DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE			
Course Title	**Digital Electronics**		
Course Code	**ICPC 15**	**No. of Credits**	**3**
Department	**ICE**	**Faculty**	**Dr. D. Ezhilarasi**
Pre-requisites Course Code	**Basic level course on electron devices and Basic algebra**		
Course Coordinator(s) (if, applicable)	**NA**		
Other Course Teacher(s)/Tutor(s) E-mail		**Telephone No.**	**9444878908**
Course Type	■ **Core course**		

COURSE OVERVIEW

This course covers combinational and sequential logic circuits. Topics include number systems, Boolean algebra, logic families, medium scale integration (MSI) and large scale integration (LSI) circuits, analysis and design of combinational and sequential circuits. Upon completion, students should be able to construct, analyze, verify, and troubleshoot digital circuits using appropriate techniques and test equipment.

COURSE OBJECTIVES

The subject aims to provide the student with
1) An understanding of number system, codes and their conversions
2) The capability to reduce Boolean expression using K-map and tabular methods
3) The ability to design and analyze combinational and sequential logic circuits for a given problem statement.
4) An understanding of Digital hardware and different types of logic families

COURSE OUTCOMES (CO)

Students will:
1.Understand how digital and logic computing is built from the fundamentals of semiconductor electronics and learn the capability to use abstractions to analyze and design digital electronic circuits
2. Gain knowledge on the basic logics and techniques related with digital computing
3. Develop expertise to design and implement various complicated digital systems to be applicable for signal measurement and processing

Course Outcomes	**Aligned Programme Outcomes (PO)**
1. Understand how digital and logic computing is built from the fundamentals of semiconductor electronics and learn the	1.would have developed an ability to apply the knowledgeof mathematics, sciences, and engineering fundamentals to the field of

capability to use abstractions to analyze and design digital electronic circuits **2.** Gain knowledge on the basic logics and techniques related with digital computing **3.** Develop expertise to design and implement various complicated digital systems to be applicable for signal measurement and processing	instrumentation & control. 2. would have possessed a comprehensive understanding of a wider range of electronic devices, analog and digital electronic circuits and the state-of-the-art advanced electronic systems invariably found in every measurement and instrumentation system 3. would have recognized the need for engaging themselves in independent and life-long learning in the broadest context of technological change

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Hours	Topic	Mode of Delivery
1	12 hours	Review of number systems and logic gates, Algebraic reductions, Binary codes **-**Weighted and non-weighted, number compliments, Binary arithmetic, Error detecting and error correcting codes, SOP, POS Canonical logic forms, Karnaugh maps and Quine-McClusky methods, Don't care conditions, minimization of multiple output functions.	Chalk and talk
2	8 Hours	Synthesis of combinational functions: Arithmetic circuits-Adder/Subtractor, carry look-ahead adder, signed number addition and subtraction, BCD adders. IC adders. Multiplexers, implementation of combinational functions using multiplexers, de-multiplexers, decoders, code converters, Digital ICs for combinational logic circuits, Complexity and propagation delay analysis of circuits.	Chalk and talk
3	8 Hours	Sequential Logic: Basic latch circuit, Debouncing of a switch, Flip-Flops: truth table and excitation table, conversion of Flip-flops, integrated circuit flip-flops. Race in sequential circuits, Shift Registers, Counters - Synchronous, Asynchronous, Up-Down, Design of counters.	Chalk and talk
4	8 Hours	Analysis of clocked sequential circuits, Design with state equations, Moore and Mealy graphs, State reduction and assignment ,Sequence detection, Hazards. Programmable logic devices,Design using Programmable Logic Devices (ROM,PLA,PAL,FPGA).	Chalk and talk
5	8 Hours	Digital Hardware: Logic levels, Digital integrated circuits, Logic delay times, Fan-Out and Fan-In, Logic families, Interfacing between different families. CMOS Electronics: CMOS electronics and Electronic logic gates, The CMOS inverter, Logic formation using MOSFETs, CMOS memories.	Chalk and talk

COURSE ASSESSMENT METHODS				
S.No.	**Mode of Assessment**	**Week/Date**	**Duration**	**% Weightage**
1	Test-1	4th week of August	1 hour	20%
2	Test-2	1st week of October	1 Hour	20%
3	2- Assignments	Month end(Sept, Oct)		10%
4	Exam	1st week of November	3 Hours	50%

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. M.M. Mano, Logic and Computer Design Fundamentals ,Pearson, 4thEdition, 2014
2. Floyd, Digital Fundamentals, 4th Edition, Universal Book Stall, New Delhi, 1992.
3. J.P. Uyemura, A First Course in Digital Systems Design, Brooks/Cole Publishing Co.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

Written feedback from students
Students' performance in test
Problem solving ability from assignments

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

80% attendance must
Passing minimum is 40 out of 100

ADDITIONAL COURSE INFORMATION

The Course Coordinator is available for consultation at any time during office hours.
Queries may also be emailed to the Course Coordinator directly at ezhil@nitt.edu

FOR SENATE'S CONSIDERATION

Course Faculty _____ CC-Chairperson _____ HOD _____