DIGITAL TECHNIQUES QB (2MARKS)

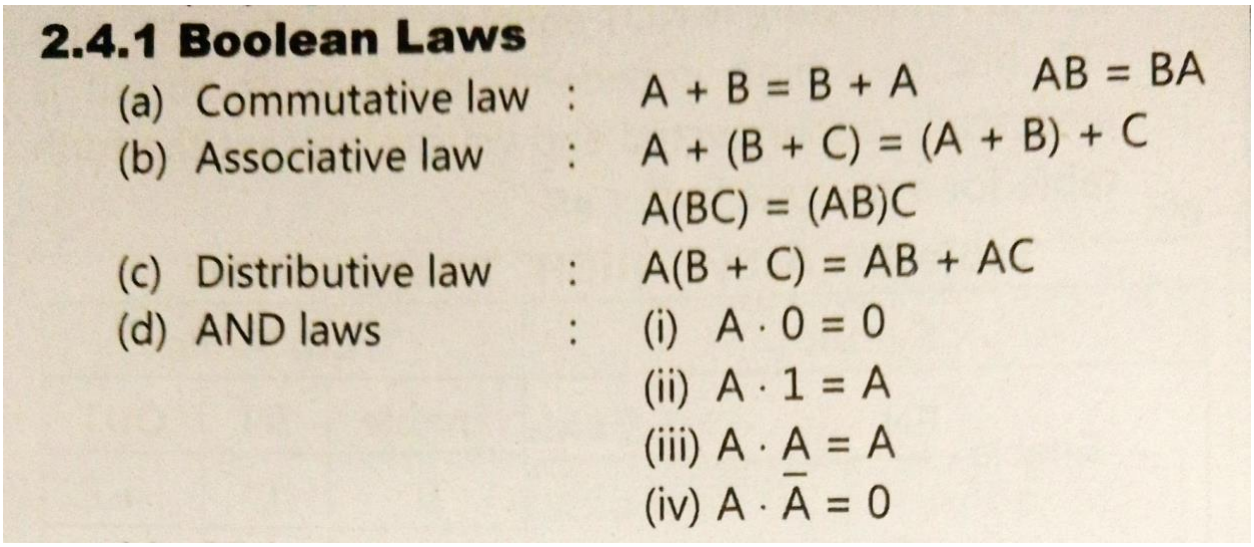
1) Distinguish between analog and digital signals ?

Ans)

Sr. No.	Analog Signal	Digital Signal
1.	It is an electrical signal in that amplitude varies continuously over a specified range of time.	It is an electrical signal in that amplitude varies in discrete over a specified range of time.
2.	It can take infinite values within the specified range of time.	It can take only finite (normally only two) discrete values within the specified range of time.
3.	Sine wave is one of the examples of an analog signal.	Pulse signal is one of the examples of a digital signal.
4	A.C. or D.C. signal.	Only D.C. signal.

2) Explain any 4 Boolean law?

Ans)



2.4.1 Boolean Laws

(a) Commutative law : $A + B = B + A$ $AB = BA$

(b) Associative law : $A + (B + C) = (A + B) + C$

$A(BC) = (AB)C$

(c) Distributive law : $A(B + C) = AB + AC$

(d) AND laws :

