Anil Neerukonda Institute of Technology & Sciences (Autonomous)
(Affiliated to AU, Approved by AICTE & Accredited by NBA (ECE,EEE,CSE,IT & Mech.) & NAAC)
Sangivalasa-531 162, Bheemunipatnam Mandal, Visakhapatnam District
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Digital Logic Design (other departments)	
Code: 23EC3103	**Credits: 3**
Instruction: 3 periods &1 Tut/Week	Sessional marks: 40
End exam: 3hours	End exam marks: 60

Course Outcomes: At the end of the course the student will be able to:

CO	BL	CO Statement
CO1	BL-2	Perform conversions between different number systems and codes
CO2	BL-3	Apply appropriate techniques in simplifying given Boolean functions consisting up to four variables
CO3	BL-2	Realize given logic functions using basic gates, universal gates and PLDs
CO4	BL-3	Design and Analyse combinational logic circuits.
CO5	BL-3	Design and Analyse sequential logic circuits.

CO	Bloom's Level
CO1	Action Verb from Blooms Taxonomy-**Apply**/ Cognitive level- Application (BL-3)
CO2	Action Verb from Blooms Taxonomy-**Apply**/ Cognitive level- Application (BL-3)
CO3	Action Verb from Blooms Taxonomy-**Design**/Cognitive level- Analysis (BL-4)
CO4	Action Verb from Blooms Taxonomy-**Design**/Cognitive level- Application (BL-4)
CO5	Action Verb from Blooms Taxonomy-**Design** /Cognitive level- Analysis (BL-4)

Program Matrix

COs	Program Outcomes (POs)												PSOs			Justification
	Domain Specific POs					Domain Independent POs										
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	1	1	1	-	-	-	-	-	-	-	-	1	-	-	1	P1.2.1, P1.3.1, P2.1.2, P2.1.3, P3.2.1,P12.1.1,
CO2	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1	P1.3.1, P1.4.1, P2.1.2, P2.1.3, P2.2.3, P3.2.1, P3.2.3, P12.1.1
CO3	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1	P1.2.1, P1.3.1, P2.4.1, P3.2.1, P3.2.3,P12.1.1
CO4	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1	P1.3.1, P1.4.1,P2.1.2, P2.1.3, P2.2.3, P3.2.1, P3.2.3, P12.1.1
CO5	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1	P1.3.1, P1.4.1, P2.1.2, P2.1.3, P2.2.3, P3.2.1, P3.2.3,P12.1.1

Justification of CO mapping with POs and PSOs

Course outcome	PO Mapped	Level Mapped	Justification for Mapping
CO1	PO1	1	Student will be able to apply the knowledge of basic engineering sciences, core engineering in designing various digital systems.
	PO2	1	Able to identify, analyse the problems in digital domain.
	PO3	1	Able to apply the knowledge of number systems and conversions in developing digital systems and related projects
	PO12	1	Able to apply the knowledge of digital concepts in developing the new technologies s and their outcomes in multidisciplinary areas.
	PSO3	1	Apply the knowledge of engineering fundamentals to formulate, analyse and provide appropriate problem solving strategies in the field of embedded and VLSI and communicate them effectively to the concern.
CO2	PO1	2	Student will be able to apply the knowledge of core engineering to compute the concept in modelling and designing computer based systems.
	PO2	2	Able to identify, analyze the problems in different domains
	PO3	2	Able to apply the knowledge of engineering to develop and assess projects and their outcomes in multidisciplinary areas.
	PO12	1	Able to apply the knowledge of digital concepts in developing the new technologies s and their outcomes in multidisciplinary areas.
	PSO3	1	Apply the knowledge of engineering fundamentals to formulate, analyse and provide appropriate problem solving strategies in the field of embedded and VLSI and communicate them effectively to the concern.
CO3	PO1	2	Student will be able to apply the knowledge of engineering sciences, core engineering concepts in designing computer based systems.
	PO2	2	Able to identify, analyze the complex problems in different domains.
	PO3	2	Able to apply the knowledge of combinational circuits in designing digital systems and assess projects in multidisciplinary areas.
	PO12	1	Able to apply the knowledge of digital concepts in developing the new technologies s and their outcomes in multidisciplinary areas.
	PSO3	1	Apply the knowledge of engineering fundamentals to formulate, analyse and provide appropriate problem solving strategies in the field of embedded and VLSI and communicate them effectively to the concern.
CO4	PO1	2	Student will be able to apply the knowledge of engineering sciences, core engineering and computing concept in designing computer based systems.
	PO2	2	Able to identify, analyze the problems in different domains
	PO3	2	Able to apply the knowledge of sequential circuits in designing digital systems and projects and their outcomes in multidisciplinary areas.
	PO12	1	Able to apply the knowledge of digital concepts in developing the new technologies s and their outcomes in multidisciplinary areas.
	PSO3	1	Apply the knowledge of engineering fundamentals to formulate, analyse and provide appropriate problem solving strategies in the field of embedded and VLSI and communicate them effectively to the concern.
CO5	PO1	2	Student will be able to apply the knowledge of engineering sciences, core engineering and computing concept in designing computer based systems.
	PO2	2	Able to identify, analyse the problems in different domains
	PO3	2	Able to apply the knowledge of counters and PLDs in designing digital systems and assess projects and their outcomes in multidisciplinary areas.
	PO12	1	Able to apply the knowledge of digital concepts in developing the new technologies s and their outcomes in multidisciplinary areas.
	PSO3	1	Apply the knowledge of engineering fundamentals to formulate, analyse and provide appropriate problem solving strategies in the field of embedded and VLSI and communicate them effectively to the concern.

