ABDUL RAFEH CSC-20S-104 Digital & Logic Design
Instructor :- Mr. Haque Nawaz Lashari.

LECTURE # 01

Summary:-

lecture #1 Started from the introduction b/w Teacher & Student's after introduction teacher told us about Subject Digital & logic Design. In Subject Introduction Started from course objectives. in Course objective we learned this digital & logic design Course for us basic concepts clearing for digital Circuits. this Course basically for computer architecture. after that Course description in Course description we learned an overview of Digital & Logic design Subject in this Subject also we learned about number System, logic gates, Digital Circuit and Much more like Boolean Algebra and logic Simplification. after that will overview of Course learning outcomes Means after learned Subject digital & logic Design we are able to do:_ Identify circuits, Know about to design the digital logic circuits, how logical gates Used to a design Circuit and last we also able to how to design and implement of digital logic Circuit and its applications. then we go through of Course Contents Based on 15 weeks In Course Content we overview of the Topics which we learned in the next coming weeks.

And also in Course Contents we discuss about LAB works and LAB manual after that teacher ~~will~~ gave us Some text and references book's name for our knowledge increament and Course covering helps. Course goals after 15 weeks of lecture and lab work we have knowledge of basic electronics and also Electronic devices operations. after all of that we discuss with teacher about Attendence, Quizes, Assignments and lab manual. And last Introduction of digital logic design in introduction will go through of basic thing of digital logic design like what is DLD So digital logic design is a System in electrical and Computer engineering that uses Simple values to produced Input and Output operations. where is use of digital logic design So DLD Used to develop hardware, Such as Circuit boards and Microprocessors. This hardware processes User inputs, System protocol and other data in Computers, navigational System, cells phones or other high-tech System.

LECTURE # 02

Summary:-

Lecture # 02 we started from end to lecture # 01 after introduction of digital logic design we started learning briefly digital logic design. Digital logic represent of signals and sequences of a digital circuit through number and how circuit and hardware communicate within computer. logic gates have two inputs and one output. like we know digital logic design is a system in electrical and computer engineering also digital logic is rooted in binary code, which renders information through zeroes and ones, giving each number in binary code an opposite value. The design of electronic circuits that convey information, including logic gates with function that include AND, OR, and NOT commands. after that we learned about digital logic applications. In applications of digital logic we learned Digital logic design forms the foundation of electrical engineering and computer engineering. DLD build complex electronic components that use both electrical and computational characteristics. Digital hardware logic circuit are used to build computer hardware as well as other digital hardware's product. 1960's and 1970's revolution in digital capability. like Smaller transistors, larger chip Size they need greater functionality, but requires more complexity in the the design process. The integrated Circuits fabricated on Silicon wafers. wafers cut & packed to form individual chips. chips have from tens to Millions of transistors. Design approaches how will design a circuit with using highly used CAD Software in that Software have mathematical model, analytical approach and very used ful to use for real problem. we learned also why we learn/study Digital logic so here it is for Knowledging digital logic design when one designs new CPU's programs so how we know to connects those Components to other digital chips. Digital electronic circuit are usually made from large assemblies of logic gates. So after lecture #2 I'm able to understand how we are work with circuit using Digital logic and know about for basic seven logic gates and advantages of digital circuit, Design issues digital circuit and last we learned about the digital circuit construction like output logic gate is an electrical flow of voltage that can control more logic gates. and also learned about of design a circuit using CAD and other tools.

LECTURE # 03

Summary:-

Lecture # 03 we learned new topic Digital and Analog Quantities in this topic started from Analog have Continuous values & Digital quantities have discrete Set of values we Understand both quantities through Graph Charts. Then we learn about Analog Quantities like many example we have but in this Summary I'M mentioned Some quantities that we Measure nature for example: Intensity of light, Temperature, Velocity & Basic audio public address System all these example also available in our lecture # 03 which given by a instructor. Then we Move ward to the Continue Signal and Understand Using chart diagram so what is a Continuous Signal or a Continuous-time Signal is best example is temperature. difference b/w continuous and discrete Signal, A Signal of which a Sinusoid is only one example, is a Sequence of numbers. A Continuous-time Signal is an infinite and uncountable Set of numbers, as are the Possible values each number Can have. Then we discuss about digital quantities so digital values on the other hand are a discrete Set of values which represent the actual Continuous Signal example. Personal Computer, Laptops, Mobiles Phones and so many digital

Quantities_ Digital Representation the reconstructed Continuous Signal does not give an exact replica of the original, it has Sharp edges and Corners in Contrast to the original Signal which has Smooth Curves_ Digital System Use electronic Circuity that only works with two levels. The two Voltage level represents two states. A value near the Supply voltage represent logic high or logic 1 State and a reference Value at 0 voltage level or ground which represent logic low or Logic 0 state_ The two levels Can be represented as:-

Two State:- * Number 0/1 * Black/white
* On/OFF * Hot/Cold
* Stationary/Moving_

Also we learned about Binary Digits and logic levels Binary, a Signal number is called a bit (for binary digit). A bit can have a value of either a 0 or 1, depending on if the voltage is HIGH or Low_ and last we learned about the digital wave forms_ A waveform Representing the two State of a Boolean value (0 & 1), (low & high) & (True & false) is reffered to as a digital Signal or binary Signal when it is interpreted in terms of only two possible digits_

LECTURE # 04

Summary:-

Lecture # 04 we learned how to Convert a binary number with different Conversion for Conversion what we learned in this lecture I'm mentioned in below and every Conversion of Answers. So we are able after taking lecture # 04 for conversion of binary numbers. Total lecture # 04 we learned Six number of Conversion mentioned below.