(i) $A \cdot 0 = 0$

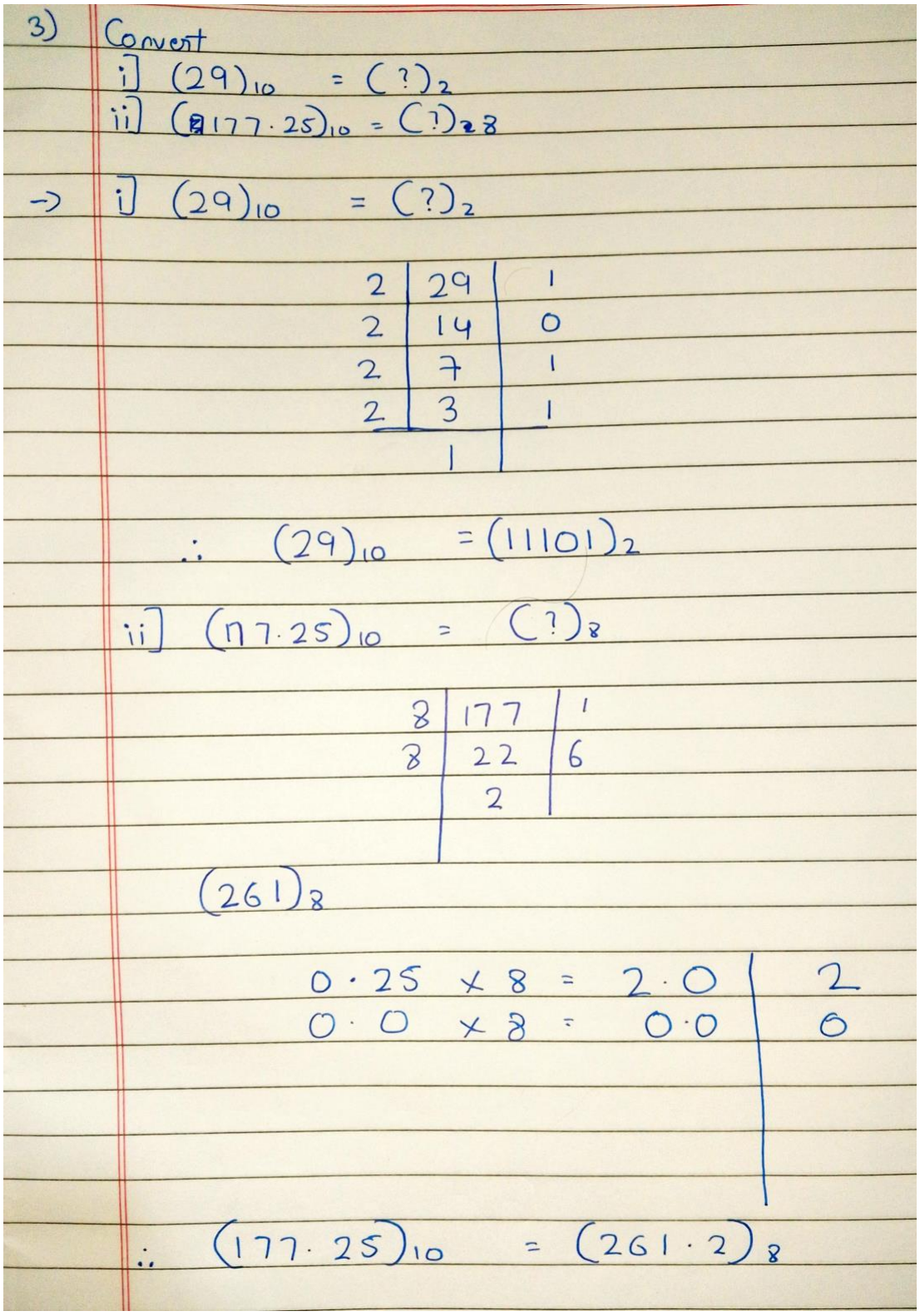
(ii) $A \cdot 1 = A$

(iii) $A \cdot A = A$

(iv) $A \cdot \overline{A} = 0$

3)

Ans)



