Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-1

Subject: Basics of Digital Electronics- DETEE10101

Type of course: Major

Prerequisite: Basic knowledge of Electronics & Number system

Rationale:

This course has been designed to make the students know about basic principles of digital electronics. The students learn basic concepts of digital circuits and system and apply the principles of digital electronics when required to develop complex circuits. The students need to learn combinational and sequential circuits using digital logic fundamentals.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Continuous Assessment:

(For each activity maximum-minimum range is 5 to 10 marks)

Sr. No	Active Learning Activities	Marks
1	**Learn with Fun:** Students need to prepare micro project in group of two and upload video clip of working model on Moodle	10
2	**Poster Making:** Students need to prepare a poster in group of two on the theme (i.e. Recent Trend, Pin Diagram of IC, Processor, Controller etc.) assigned by faculty and upload on Moodle	10
3	**Solve &Simulate** A puzzle (problem) will be assigned by faculty, student need to solve and simulate on any application and upload the screen shot on Moodle.	10
Total		30

Course Content:

Unit. No	Course content	Hrs	% Weightage

1	**Chapter - 1: Binary Systems: Binary Systems**
	• Binary Systems
	  • Introduction of Digital Systems
	• Numbers Systems
	  • Binary, Decimal , Octal, Hexadecimal
	• Base Conversion
	• Arithmetic operations with binary numbers
	  • Binary Addition
	  • Binary Subtraction
	  • Binary Multiplication
	  • Binary Division
	• Complements
	  • R's Complement
	  • 2' and 10's Complement
	  • (R-1)'s Complement
	  • 1's and 9's Complement
		12	25%

	• Binary subtraction using 1's and 2's Complement method
	• Binary Codes
	  • Weighted Codes
	  • Non weighed codes
	  • Gray Code
	  • BCD Code
	  • Excess-3 Code		

2	**Chapter - 2: Binary Logic and Boolean algebra:**
	• Binary logic
	• Logic Gates
	  • AND , OR, NOT, EX-OR, NOR, NAND, EX-NOR
	• Universal Gates
	  • NAND Gate
	  • NOR Gate
	• Postulates
	• Laws
	• Boolean algebra
	• Basic theorems of Boolean algebra
	• De-Morgan's Theorems
	• Boolean functions
		12	25 %

3	**Chapter– 3: Boolean Function Implementation:**
	• Need for simplification
	• Converting Boolean expressions to logic circuits and vice versa
	• Converting Boolean expression to truth tables and vice versa
	• K – Map method
	  ▪ 2 – Variable K – map
	  ▪ 3 – Variable K – map
	  ▪ 4 – variable K – map
	• K – Map using Don't care condition
	• NAND Implementation
	• NOR Implementation
		10	20 %

4	**Chapter– 4: Basic Combinational Logic:**
	• Introduction to combinational circuits
	• Arithmetic and Logical Combinational Circuits
	  ▪ Half Adder
	  ▪ Full Adder
	  ▪ Half Subtractor
	  ▪ Full Subtractor
	  ▪
		14	20%

	• Data transmission combinational circuits o Encoder ▪ 4 – 2 Encoder o Decoder ▪ 2 – 4 Decoder o Multiplexer ▪ 4 – 1 multiplexer o De-multiplexer ▪ 1 – 4 De-multiplexer **Chapter– 5 Basic Sequential circuits** • Introduction to sequential circuits o Flip-flops ▪ SR Flip flop ▪ JK Flip flop ▪ D Flip flop ▪ T Flip flop	7	10%

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20	40	30	10	0	0

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Perform conversion of given number between various types of number
CO2	Apply Boolean algebra for circuit optimization
CO3	Optimize given Boolean expression with K-map
CO4	Understand and apply various types of Combinational & Sequential circuits

List of Practical

(Minimum-10 practical):

Sr. No	Descriptions	Unit No	Hrs
1	To study and solve binary conversation examples.	1	4
2	To study and Solve examples based on Binary Complement, excess 3 codes, BCD codes.	1	2
3	To study and simplify Boolean expressions using Boolean algebra.	2	2
4	To study basic logic gates & Verification of truth table.	2	2
5	To Study Universal Building Block Implementation of various Logic gates using only NAND gates & verification of truth table.	2	4
6	To Study Universal Building Block Implementation of various Logic gates using only NOR gate & verification of truth table	2	4
7	To design & Implement Half Adder & Full Adder circuits.	4	2
8	To design & Implement Half Subtractor & Full Subtractor circuits.	4	2
9	To realize Encoder & Decoder Combinational Circuits	4	2
10	To realize Multiplexer & De-Multiplexer Combinational Circuit	4	2
11	To verify function of SR Flip Flops & study different Flip Flops.	4	4
	TOTAL		**30**

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] Digital Logic and Computer Design: Mano M Morris, Pearson Publication

[2] Modern Digital Electronics: Jain R P, Tata McGraw-Hill

[3] Digital Electronics Principles & Application: Malvino & Leach, Tata McGraw-Hill

[4]Fundamentals of Digital Circuits: Anand Kumar Prentice –Hall of India