I - ASSIGNMENT

(Start Writing From Here)

1) Differentiate between Analog and Digital System. What are advantages of Digital System

Analog System	Digital System
* Analog signal represents physical measurements	* Digital Signals are discrete and generated by digital Modulation
* Represented by sine waves	* Represented by square waves
* Signal values can take any value within a range, providing a smooth and continuous, representation	* Signal values are discrete and Quant -ized, allowing for precise represent- -ation and manipulation
* Prone to interference and noise, which can disorde signal during transmission	* More resilent to noise due to discrete nature of signals and error correction mechanism can be employed
* Faces challanges in long distance tran -smission and may require amplification. Storage can be less efficient	* Allow for efficient long distances transm -ission and storage, with minimal signal degradation and easy replication
* Manipulating analog signal can be computex and precision may be challenging	* Enables precise manipulation, process -ing and analysis of data facilitating advanced computations

* Requires specialized equipment for signal processing and condition -ing	* enables precise manipulation, processi -ng and analysis of data facilitating advanced computations
* Multiplexing and Demultiplexing can be challenging due to the continuous nature of signals	* facilities efficient multiplexing and demultiplexing, enhancing communication in complex systems
* Costs can be higher for certain applic -ations and efficient may vary	* Often costs effective with high efficiency in data representation, transmission and processing
* Uses : Best suited for audio and video transmission	* Uses : Best suited for computing and digital electronics

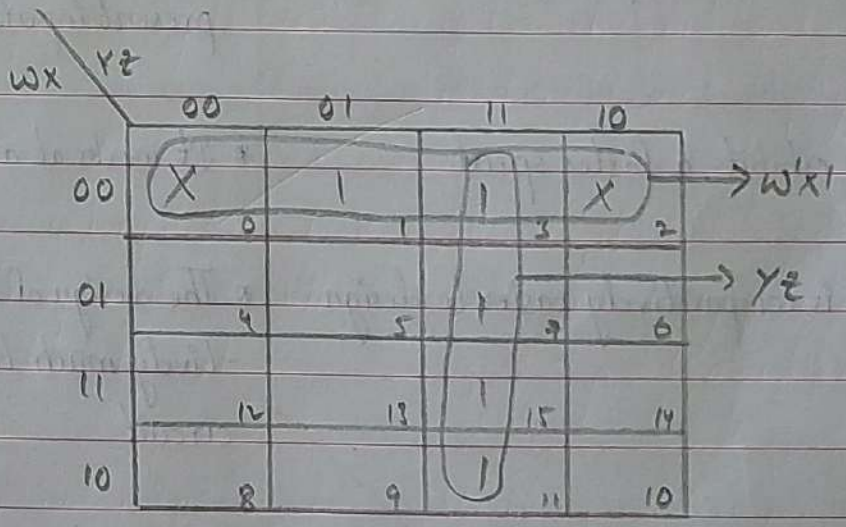
Advantages of Digital System

* Reproducibility of the results and accuracy
* ease of design : No special math skills needed to visualize the behaviour of small digital circuits
* Flexibility and functionality
* programmability
* Speed : A digital logic element can produce an output in less than 10 nano seconds (10^{-8} sec)

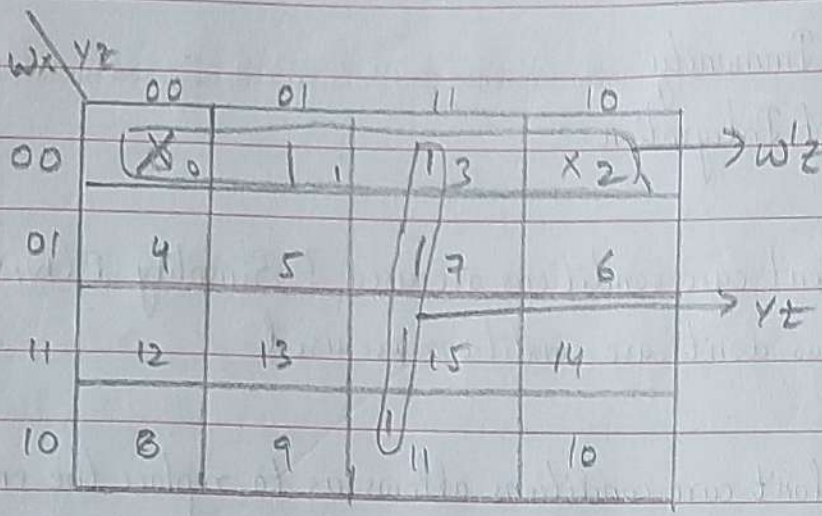
* Noise Immunity
* Ease of Integration

2) Why don't care conditions are used ? Simplify $F(w,x,y,z) = \Sigma(1,3,7,11,15)$ which has don't care conditions are used

ans:- * The don't care conditions allows us to replace the empty cell of K-map to form a grouping of variables which is larger than that of forming groups without don't care
* while forming groups of cells, we can consider a "Don't Care" as 1 or 0 or we can also ignore that cell
* A Don't care cell can be represented by cross (X) or minus (-) or phi (ϕ)
* To decrease min terms we use don't care $\Sigma(w,x,y,z) = \Sigma(1,3,7,11,15) + d(0,2,5)$.



$F = w'x' + yz$



3) Differentiate between combinational logic and Sequential logic. List some applications of Sequential logic.

Combinational Circuit	Sequential Circuit
* The output of a combinational circuit depends entirely on presents input	* The output of a sequential circuit depends on both part as well as present inputs
* It exhibits a faster speed	* It works at a comparitively slower speed
* It is comparitively easier to design	* The design of these circuits is compari-tively much tougher than combinational circuit
* No feedback is present between the Input and Output	* A feedback path exists between the output and inputs

* Combinational circuit depends on time	* The circuit is time dependent
* Logic gates form the building blocks of Such circuits	* Flip-flops constitute the building blocks of such a circuits
* One can make use of it for both boolean and arthematic operations	* People mainly use them for storing data and information
* These circuits don't have a clock, they don't requires triggering	* This circuits depends on a clock, It usually requires triggering
* They don't possess any memory element	* They always possess memory element
* User can feasibly use as well as handle them	* A user mayn't be able to handle and use these circuits easily
eg:- Demultiplexer, encoder, decoder etc.	eg:- Counters, Flip flops, latches

Applications of Sequential logic circuits

* Shift registers
* Flip flops

* Analog to Digital and digital to Analog converters
* Counters
* Clocks
* Used as Registers inside microprocessors and controllers to store temporary information
* Data Storage

4) Describe BCD to excess-3 code conversion with truth table and logic diagram

ans:- BCD digit can be controlled converted to its corresponding excess-3 code by simply adding 3 to it

The conversion of BCD to excess-3 code is performed as per following steps

step-1 : Take given BCD code

step-2 : Add (0011)$_3$ to each BCD code to obtain its equivalent excess-3 code

step-3 : Combine the excess-3 codes of each BCD code to obtain complete excess-3 code for given BCD number

(i) 0

Binary of 0 → 0000

add 3 → 0011

0011 → excess-3 code

(ii) 1

1 → 0001

add 3 → +0011

0100

(iii) 2

→ 0010

3 → +0010

0101

(iv) 3

0011

+0011

0110

(v) 4

4 → 0100

3 → 0011

0111

(vi) 5

5 → 0101

3 → 0011

1000

(vii) 6

6 → 0110

3 → 0011

1001

(viii) 7

7 → 0111

3 → 0011

1010

(ix) 8

8 → 1000

3 → 0011

1011

(x) 9

9 → 1001

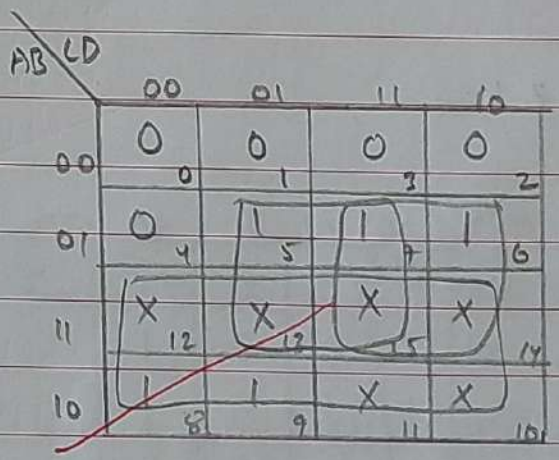
3 → 0011

1100

Truth Table

Decimal Numericals	BCD Input							
Decimal	B_3	B_2	B_1	B_0	E_3	E_2	E_1	E_0
0	0	0	0	0	0	0	1	1
1	0	0	0	1	0	1	0	0
2	0	0	1	0	0	1	0	1
3	0	0	1	1	0	1	1	0
4	0	1	0	0	0	1	1	1
5	0	1	0	1	1	0	0	0
6	0	1	1	0	1	0	0	1
7	0	1	1	1	1	0	1	0
8	0	0	0	0	1	0	1	1
9	1	0	0	1	1	1	0	0