3) Convert

i] $(29)_{10} = (?)_2$

ii] $(177.25)_{10} = (?)_8$

-> i] $(29)_{10} = (?)_2$

2	29	1
2	14	0
2	7	1
2	3	1
	1	

$\therefore (29)_{10} = (11101)_2$

ii] $(177.25)_{10} = (?)_8$

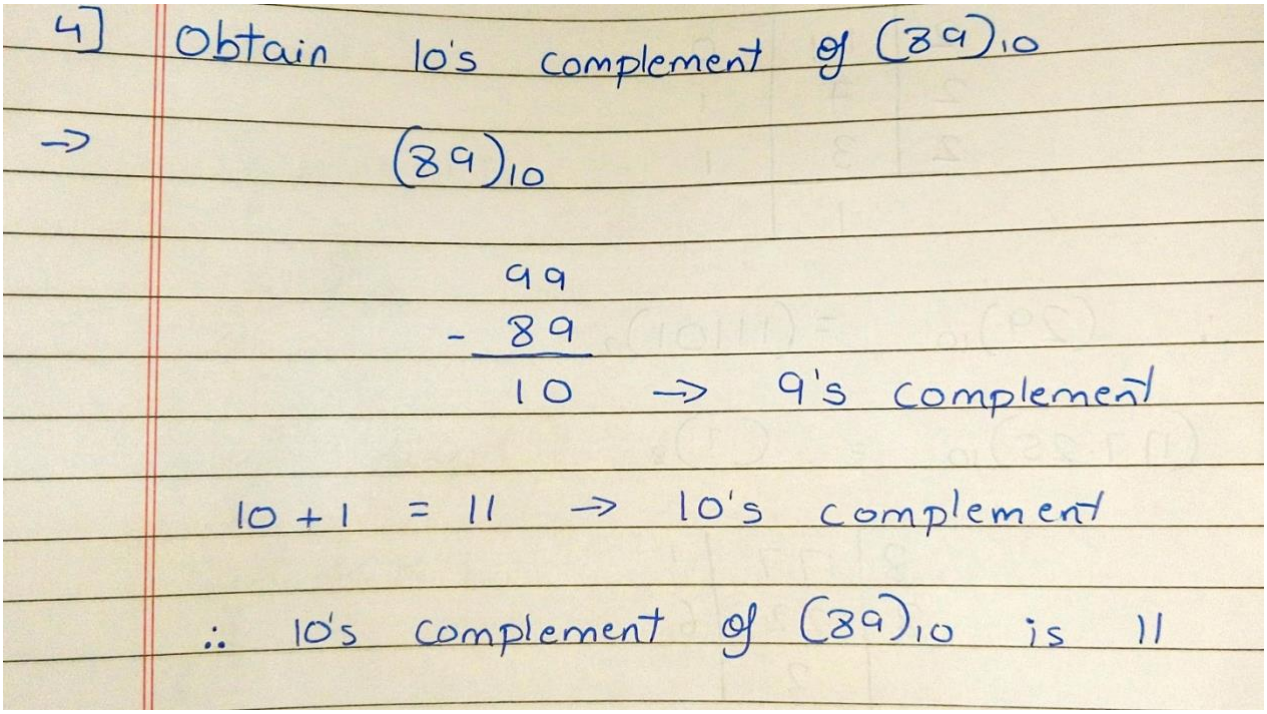
8	177	1
8	22	6
	2	

$(261)_8$

$0.25 \times 8 = 2.0$		2
$0.0 \times 8 = 0.0$		0

$\therefore (177.25)_{10} = (261.2)_8$

4)



5) Explain any one type of universal gate ?

Ans) **<u>NAND GATE :</u>** A NAND gate is a digital logic gate that performs the NOT-AND operation. It outputs 0 only when all its inputs are 1; otherwise, it outputs 1. This gate is called a universal gate because it can be used to create any other logic gate, such as AND, OR, and NOT.

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Truth Table

Inputs		Output
A	B	$Y = \overline{A \cdot B}$
0	0	1
0	1	1
1	0	1
1	1	0

6) Explain fan-in and fan-out ?

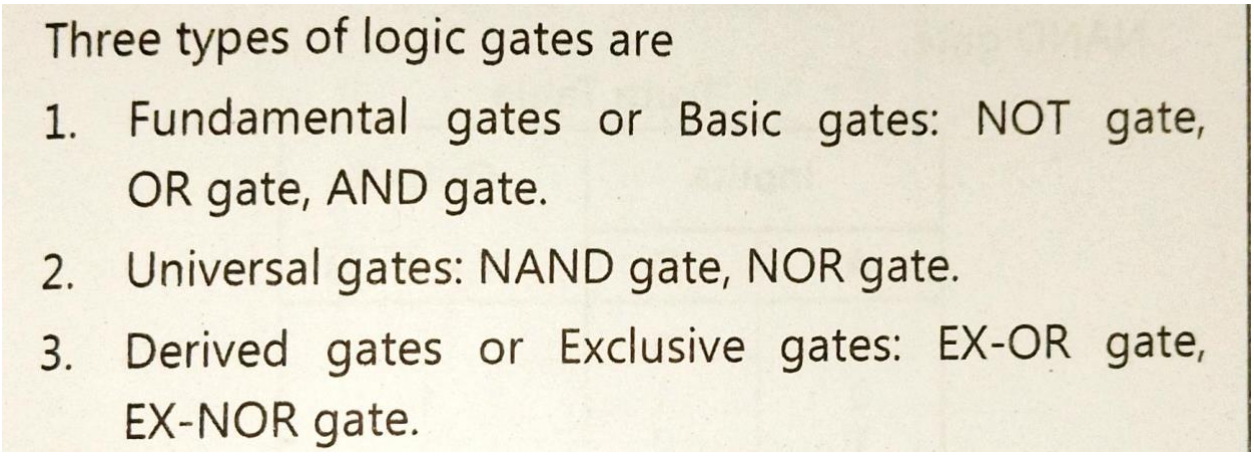
Ans) The Fan-in of a logic gate is the number of inputs that a gate can handle. For example, 4 input gate will have a fan-in =4. While designing digital circuit, this factor us considered

The Fan-Out is the number of logic gates that a single output can drive. It shows how many gates can be connected to one output without weakening the signal. For example a fan-out of 4, means that the gate Can drive at most 4 inputs of the same IC family

7) Define Logic gates and state its types ?

Ans) Logic Gates are the basic components in digital circuits used to perform logical operations on one or more binary inputs (0s and 1s) to produce a single binary output.

Types of logic gate is :



8) Explain AND gate and OR gate.

Ans **AND Gate**: A logic gate that outputs 1 only when all of its inputs are 1.

For example, with two inputs A and B:

- If A = 1 and B = 1, then output = 1.
- For any other combination of inputs, the output is 0.

OR Gate: A logic gate that outputs 1 if at least one of its inputs is 1.

For example, with two inputs A and B:

- If A = 1 or B = 1 (or both), then output = 1.
- Only if both A and B are 0, the output is 0.

9)

10] Obtain

a] 2's complement of 110011

b] Gray code of 1101

→ a] 2's complement of 110011

$(110011)_2$

~~We~~ ~~Are~~

$(001100)_2$ → 1's complement

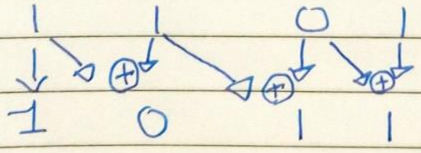
$$\begin{array}{r} 001100 \\ + \quad\quad 1 \\ \hline 001101 \end{array}$$

→ 2's complement

∴ 2's complement of 110011 is 001101.

b] Gray code of 1101

$(1101)_2$ we perform XOR operation for Gray code

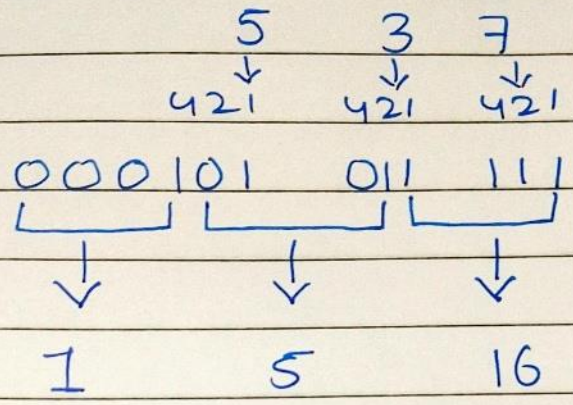


∴ The gray code of $(1101)_{\&2}$ is $(1011)_2$.

10)

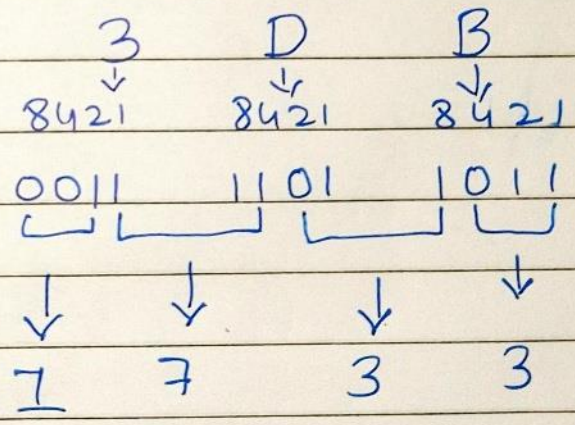
Convert

i) $(537)_8 = (?)_{16}$



$\therefore (537)_8 = (15F)_{16}$

ii] $(3DB)_{16} = (?)_8$



$\therefore (3DB)_{16} = (1733)_8$

11) Identify type of number system having base a) 8 b) 16 state two example of each type ?

Ans) i) Base 8 (Octal) System Definition : The octal number system has a base of 8, using digits from 0 to 7.

Examples : 345 (in octal) = $3\times8^2 + 4\times8^1 + 5\times8^0 = 192 + 32 + 5 = 229$ (in decimal).

ii) Base 16 (Hexadecimal) System Definition: The hexadecimal number system has a base of 16, using digits from 0 to 9 and letters A to F (where A=10, B=11, C=12, D=13, E=14, F=15).

Examples : 1F4 (in hexadecimal) = $1\times16^2 + 15\times16^1 + 4\times16^0 = 256 + 240 + 4 = 500$ (in decimal).