1) Decimal to Binary Conversion.
2) Decimal to octal Conversion.
3) Decimal to Hexadecimal Conversion.
4) Binary to Decimal Conversion.
5) Octal To Decimal Conversion.
6) Hexadecimal to Decimal Conversion.

1) Decimal to Binary:- $(303)_{10} = (?)_2$

2	303	
2	151	1
2	75	1
2	37	1
2	18	1
2	9	0
2	4	1
2	2	0
	1	0

$(303)_{10} = (100101111)_2$ Ans

2) Decimal to Octal :- $(3026)_{10} = (?)_8$

8	3026	
8	378	2
8	47	2
	5	7

$(3026)_{10} = (5722)_8$ Ans

3) Decimal to Hexadecimal :- $(2509)_{10} = (?)_{16}$

16	2509	
16	156	13
	9	12

$(2509)_{10} = (9CD)_{16}$ Ans

4) Binary to Decimal :- $(1110011)_2 = (?)_{10}$

$$(1\times2^6)+(1\times2^5)+(1\times2^4)+(0\times2^3)+(0\times2^2)+(1\times2^1)+(1\times2^0)$$

$$64 + 32 + 16 + 0 + 0 + 2 + 1$$

$(1110011)_2 = (115)_{10}$ Ans

5) Octal to Decimal :- $(3502)_8 = (?)_{10}$

$$(3\times8^3)+(5\times8^2)+(0\times8^1)+(2\times8^0)$$

$$1536 + 320 + 0 + 2$$

$(3502)_8 = (1858)_{10}$ Ans

6) Hexadecimal to Decimal :-

$(5A9)_{16} = (?)_{10}$

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$$(5 \times 16^2) + (A \times 16^1) + (9 \times 16^0) \qquad \{A = 10\}$$

$$1280 + 160 + 9 = 1449$$

$$= (5A9)_{16} = (1449)_{10} \text{ Ans}$$

So in lecture # 04 we are able to solve number system Conversion as I mentined six Conversion.

LECTURE # 05

Summary:-

Lecture #5 also we Convert more six number System Conversion. Six number System Conversion Mentioned Below.

1) Binary To Octal Conversion.
2) Binary to Hexadecimal Conversion.
3) Octal to Binary Conversion.
4) Hexadecimal to Binary Conversion.
5) Octal to Hexadecimal Conversion.
6) Hexadecimal to Octal Conversion.

1) Binary to Octal Conversion:- $(10011011)_2 = (?)_8$

$$\underline{010}\ \underline{011}\ \underline{011}$$
$$2 \quad 3 \quad 3$$

$$(10011011)_2 = (233)_8$$

2) Binary to Hexadecimal :- $(11100100101)_2 = (?)_{16}$

0111 0010 0101
7 2 5

$(11100100101)_2 = (725)_{16}$ Ans.

3) Octal to Binary :- $(7001)_8 = (?)_2$

7 0 0 1
111 000 000 001

$(7001)_8 = (111000000001)_2$ Ans

4) Hexadecimal to Binary :- $(100AC)_{16} = (?)_2$

1 0 0 A C
0001 0000 0000 1010 1100

$(100AC)_{16} = (00010000000010101100)_2$ Ans

5) Octal to Hexadecimal :- $(345)_8 = (?)_{16}$

3 4 5
011 100 101

011100101 = E5
14 5

$(345)_8 = (E5)_{16}$ Ans

6) Hexadecimal to Octal :- $(A0FC)_{16} = (?)_8$

A 0 F C = 1010000011111100
1010 0000 1111 1100

001	010	000	011	111	100
1	2	0	3	7	4

$(A0FC)_{16} = (120374)_8$ Ans

So in lecture # 05 we are able to Solve More different types of number System Conversion_

LECTURE # 06

Summary:-

Lecture # 06 we learned about theory of number Systems. A decimal number System Such as 7392 represents a quantity equal to 7 thousand plus 3 hundered plus 9 tens, plus 2 units. The thousands, hundereds etc are powers of 10 implied by the position of Co-efficients. To be more exact, 7329 Should be written as; $7\times10^3 + 3\times10^2 + 9\times10^1 + 2\times10^0$.

