Course Number and Name

BEC302 - PRINCIPLES OF DIGITAL ELECTRONICS

Credits and Contact Hours

4 & 60

Course Coordinator's Name

Dr M.Sangeetha

Text Books and References

TEXT BOOK:

1. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. William I. Fletcher,"An Engineering Approach to Digital Design ", Prentice-Hall of India, 1980.

REFERENCES:

1. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
2. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning,2006.
3. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
4. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition , TMH,2006.
5. http://www.electrical4u.com/digital-electronics

Course Description

To manipulate across various number system and to compute binary arithmetic operations.
To understand the design of combinational and sequential circuits using gates.
To know the concept of memories and programmable logic devices
To learn the design of asynchronous and synchronous sequential circuits.

Prerequisites	Co-requisites
Basic Electrical & Electronics Engineering	NIL

Required, elective, or selected elective (as per Table 5-1)

Required

Course Outcomes (COs)

CO1- Recall the different number systems and demonstrate the simplification of Boolean expressions using Boolean algebra & K-Map method.
CO2- Analyze the Combinational building blocks
CO3- Analyze the sequential building blocks.
CO4- Develop a state diagram and simplify the given sequential logic
CO5- To illustrate the concept of synchronous sequential circuits
CO6- To illustrate the concept of asynchronous sequential circuits

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k
CO1	H	H	H		H	L	M			M	
CO2	M	M	H	M	H		M				
CO3	H	H	H								
CO4	H										
CO5	M	M	H	M	H		M			M	
CO6	H	H	H	M	H					M	

List of Topics Covered

UNIT I BASIC CONCEPTS ,BOOLEAN ALGEBRA AND LOGIC GATES 12

Number systems - Binary, Octal, Decimal, Hexadecimal, conversion from one to another, complement arithmetic, Boolean theorems of Boolean algebra, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map, Quine-McCluskeymethodofminimization **.**NAND-NOR implementation of Logic gates,Multilevel gate implementation,Multi output gate implementation,TTL and CMOS logic and their characteristics,Tristate gates.

UNITII COMBINATIONAL CIRCUITS 12

Problem formulation and design of combinational circuits, Half Adder ,Full adder,HalfSubtractor, Full Subtractor, Carry Look Ahead adder, BCD adder, Fast adder,Serial adder/subtractor,BinaryMultiplier,Binary Divider, Encoder ,Decoder, Mux / Demux, Code-converters, Parity Generators, Comparators.

UNIT III SEQUENTIAL CIRCUIT 12

Latches,Flipflops - SR, JK, T, D, Master/Slave FF, Triggering of FF,Realization of one flip flop using other flip flops Analysis of clocked sequential circuits - their design, State minimization, State assignment, Circuit implementation, Registers-Shift registers, Asynchronous Up/Downcounter SynchronousUp/Down counters, Modulo–ncounter, Ring counter ,Shift counters ,Sequence generators.

UNIT IV MEMORY DEVICES 12

Classification of memories – ROM ,ROM organization - PROM , EPROM ,EEPROM , EAPROM, RAM – RAM organization – Write operation , Read operation , Memory cycle, Timing wave forms , Memory decoding , memory expansion , Static RAM Cell, Dynamic RAM cell ,Programmable Logic Devices – Programmable Logic Array (PLA) and Programmable Array Logic (PAL) ,Field Programmable Gate Arrays (FPGA) ,Implementation using ROM, PLA, and PAL.

UNIT V SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL CIRCUITS 12

Synchronous Sequential Circuits: General Model – Classification – Design – Use ofAlgorithmic State Machine – Analysis of Synchronous Sequential Circuits.

Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits.