

## HindPhotostat



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## MADE EASY ELECTRICAL ENGINEERING

Computer Fundamental By.Sagar Sir

- Theory
- Explanation
- Derivation
- Example
- Shortcuts
- Previous Years Question With Solution

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CAMPITER
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■ SYLLABUS
1. Data Representation 2. Computer Architecture 3. Computer Organization 4. Operating System 5. Networking 6. Programming Elements St.  **EXWORDS**  1. Computer **Direction**  2. Computer **Direction**  3. Computer **Direction**  4. Operating System **Direction**  5. Networking **Elements System**  1. Computer **Direction**  1. Computer **Dire
2. Computer Architecture
3. Computer Organization
4. Operating System con
5. Networking
6. Programming Elements &
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■KEYWORDS SS'
De la companya della companya della companya de la companya della
1. Computer
It is a computational machine used to process data under the control of a program application initiated
under the control of a program application initiated
by the user.
input Computer data
data 1 componen data
n Drogram
2. Program  Construction
Program {
Data

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3. Instruction
It is a binary code designed inside the processor
to perform some task.
Binary code - Bind with - Operation
Eg. CPU-X supports 8 different operations, then opcode size = log_8 bits  [binary code] = 3-bit
{binary code} = 3-bit
say, poo → multiplication x
001 -) Subtraction of
say, poo → multiplication 101  out → subtraction out  101 → addition out  say, poo → multiplication 101  out → subtraction out  say, poo → multiplication 101  out → subtraction 101
These oncodes tare decided by the designed
These opcodes take decided by the designed  4. Encoding The process, N signals are represented using
4. Encoding JRS
In this process, N signals are represented using
log N bits
log_N bits
N signals Encoder ————————————————————————————————————
5. Decoding
In this process an n-bit decoder produces 2° 0/p
signals.
n-bits — Decoder > 2° signals

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a h t
Data is a binary code which is associated with
Dala is a bittary core which is associated with
38 Value Dasert on Sure Garage
Binary code - Bind with - value
E.g. (101) <sub>2</sub> unsigned 5
sign mag. > -
2 comp 3
1's comp 2
Floating pt Fraction of
$\mathcal{A}^{\lambda}$
In the computer system data is always represented
<u>É</u>
In the computer system, data is always represented
In the computer system, data is always represented in binary. Different formats are used in the Computer system? to defined the data, described as follows:
Computer systems to defined the data, described
as follows: M
DATA FORMATS
Fixed Point Floating Point
-> single precision (32-bit)
Magnitude Complement -> double precision (64-Lit)
Unsigned Sign Magnitude 1's Comp. 2's Comp.
-> only +ve -> both +ve & -ve -> +ve & -ve -> +ve & -ve
data data data data
/
$(0 to 2^{n-1}) - (2^{n-1}) to + (2^{n-1}) - (2^{n-1}) to + (2^{n-1}) - (2^{n-1}) to + (2^{n-1})$

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Fixed	Paint	Data

	·	·····		
4-Bit Code	Unsigned	Sign. Magnitude	1'5 Comp.	2'5 Comp.
,		Magnitude		
00000	obside	(+o)	(±0)	+0
0001	1	+1	+1	+1
0.010	2	+2	+2	+2
0011	3	+3	+3	+3
0100	4	+4 .	+4	+4
0101	5 6 7 8 9 10 14 113	+5	+5	+5
0110	<u>6</u> .	+6 10	+6	+6
0111	7	+30,1	+7	+3
1,000	8	(B)	-7	-8
. 1001	g	K1	-6	-7
1010	10 4	-2	-5	-6
1011	us'	-3	-4	
1100		-4	-3	-4
	12/13	-5	-2	3
1110	14	-6		-2
111	., 45.	: 1.144		
	-	· .		

· Consider a hypothetical system with a word length of

12 bit. What is the range of a 2's complement data

possible in this system?

 $\rightarrow$  n=12  $\rightarrow$  range: -2" to 2"-1

-2948 to +2047

Page	
rago ————————————————————————————————————	
• What is the range of a signed data?  —> Signed + Sign Magnitude.	
C Sign Magnitude	
Signed data 1's complement	
L 2's complement	
when a particular format isn't specified, the default format i.e. 2's complement is taken.	- :
· What is the range of a data possible to process on  a 8-bit CPU?  -> Since the data type itself isn't specified so we consider default type i.e. unsigned data.	
0,21	
· What is the range of a data possible to process on	
a 8-bit CPU?	
-> Since the data type itself isn't specified, so we	
consider default Type i.e. unsigned data.	
7. +	
* Sign Extension	
This to an a lite to a person of	_
This concept is used in the signed data, to preserve	<u> </u>
the sign of a data when the data is stored in a large storage space.	
Sign Extension means replication of MSB of data	
The state of the s	_
Eg. $-7:1001 \longrightarrow store$ in a 8-bit space	
+9 < 00001001 1111001 2's comp -7	
05 padding MSB replication	
(zero's padding) (sign extension)	

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Note: 0's padding is used in Si Unsigned data &
Sign extension is used in Signed data
□ Bit Overflow
Eg. 4 bit data
+ 1111 +15
D 1110 +30
bit overflow {carry?
2770
- Carry Flag holds the sange exceeding condition.
of an unsigned data? represented by Cy
Sex Control of the Co
D 1110 +30  bit overflow {carry?
Grany flag is this
additional_bit
If Cy=1 Their Carry is present te hange
nas been exceeded in the second
if Cy=0, no carry is present.
Eg. 4-bit data
1000 8
(100) +9 (1000) 17
(y0001 17 4) Cy=1 => out of range

)		
		PREEMING
•		Page147-
===		
	□ Multiplication	
_		
	→ In the multiplication proce	ess, two steps are performed.
	is generation of partial prod	ducts
	ii> summation of partial prod	lucts
	0 + 1 + 1 + 1 + 1	tad lateral in the lateral
_	→ Partial products are general bits i.e. when multiplier	hit is a multiplier
	1 10 + 1	· 1
	product is 0	in process the fallot
		102
	product is 0.  — After the generation of to produce the final position multiplicand multiplier  E.g. 1111 * 11114  [11] Sartial  [11] products	p.g.? provide the summation
	to produce the final of	Poduct
	multiplicand multiplier	
	Eg. 1111 * 111/4	
	oir IIII (parlial	
	Sio Jill y products	
	11100001 -> final produ	ct = 225
	8-bit	
	Note: $(n \text{ bit})*(n \text{ bit}) = 2n \text{ bits}$	
	→ register "pair" is used to	store final product
	C 11 11 011	
	· Consider the following mul	tiplication
	(10WIZ), *(15)10 = (yolo1	inal)
·	what are the values of w,	v 1, z ?
	with ale the values of W,	102.

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		The second life is a second se
$\longrightarrow (10W17)_{*} * (1111)_{*} = (Y01011001)_{*}$		
221		
10W17	<u> </u>	
$\frac{2  DW Z}{ DW Z} \frac{1+W+1+Z=0}{ DW Z}$		
$\frac{10W1Z}{10w1Z} \frac{1+W+1+1=0}{1}$	<u>.</u>	
$\frac{10\omega 1Z}{} \Rightarrow \omega = 1 -$	-) cy	= 2
10101100Z Y=1 Z=1 , else (4w+z+18)		(0-1 1 1 )
$\frac{y}{y} = \frac{1}{2} \frac{1}{(\omega, y)}$ $\Rightarrow (\omega, y)$		
•		· ·
→ In the division procedure, bits are		
6012	*******	
→ In the division procedure bits are	3 40	anned from
MSB to LSB in bit-wise seque	ence.	
- Akt		
> After scannings dividend value is	comp	pared with
→ In the division procedure, bits are  MSB to ISB in set bit-wise seque  —> After scannings dividend value is  divisor values in the dividend value is	<u> </u>	
	<u>_</u> _	
→ If Dividend > Divisor then	· ·	
put '1' in quotient & subtract th	<u>e</u> d	ivisor
from the dividend & scan the c	<u>ex</u> l	
→ If Dividend < Divisor, then		
put 'o' in quotient & scan the nex		
- John of the Great The Trees	1 [	
→ Continue the process till all the	bits	are
serviced.		
Fg. 00000111 ÷ 0010		
·		· · · · · · · · · · · · · · · · · · ·

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