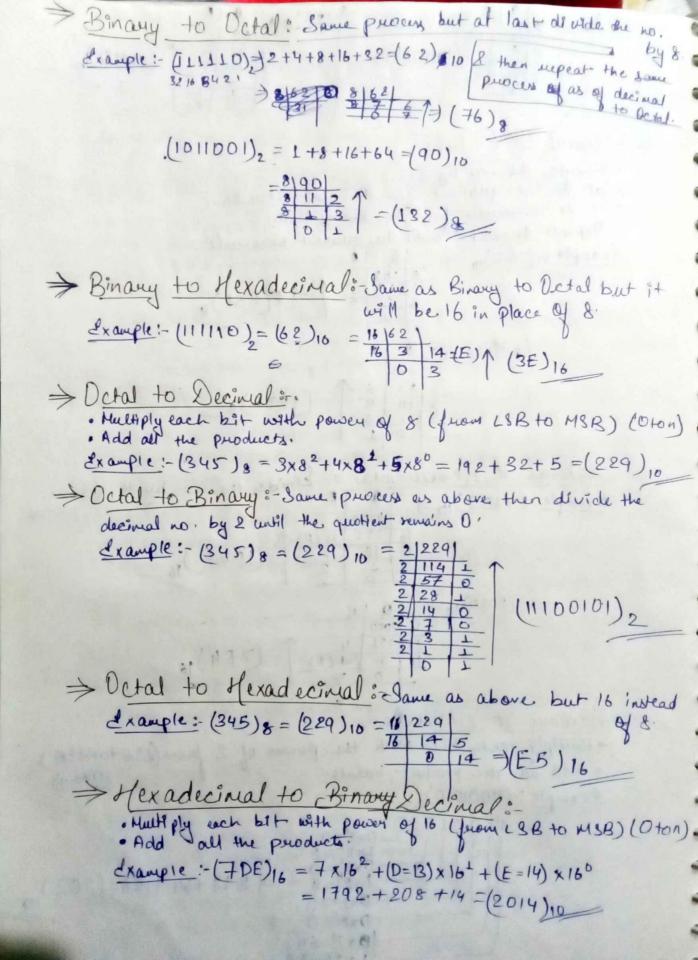
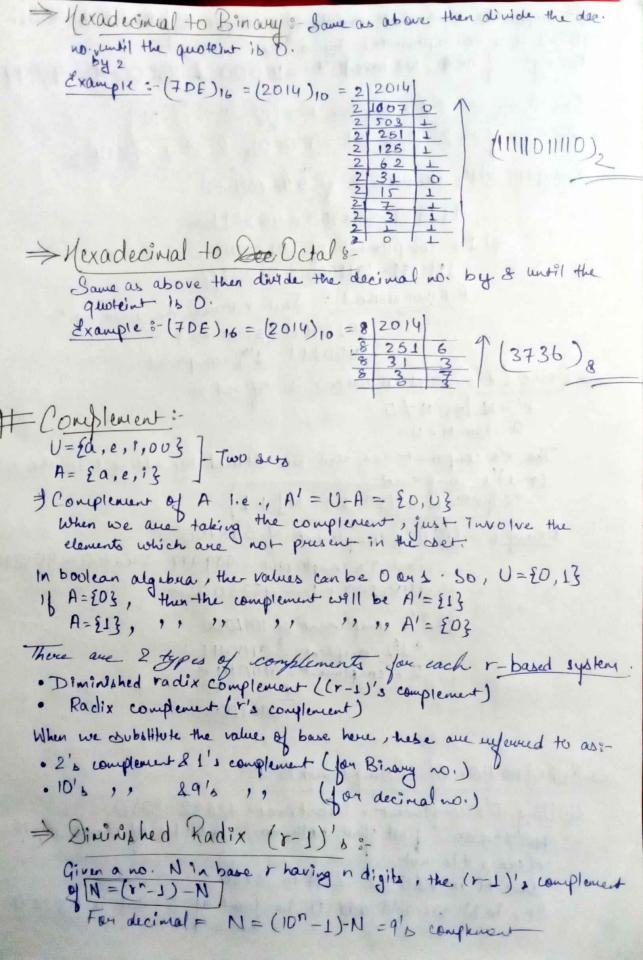
COMP. SYSTEM ARCHITECTURE FECAP268 CH:-1:- BINIARY, OSYSTEM It is the mathematical notation for Duespresenting no. of a given of by using digits or other symbols in a consistent manner. · A no. can be supresented differently in diff. number system. e'g'- the to numbers (2A)16 2 \$2)8 both reger to the same quantity (42) 10 but the representations & are different. > Value of any digit :- can be determined by:-· It's position in the no. . The base of the number system Types of Number Systems: - There are 4 most common N/s: i) Decimal N/9: - A no. is represented as a string of digits. · Decimo These are possitional no. that have a base on radix of 10 on Dec on Simply D. · In a dec. no. there are ten such digits that may be used, sterging in value from 0 to 9. · Number's value = a weighted sum of the digits. Number's value = degit x10x + degit x10x where $\kappa = (position number-1)$ e.g:- 1284,0 = 1 x 103 + 2 x 102 + 3x 10+ 4x 100 =1000+200+30+4 = 123410 9860= 9x102 +8x10+6x10° = 400 + 800 + 6 = 986 D The term comp. numbering Jaumats enforces to the schemes implemented in digital comp. & calculators to be supresent numbers. · Base is 2 on 'b' on 'B' on 'Bin' · Two objubals : 021 · Each bit in the no. is weighted by the power of 2. 1 (signal)

