Subject Code	Subject Name	Teaching Scheme (Hrs.)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW	Tutorial	Total
ETC 303	Digital Electronics	04	--	--	04	--	--	04

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				Term Work	Practical and oral	Oral	Total
		Internal assessment			End Sem. Exam				
		Test 1	Test 2	Avg. of Test 1 and Test 2					
ETC303	Digital Electronics	20	20	20	80	-	-	-	100

Course objectives:

- To introduce the fundamental concepts and methods for design of various digital circuits.
- To build the skill of digital system design and testing used in various fields of computing, communication, automatic control of mechanisms and instrumentation.

Course outcomes:

After completion of course, students will be

- Able to distinguish between analog and digital signals & data.
- Able to analyze, transform & minimize combination logic circuits.
- Able to understand basic arithmetic circuits.
- Able to design and analyze sequential circuits.
- Able to design digital system and components.

Module No.	Unit No.	Topics	Hrs.
1.0		**Number Systems and Codes**	04
	1.1	**Arithmetic codes**: Review of number system, BCD code, Octal code, Hexa-decimal code, EX-3 code, Gray code, ASCII Code	
2.0		**Logic Gates and Combinational Logic Circuits**	16
	2.1	**DTL, TTL, ECL and CMOS gates:** Transfer characteristics, noise margin, fan-in, fan-out, introduction to their logic families, their transfer characteristics and noise margin	
	2.2	**Universal gates and combinational circuits**: Realization of basic gates using NAND and NOR gates, Boolean algebra, De Morgan's theorem, SOP and POS representation, K-map up to five variables, Quine-McClusky method, variable entered mapping	
	2.3	**Arithmetic circuits:** Adder, subtractor, carry look ahead adder, BCD adder, magnitude comparator, binary multiplier, series and parallel adder	
	2.4	**Multiplexer and de-multiplexer:** Boolean functions implementation using multiplexer and de-multiplexer, encoder and decoder, parity generator and checker	
3.0		**Sequential Logic Circuits**	16
	3.1	**Flip flops and registers:** RS, JK, T, D and master slave flip flops, conversion of flip flops, universal shift registers	
	3.2	**Counter design:** Asynchronous and synchronous counter, up/down counter, mod-N counter, pre-settable counter, skipping state counter	
	3.3	**Shift registers design:** SISO, SIPO, PISO, PIPO, shift left and shift right registers	
	3.4	**Applications of sequential circuits:** Frequency division, ring counter, Johnson counter, Moore and Mealy machine, state transition diagram, synthesis table	
	3.6	**State reduction techniques:** Row elimination and implication table methods	
4.0		**Different types of Memory**	06
	4.1	**Classification and characteristics of memory:** SRAM, DRAM, ROM, PROM, EPROM and FLASH memories	
5.0		**Introduction to Programmable Logic Devices**	10
	5.1	**CPLD and FPGA:** Architecture of CPLD and FPGA, Xilinx XC 9500 CPLD Series and Xilinx XC 4000 FPGA Series	
	5.2	**VHDL:** Data types, Structural Modeling using VHDL, attributes, data flow, behavioral, VHDL implementation of basic combinational and sequential Circuits	
	5.3	**Programmable Logic Devices:** PLA and PAL	
		Total	**52**

Text Books:

1. Morris Mano and Michael D. Ciletti, *"Digital Design"*, Pearson Education, Fourth Edition, 2008.
2. Malvino A.P. and Leach D.P., *"Digital Principles and Applications",* TMH, 6th Edition

Reference Books:

1. John F. Warkerly, "*Digital Design Principles and Practices"*, Person Education, Fourth Edition, 2008. .
2. J. Bhaskar, *"VHDL Primer",* Prentice Hall, 3rd Edition
3. William I. Fletchter, "*An Engineering Approach to Digital Design"*, PHI, Tenth Indian Reprint, 2001.
4. Norman Balabanian and Bradley Carlson, "*Digital Logic Design Principles"*, John Wiley & Sons, First Edition, 2011.
5. A. Anand Kumar, *"Fundamentals of Digital Circuits"*, PHI, Second Edition, 2012.
6. Charles H. Roth, *"Fundamentals of Logic Design"*, Jaico Publishing House, First Edition, 2004.
7. G. K. Kharate, *"Digital Electronics"*, Oxford University Press, First Edition, 2010
8. R. P. Jain, "*Modern Digital Electronics*", Tata McGraw Hill Education, Third Edition 2003.
9. Frank Vahid, "*Digital Design*", John Willy and Sons, First Edition, 2011.

Internal Assessment (IA):
Two tests must be conducted which should cover at least 80% of syllabus. The average marks of both the tests will be considered for final Internal Assessment.

End Semester Examination:
1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. The students need to solve total 4 questions.
3: Question No.1 will be compulsory and based on entire syllabus.
4: Remaining question (Q.2 to Q.6) will be selected from all the modules.