K-map for E_3 or (W)



E_3 (or) $W = A + BC + BD$ (or) $B_3 + B_2 (B_1 + B_0)$

K-map for E_2 (or) X :-

AB \ CD	00	01	11	10	
00	0	1	1	1	$\bar{B}C$
01	1	0	0	0	
11	X	X	X	X	
10	0	1	X	X	

$B\bar{C}\bar{D}$

E_2 (or) $X = B\bar{C}\bar{D} + \bar{B}C + \bar{B}D$

K-map for E_1 (or) Y :-

AB \ CD	00	01	11	10
00	1	0	1	0
01	1	0	1	0
11	X	X	X	X
10	1	0	X	X

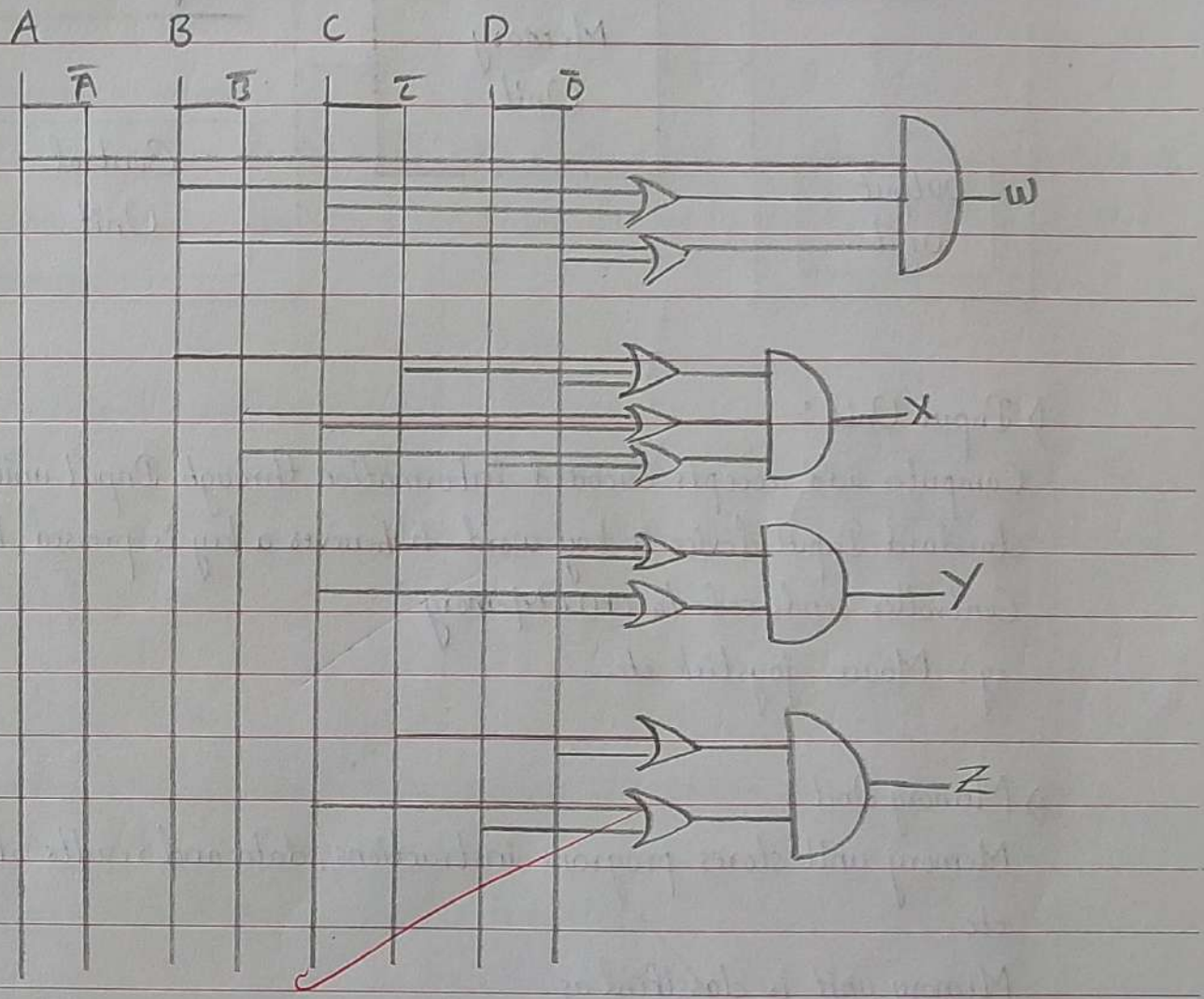
E_3 (or) $Y = \bar{C}\bar{D} + CD$

K-map for E_0 (or) Z :-

AB \ CD	00	01	11	10
00	1	0	0	1
01	1	0	0	1
11	X	X	X	X
10	1	0	X	X

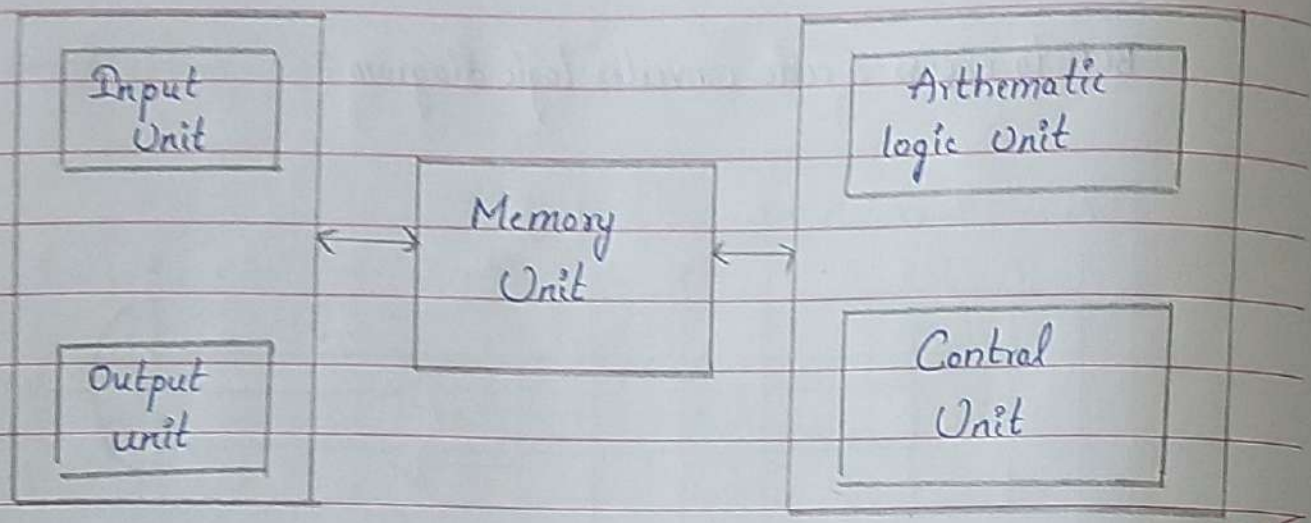
E_0 (or) $Z = \bar{C}\bar{D} + C\bar{D}$

BCD to excess-3 code converter logic diagram :



5) Explain about functional units of basic computer

ans: Functional unit : A computer in its simplest form compress five functional units namely input unit, out put unit, memory unit, Arthematic and logical unit and control unit



1) Input Unit :-

Computer add accepts encoded information through Input unit. The standard Input device is key coord. Whenever a key is pressed, keyboard, Controller sends code to CPU / Memory

eg :- Mouse, joystick etc...

2) Memory Unit :-

Memory unit stores program instructions, data and results of computations etc...

Memory unit is classified as

(i) Primary / Main Memory

(ii) Secondary / Auxilary Memory

Primary memory

* ROM (Read Only Memory) holds system programs and firm ware routines such as BIOS, POST

* RAM (Random Access Memory) is termed as write/read memory or user memory that holds runtime program Instructions and data

Secondary memory

* It is a storage device that CPU can't access directly. It is a permanent storage device. The CPU access these devices through out input/Output channel

3) Arthematic and Logic Unit

ALU Consists of necessary logic circuits like adder, comparator etc.., to perform operations of addition, subtraction, multiplication, comparision of 2 numbers etc..

4) Output Unit

Computer after computation returns the computed results, error message etc, via output unit

The standard output devices is a video

5) Control Unit

Control unit co-ordinates activities of all units by issueing control signals. Control signals issued by control unit govern the data transfers and then appropriate operations takes place