· All the 9 of 0. In the digital comp. is represented as bit patterns. · 01010101 - bit pattern · A wit of 4 bits - a nibble (on nybble) 11 11 11, 8 11 - a byte on an octet 1) 11 11 16 bits - a wond Representation of Bit Pattern: c.8: - 0101 0101 B1+7 B1+6 B1+5 B1+4 B1+3 B1+2 B1+1 B1+0 0 1 1 0 There are 8 69ts in the above table. Bit 7 % called Least Significant Bit (LSB)
Bit 7 % called Most Significant Bit (MSB) Representation of Unique States :-· A single bit can be represent 2 unique states : O L. ..., of you take two bits, you can use them to represent 4 unique states: 00, 01, 10 & 11 1 3 bits, 8 unique states: 000,001,010,100,011, · With every bot we add, we doubte the no. of states we can suppresent. ..., the expression for the no. of states with mbits in 2" iii) Octal N/3:- Base is & on 'o' on 'Oct' · 8 symbols (D to 7). · dack no. is weighted by the power of &. iv) d'exadecimal N/9: Base 18 16 on 'H' on 'Hex' · 16 dymbols are used: 10 digits & 6 letters (0+09 & Atof) {1,2,3,4,5,6,7,8,9,A=10,B=11,C=12,D=13,E=14 F=15} · d:9:- AB12 ,876F , Ffff etc. · dack dymbol is weighted by the power of 16 # Number Conservations: > Decimal to Binary: · Divide the no. by 2 · Get the 1st guotient for the * next iteration 1) 11 remainder for the binary digit. · Repeat the osteps until the quotient becomes O. dxample 1- (41)10) (101001)2 Aus 20







10" respuesants a no. that consists of a single I followed by n Os. Ton eg: - if n=4, we have 104 = 10,000 & 10,000-1=4,999 Fan binary no. Bd's complement = [N=(2"-1)-N for eg: 1/n=2 then 24=(10000), & 24-1=(1111)2 Example: 4) 9's complement of 546700 99999 -546700 = 453299 (1) 1's complement of 101.1000 111111-1011000 = 0100111 Another method: Just riverse the given no. E 101 1000 (Fiver no.) 0100111 1's complement > Radic (r's) =- N in base r is defined as rn-N for N 70 D for N = DThe r's complement can also be obtained by adding I to the (r-1)'s complement $|x_n - N| = [(x_n - T) - N] + T$ Example: - 85 10's complement of 546700 Hust 9's complement = 999 999 - 546700 = 458299 7453299+1=453300 8) 2's complement of 1016000 a 18 complet = 0100111 2's confinet = 0100111 & 0101000 > Substraction of Complements: 8.) Using 10's complement, Substract 72532-3250 H-72532 first of all both no. Should be of dome digit. Here, His not. Dun H is 72532 LN is 3250 So, In N we will add O in Junt of 3 that is 03250

Now, we will get the 10's complement of 03250 that is 99999-03250=96749=9's complement 96749 +1 = 96750 = 10's complement of N Sum of M& 10's complement of N = 72532 + 96750 Carry (1)6 9282 Discard end carry here :- 69282 Are 8.) Using 10's complement, osubstract- 3250-72532 10's complement of N: - 99999-72532=27467+1=27468 Sum of H& 10's complement of N = 03250 + 27468 30718 There is no end cowy Answer= -(10's complement of 30718) = 99999 - 30718 = 69281 + 1 = 69282= -69282A.) Using 2's complement substract 1010100-100001T 2's complement of N=0111100+1 = 0111100 Sun of M& 2's complement of N = 1010100 0111101 10000001 Discard the carry :- 001 0001 0.) Using 2's complement dubstract 100,0011-1010100 2's complement of N=0101011+1 =0101100 Sun of M&2's complement of N = 1000011 01011100 There is no end cavery 110000 1101111 80, Answer is - (2's complement of 1101111) -(0010000+1) =-0010001 # Keprusentation = However, to supresent so -ve integers we need a notation of a -ve values. ·Boz of the How limitations component supresent everything with 1° 20's, including the sign of the no.

As a consequence 1 it is customary to represent the dign with bit placed in the leftmost position of the no. The convention is to make the sign bit 10 for (tre) & 1 for (-re). In addition to the sign, and may have a decimal (on binary) point. The position of binary point is needed to represent the fractions, Int, on mixed int. fraction no. There are 2 ways to suspecify the position of a binary point in a register. By giving a fixed postion · By employing a floating point representation. > Fixed Point Representation: This method assumes that the binary point is always fixed in one position. The 2 positions most widely used one: ?) The binary point in the extreme left of the register to make the stored no a fraction. 91°) The binary point on the extreme right of the registers to make the obtored no. a just In either case, the binary point is not present, but its presence is assumed from a fact that no. 3 tored in the register is treated bas a quaction or an int. When the int binary no. is the sign is represented by 0 & the magnitude by a tre binary no. When we, the sign is prepuesented by I but the rest of the no, may be represented by one of 3 possible ways ?) Signed magnitude representation. ir) Signed 1's complement 1, iii) 19 2'b 19 Example: - Consider the signed no. 14 stored in 14 -bit regist 00001110 = +14 for - 14:- 1) 1 0001110 - Signed magnitude ii) 11110001- 1's complement iii) 11110010 - 2's complement

Floating Point Representation:

It were 2nd register to store a no. that designates the position of the decimal point in the 1st register

The Hoating point representation of a no. has Eparts:

1) A signed, fixed point no. called the martista 1st part

1) The position of the decimal (or binary) point called exponent grid part Mantina may be a fraction on an integer. tor e.g. + 6132.789 traction + 0.61324789 exponent +04 The value of exponent andicates the actual position of the decimal point. This can also be represented as +0.6132789 \$ 104.