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SYLLABUS

UNIT –I **[09Periods]**

NUMBER SYSTEMS

Number representation, Conversion of bases, Binary Arithmetic, Representation of Negative numbers, Binary codes: weighted and non-weighted BOOLEAN ALGEBRA: Basic definitions, Axiomatic Definitions, Theorems and properties, Boolean Functions, Canonical and standard forms.
(TB1-chapters1&2)

UNIT– II **[09Periods]**

LOGIC GATES- AND, OR, NAND, NOR, XOR,XNOR (**TB2-chapter 4)**

LOGICMINIMIZATION

The K-Map Method: Two variable map, Three variable map, four variable map Prime Implicants, Don't Care conditions, NAND and NOR implementation, Quine-Mccluskey (QM) (up to four variables) Technique.(**TB1-chapters3)**

UNIT– III **[09Periods]**

COMBINATIONAL LOGIC DESIGN

Combinational circuits, Analysis Procedure, Design Procedure, Code Converters (BCD to XS3 (XS3 to BCD)), Gray to Binary (Binary to Gray), Binary Adder-Subtractor, Decimal adder, Binary Multiplier, Magnitude comparator, Decoders, Encoders, Multiplexers. De-Multiplexer
(TB1-chapters 4&9.7)

UNIT– IV **[09Periods]**

SEQUENTIAL CIRCUITS-1

Sequential logic- Introduction to Latch and Flip flop, clocked S-R, JK, D, T flip flops. Excitation table of Flip flop, Flip flop conversion, Clocked flip flop design, Edge triggered flip flop
Registers, Applications of Shift registers, universal shift register,**(TB2-chapters7&8(till8.5))**

UNIT –V **[09Periods]**

SEQUENTIAL CIRCUITS-2

Counters- Ripple counters, Synchronous counters, Ring counters, Johnson counter.
PLD's- PAL, PLA and PROM

TEXTBOOKS

1. M. Morris Mano and Michael D.Ciletti, "Digital Design", 6th Edition, Pearson Publishers,2018.
2. R. P Jain, "Modern Digital Electronics", 5th Edition, TMH, 2022.

REFERENCEBOOKS

1. William I.Fletcher, "An Engineering Approach to Digital Design", PHI, 2015.
2. John F.Wakerly,"Digital Design Principles and Practices", 3rd Edition, Prentice Hall,2015

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IOT LABORATORY (Common to Chemical and Mechanical)	
Code: 23EC4212	**Credits:3**
Instruction:3Periods &1E/Week	SessionalMarks:50
EndExam: 3Hours	EndExam Marks:50

Course objectives:

- To Interface various input and output devices with Arduino Uno
- To Design the minimum system for sensor-based application.
- To solve the problems related to the primitive needs using IoT.

CourseOutcomes: At the end of the course the student will be able to:

CO	BL	CO Statement
CO1	BL-2	Make a basic electronic test circuit connection to familiarize with lab components
CO2	BL-3	Interface simple input/output devicesto Arduino Uno
CO3	BL-3	Implement basic wired data communication using Arduino Uno
CO4	BL-3	Perform I/O operations over local wireless network
CO5	BL-3	Perform basic data sending and visualization operation using IoTCloud

Program Matrix

COs	Program Outcomes (POs)											
	Domain Specific POs					Domain Independent POs						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	-	-	2	-	-	-	1	-	-	-
CO2	2	1	2	-	2	-	-	-	1	-	-	-
CO3	2	1	2	-	2	-	-	-	1	-	-	-
CO4	2	1	2	-	2	-	-	-	1	-	-	-
CO5	2	2	2	-	2	-	-	-	1	-	-	-

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

List of Experiments

1. Familiarization of Electronic lab tools and glow LED using simple circuit *(CO1)*
2. Familiarization of Arduino Uno, its Setup & Installationand control LED*(CO1)*
3. Interface and control Buzzer with Arduino Uno*(CO2)*
4. Interface push button/digital sensors withArduino Uno*(CO2)*
5. Interface DHT sensor and read the humidity using Arduino Uno*(CO3)*
6. Perform Serial Communication and transmit "Hello World!"*(CO3)*
7. Interface HC-05 Bluetooth module to send data to PC applications*(CO4)*
8. Interface HC-05 Bluetooth module to receive data from PC applications*(CO4)*
9. Interface relay and remotely operate an electrical device *(CO4)*
10. Sending sensor data to Cloud and Visualization (CO5)