

<b>Department /Institute Name</b>	Department of Electronics & Electrical Engineering/ Chitkara University Institute of Engineering & Technology		
<b>Program Name</b>	B.E.(Computer Science and Engineering)		
<b>Course Code</b>	ECL4207		
<b>Course Name</b>	Digital Electronics and Logic Design		
<b>Lecture/Tutorial (per week)</b>	3-1-0	<b>Course Credits</b>	4
<b>Course Coordinator Name</b>	Ms. Meenu Garg		

**1. Scope and Objectives of the Course**

- To obtain a basic level of Digital Electronics knowledge and set the stage to perform the analysis and design of complex digital electronic circuits.
- To implement **simple logical operations** using Combinational logic circuits and to understand common forms of **number representation**.
- To understand the concepts of **sequential circuits** to enabling them to analyze sequential systems in terms of **state machines**
- To implement synchronous state machines using flip flops.

**2. Recommended Books**

**RB1:** Anand Kumar, Fundamentals of digital circuits, 2<sup>rd</sup> Edition, PHI.

**RB2:** Thomas L. Floyd, 10<sup>th</sup> Edition, Digital Fundamentals, Pearson Publications.

**RB3:** M. Morris Mano, Digital Design, 4.ed., Prentice Hall of India Pvt. Ltd., New Delhi, Sixth impression  
Pearson Education (Singapore) Pvt. Ltd., New Delhi.

**RB4:** Donald P. Leach and Albert Paul Malvino, Digital Principles and Applications, 5<sup>th</sup> Edition, Tata McGraw  
Hill Publishing Company Limited, New Delhi, 2003.

**3. Other readings and relevant websites**

S. No.	Link of Journals, Magazines, websites and Research Papers	Lecture No.
1	<a href="http://www.cl.cam.ac.uk/teaching/0708/DigElec/">http://www.cl.cam.ac.uk/teaching/0708/DigElec/</a>	A complete source guide from lecture 1 to 36.
2	<a href="http://nptel.ac.in/courses/117106086/">http://nptel.ac.in/courses/117106086/</a>	Lecture No. 7-9
3	<a href="https://www.youtube.com/watch?v=y2_CJ49C5UE">https://www.youtube.com/watch?v=y2_CJ49C5UE</a>	Lecture No. 17-22

**4. Course Plan**

Lect. No. (Hour)	Topics	Recommended Book
1	<b>Introduction to Digital Concepts:</b> Digital and Analog systems, logic levels & Pulse waveform. <a href="https://www.youtube.com/watch?v=CeD2L6KbtVM&amp;noredirect=1">https://www.youtube.com/watch?v=CeD2L6KbtVM&amp;noredirect=1</a> <b>Logic Gates:</b> And Gate, OR Gate, Not gate, Universal Gates, Exclusive-OR gate, Exclusive-NOR gate.	RB1 RB2 RB1
2	<b>Number systems:</b> Decimal number system, Binary number system. Representation of signed numbers. Octal number system, Hexadecimal number system. <a href="http://web.iitd.ac.in/~shouri/eel201/PDFs/eel201Jul28.pdf">http://web.iitd.ac.in/~shouri/eel201/PDFs/eel201Jul28.pdf</a>	RB1 RB2
3	<b>Binary codes:</b> Classification of binary codes. 8421 BCD code, Excess three code, Gray code. Error detecting codes: Parity, checksum, block parity. Error correcting codes: 7 bit Hamming code Alphanumeric codes: ASCII code	RB1 RB2
4	<b>Boolean algebra:</b> Laws of Boolean algebra and De Morgan's Theorem. Minimization of Boolean expression. Boolean expression and logic diagram, converting AND/OR/Invert Logic to NAND/NOR logic.	RB1 RB2
5-6	Boolean Functions and their representation: Sum of Product (SOP), Product of Sum (POS), canonical forms.	RB1
7-9	Karnaugh map (upto 5 variable) <a href="http://nptel.ac.in/courses/117106086/8">http://nptel.ac.in/courses/117106086/8</a>	RB2
10	Q-M method of minimization	RB1
11	<b>Combinational circuit:</b> <b>Arithmetic circuits</b> Binary Adders & Subtractors (half, Full, parallel)	RB1
12-13	Magnitude Comparator: Multiplexer and Demultiplexer	RB1
14-15	Encoder, Priority encoder, Decoder, Code Converters	RB1
16	Parity bit generators and checkers	RB1
<b>ST1 (Syllabus Covered from Lecture 1 to 16)</b>		

