COURSE CODE	COURSE TITLE	L	T	P	C
1151CS104	DIGITAL ELECTRONICS	3	0	0	3

Course Category: Program Core

A. Preamble:

The primary aim of this course is to understand the fundamentals behind the digital logic design. From that students can gain the experience, to design any digital circuits and systems. The course includes fundamentals of Boolean algebra, combinational, sequential circuits and applications of digital electronics. Students can learn the basic programming concepts to implement digital circuits using hardware description language.

B. Prerequisite Courses:

Sl. No	Course Code	Course Name
1	1150EE302	Basic Electronics Engineering

C. Related Courses:

Sl. No	Course Code	Course Name
1	1151CS110	Computer Organization and Architecture
2	1151CS116	Microprocessor and Microcontroller
3	1151CS118	Microprocessors and Controllers

D. Course Outcomes:

Students undergoing this course are able to:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Apply the simplification of Boolean expressions using K – Map method and designing Combinational circuits.	K3
CO2	Outline the combinational building blocks & memory elements.	K2
CO3	Design the combinational and sequential circuits using hardware description language.	K3
CO4	Solve the asynchronous sequential circuits for given applications	K2
CO5	Explain the applications of digital electronics	K2

E. Correlation of COs with Programme Outcomes:

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	H	M			M					L			H		L
CO2	M	M			M					L			L		
CO3	H			M	H			L						M	
CO4	M	M											M		
CO5	M	M			M			L				L			L

H- Strong; M-Medium; L-Low

F. Course Content:

UNIT–I DIGITAL FUNDAMENTALS AND COMBINATIONAL CIRCUITS 10

Introduction to Boolean algebra and Switching Functions; Boolean Minimization using K Map and Tabulation method; **combinational circuits**: Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder– Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.

UNIT –II SEQUENTIAL CIRCUITS 10

Flip Flops and Memory devices: RAM – Static and Dynamic, ROM, PROM, EPROM, EEPROM; **Counters and Shift registers:** Binary, BCD and programmable modulo counters, Shift register counters; **Sequential circuit design**: using Mealy and Moore model.

UNIT III INTRODUCTION TO HARDWARE DESCRIPTION LANGUAGE 10

Introduction to Verilog / VHDL- Structural, Dataflow and Behavioral modeling. Structural, Dataflow and Behavioral modeling of combinational logic circuits (Multiplexer, Demultiplexer, decoder and encoder). Structural, Dataflow and Behavioral modeling of sequential logic circuits (counters and shift registers).

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 10

Analysis Procedure, Circuits with latches; Design Procedure, Reduction of state and flow table; Race free state assignment; Hazards; ASM chart; Design examples.

UNIT V APPLICATIONS OF DIGITAL ELECTRONICS 5

Multiplexing displays - Frequency counters - Time measurements - using the ADC0804 - Slope alone operation, span adjust, zero shift, testing - microprocessor compatible A/D converters.

TOTAL: 45 Periods

G. Learning Resources:

i. TEXTBOOKS

1. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Donald. P.Leach, Digital principles and applications, 7th Edition, McGraw-Hill ,2012

ii. REFERENCE:

1. John F.Wakerly, Digital Design, Fourth Edition, Pearson/PHI, 2006.
2. Thomas L. Floyd, Digital Fundamentals, 8th Edition, Pearson Education Inc, New Delhi, 2003 Donald D.Givone, Digital Principles and Design, TMH.
3. William H. Gothmann, Digital Electronics, 2nd Edition, PHI, 1982.

iii. Online resources

1. http://www.wiley.com/legacy/wileychi/mblin/supp/student/LN08CombinationalLogicModules.pdf
2. http://www.learnabout-electronics.org
3. www.nptel.com/digitalelectronics/iitkanpur/
4. www.mooc.org