Binary number its co-efficients have to possible values i,e 0 and 1 each Co-efficient (a_j) is multiplied of 2^j. for e.g the decimal equivalent of binary number 11010.11 is:

$1\times2^4 + 1\times2^3 + 0\times2^2 + 1\times2^1 + 0\times2^0 + 1\times2^{-1} + 1\times2^{-2} = (26.75)_{10}$

Also we learned in binary Conversion So Binary Conversion Concept Clear in lecture # 04 & 05 So now we continue to complement & Binary addition & Multiplicat, Subtraction_ 1's Complement of a Binary number is another binary number obtained by toggling all bits in it. ie transforming the 0 bit to 1 and the 1 bit to 0.

Binary Addition is close to the Common addition (decimal addition), with change that it has a value of 2 equivalent of 10. for example: If you added 8+2 in decimal addition your answer is 10, when you write a 10 number; that allows a digit 0 and carry of 1 in a Second number. Addition example blew;

$$\begin{array}{rrrrrr} & {}^{1}1 & {}^{1}1 & {}^{1}1 & {}^{1}0 & 1 \\ + & 1 & 1 & 0 & 1 & 1 \\ \hline 1 & 1 & 1 & 0 & 0 & 0 \end{array}$$

Binary Subtraction is perform 4 binary operations and Simply borrow 1 digit to the next digits. floating point equation is proposed of representing very large or Small number by Using of mathematical representation. a Single 32-bit integer number is explained. Hexadecimal number the first Ten digits are borrowed from the decimal System. The letter A, B, C, D, E and F are used for digits 10, 11, 12, 13, 14 and 15 respectively example;

$$= 11\times16^3+6\times16^2+5\times16^1+15\times16^0$$

$$= (46687)_{10}$$

Singned binary numbers Show that they are describible both positive and negative number. The Sign is defined by the most important bit. It uses three primary Signed binary number Codes.

LECTURE # 07

Summary:-

lecture # 07 we learned about some coded like BCD, Grey Code, ASCII and other's. I'll discuss all those in the lecture# 7 Summary-
BCD stands for binary coded decimal. BCD is method of computing number for a decimal (base-10) number, applies a 4 digit binary code to every digit 0 to 9, its positional weigh is 8,4,2,1.

Decimal	Binary	BCD
0	0000	0000
1	0001	0001
2	0010	0010
3	0011	0010
4	0100	0100
5	0101	0101

Grey Code an unweighted digital code characterized by a single bit change between adjustant code numbers in a sequence.

Decimal	Binary	Grey Code
0	0000	0000
1	0001	0001
2	0010	0011
3	0011	0010
4	0100	0110
5	0101	0111
6	0110	0101

The ASCII code is an alphanumeric code which is used in digital System for data exchange. The ASCII Code is a 7 bit Code that Can define 27 or 128 different character numbers. The ASCII Code is Constructed by a group of 3 bits and joi-ned by a 4-bit Code_ The ASCII code is an alphanumeric Code of 7 or 8 bits_ Then Comes to a parity bit is an extra bit included in the binary text to allow whether odd or even parity the overall number of 10_ Even Parity the Conduction of 1's in every group of bits_ odd parity the Conduction of 1's in every group of bits_ Cycling Redundancy Check an error-detecting code widely used in digital net-works and Storages devices to detect unexpected modification to actual data is a Cycling redundancy Check (CRC)_ A quickly test quantity is applied to bits of information Joining these Systems based on the duration of a polyno-mial division of our objects_

LECTURE # 08

Summary:-

lecture # 08 we learned about the logic gate so all gates I'll Summarize in this Summary.

The inverter:- Digital electronic devices perform at the rate of Specific voltage relating to a logical 0 or 1. The Simple logic gate to Convert in between 2 Supply voltages works as an inverter circuit Application defines the real Volts, but your TIL Connections, Common rate including (0, +5V). The AND gate is a logic circuit having two or more inputs and one output. The output of an AND gate is high only when all of its inputs are in the high State in all other Cases, the output is low. The OR gate is a logic circuit having 2 or more input and one output. An OR gates input is one if and only if atleast 1 of its input is one. The NAND gates is the Complement of AND gates. Its output is 1 if atleast one of the input is 0. This gates performs the Same logic as an AND gate followed by an inverter. The NOR gate is the Compliment of OR gate Its output are 0. This gate performs the Same logic as the OR gate followed by an inverter. The XOR gate is an exclusive OR gate, which means the outputs are logic. 1 Because that is a characteristic of an AND gate. This is the property Shared by the AND. OR gate. So in order to make the OR gate exclusively an OR gate the output when all the input are 1 is

2no for XOR gate. The XNOR gate is just inverted XOR gate. The XNOR Junction is also called equivalent function.
Fixed function logic belongs to digital logic gates, such as an AND gate. 7408 quad 2-input, the Using digital logic in a Specific System rather than that may include many logic devices. The programmable logic array (PLA) is a Constant logic Structure System Supported by programmable OR gates with programmable AND gates. Simply, PLA is a form of Programmable logic System used to Construct digital modular Circuits. PLA is a mixture of memory and logic.

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