17-22	<b>Sequential circuits:</b> Classification of sequential circuits, Flip flops SR, JK, T, D, Race around condition and Master slave flip flops Flip flop excitation table, Conversion of flip flops. <a href="https://www.youtube.com/watch?v=y2_CJ49C5UE">https://www.youtube.com/watch?v=y2_CJ49C5UE</a>	RB1 RB2
23-24	<b>Shift Registers:</b> SIPO, SISO, PISO and PIPO.	RB1 RB2
25-28	<b>Counters:</b> Asynchronous counters, design of asynchronous counters, effects of propagation delay in ripple counters, synchronous counters. Shift register counter: Ring counter and Johnson counter.	RB1 RB2
<b>ST2 (Syllabus Covered from Lecture 17 to 28)</b>		
29-30	<b>Digital IC families(DTL,TTL,ECL,MOS and CMOS):</b> Comparison in terms of threshold voltage, Propagation delay, power dissipation, Fan in ,Fan out, voltage and current parameters, Noise margin, operating temperature and speed power product . Logic families. <b>D/A Converter and A/D converters:</b> Introduction, Digital to analog conversion, R-2R DAC, weighted resistor DAC	RB1 RB1
31-32	A/D Converter: Analog to digital conversion using Successive approximation method, Dual slope method.	RB1
33-34	<b>Semiconductor Memories :</b> program and data memory, memory types and terminology, SRAM and DRAM	RB1 RB2
35-36	<b>Programmable Logic Devices:</b> ROM, PAL, PLA, PROM	RB1
<b>ST3 (Syllabus Covered from Lecture 1 to 36)</b>		

### 5. Evaluation Scheme:

Component 1*	Two Subjective Sessional Exams*	40
Component 2**	End Term Examination**	60
	<b>Total</b>	<b>100</b>

\* There are three Sessional Tests (STs) for all theory papers, the average of best two will be considered.

\*\* The End Term Comprehensive examination will be held at the end of semester. The mandatory requirement of 75% attendance in all theory classes is to be met for being eligible to appear in this component.

**6. Syllabus with weightage**

Contents	Lectures	Weight age
<p><b>Introduction to Digital Concepts:</b> Digital and Analog systems, logic levels &amp; Pulse waveform.</p> <p><b>Logic Gates:</b> And Gate, OR Gate, Not gate, Universal Gates, Exclusive–OR gate, Exclusive-NOR gate</p> <p><b>Number systems:</b> Decimal number system, Binary number system, Representation of signed numbers, Octal number system, Hexadecimal number system.</p> <p><b>Binary codes:</b> Classification of binary codes, 8421 BCD code, Excess three code, Gray code, Error detecting codes: Parity, checksum, block parity, Error correcting codes: 7 bit Hamming code, Alphanumeric codes: ASCII code</p>	<b>3</b>	<b>14%</b>
<p><b>Boolean algebra:</b> Laws of Boolean algebra and, De Morgan’s Theorem, Minimization of Boolean expression, Boolean expression and logic diagram, converting AND/OR/Invert Logic to NAND/NOR logic, Boolean Functions and their representation: Sum of Product (SOP), Product of Sum (POS), canonical forms, Karnaugh map (upto 5 variable), Q-M method of minimization.</p>	<b>7</b>	<b>22%</b>
<p><b>Combinational circuit:</b> <b>Arithmetic circuits:</b> Binary Adders &amp; Subtractors (half, Full, parallel), Magnitude Comparator, Multiplexer and Demultiplexer, Encoder, Priority encoder, Decoder, Code Converters, and Parity bit generators and checkers.</p>	<b>6</b>	<b>17%</b>
<p><b>Sequential circuits:</b> Classification of sequential circuits, Flip flops SR, JK, T, D, Race around condition and Master slave flip flops, Flip flop excitation table, Conversion of flip flops.</p> <p><b>Shift Registers:</b> SIPO, SISO, PISO and PIPO.</p> <p><b>Counters:</b> Asynchronous counters, design of asynchronous counters, effects of propagation delay in ripple counters, synchronous counters, and Shift register counter: Ring counter and Johnson counter.</p>	<b>12</b>	<b>25%</b>
<p><b>Digital IC families(DTL,TTL,ECL,MOS and CMOS):</b> Comparison in terms of threshold voltage, Propagation delay, power dissipation, Fan in ,Fan out, voltage and current parameters, Noise margin, operating temperature and speed power product . Logic families.</p> <p><b>D/A Converter and A/D converters:</b> Introduction, Digital to analog conversion, R-2R DAC, weighted resistor DAC, A/D Converter: Analog to digital conversion using Successive approximation method, Dual slope method.</p> <p><b>Semiconductor Memories:</b> Program and data memory, memory types and terminology, SRAM and DRAM.</p> <p><b>Programmable Logic Devices:</b> ROM, PAL, PLA, PROM.</p>	<b>8</b>	<b>22%</b>
	<b>36</b>	<b>100%</b>

Designation	Name	Signature
Course Coordinator	Ms. Meenu Garg	
Program Incharge	Mr. Gurjinder Singh	
Deputy Dean	Ms. Shivani Malhotra	
Date	December 26, 2017	