KU2DSCPHY125: Digital Electronics

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
II	DSC	100	KU2DSCPHY125	4	75

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture+ Tutorial	Practical	CE	ESE	Total	
3	2	35	65	100	2

Course Description:

This course introduces the principles of digital electronics, covering binary systems, logic gates, and Boolean algebra. Students will learn about combinational and sequential circuits, including adders. The course emphasizes the design and analysis of digital circuits using truth tables and Karnaugh maps. Practical applications and hands-on lab exercises reinforce theoretical concepts.

Course Prerequisite: Higher secondary level Physics

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the different number systems	*U*
2	Analyse different logic gates and create combinational circuits	*An*
3	Analyse Boolean expression and apply in circuits	*An*
4	Apply combinational logic	*A*

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	1	2	2	3	1
CO 2	3	2	0	3	3	3	1
CO 3	3	2	1	3	3	3	1
CO 4	3	2	1	3	3	3	1

**Correlation level 0-None, 1-Slight, 2-Medium, 3-High*

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
1	**Number Systems**		**10**
	1	Decimal numbers, Binary numbers	2
	2	Decimal to Binary Conversion	2
	3	Binary Arithmetic, Complements of Binary Numbers, Signed Numbers, Arithmetic Operations with signed Numbers,	3
	4	Hexadecimal Numbers, Octal Numbers, Binary Coded Decimal (BCD), Digital Codes	3
		(Book 1, Sections 2.1 to 2.11)	
2	**Logic Gates**		**10**
	1	Analog and Digital Quantities,	2
	2	Binary Digits,	2
	3	Logic Levels and Digital wave forms	3

	4	Basic Logic Functions, Inverter(NOT gate), AND Gates, OR Gate, NAND gate, NOR Gate, Exclusive – OR and Exclusive – NOR Gates.	3
		(Book 1: Sections 1.1 – 1.3, 3.1 – 3.6)	
3	**Boolean Algebra and Logic Simplification**		**13**
	1	Boolean Operation and Expression, Laws and Rules of Boolean Algebra	3
	2	DeMorgan's Theorem, Boolean Analysis of Logic Circuits	3
	3	Logic Simplification using Boolean Algebra, Standard Forms of Boolean Expressions, Boolean Expressions and Truth Tables,	3
	4	Karnaugh Map and Karnaugh Map SOP Minimization	4
		(Book 1: Sections 4.1 – 4.9)	
4	**Combinational Logic Analysis and Function of Combinational Logic**		**12**
	1	Basic Combinational Logic Circuits, Implementing Combinational Logic	4
	2	Universal Properties of NAND and NOR Gates, Combinational Logic using NAND and NOR Gates,	4
	3	Half and Full Adders, Parallel Binary Adders, Comparator	4
		(Book 1: Sections 5.1 – 5.4, 6.1 – 6.2, 6.4)	
5	**Practical Module**		**30**
	*Directions: **At least 5** experiments from the following + 2 Activities (can be selected from the list or can be designed by the course faculty.)*		
	1. Realization of AND, OR, NOT logic gates using diodes and verify with truth table 2. Study of Digital ICs and IC trainer kit 3. Liquid lens - Refractive index of a liquid and material of the lens using another liquid of known refractive index. 4. Spectrometer – Refractive index of the material of a prism 5. Carey Fosters Bridge- resistance & resistivity 6. Potentiometer calibration of low range voltmeter 7. Deflection Magnetometer –Tan A and Tan B		

Essential Readings:

1. Digital Fundamentals , 11th Edition, Thomas L Floyd (Pearson), 2017.

Suggested Readings:

1. Digital Principles and Applications - D P Leach and A P Malvino (TMH), 8th Edn, 2014.
2. Fundamentals of Digital Ciruits - A Anandakumar (PHI), 4th Edn, 2016.
3. Principle of Electronics, V K Metha and Rohith Mehtha, 11th Edn, S Chand & Company, 2019.
4. Digital Electronics circuits and Systems – V K Puri, McGraw Hill, 2017.

Assessment Rubrics:

<table>
<tr><th colspan="3">Evaluation Type</th><th>Marks</th><th colspan="3">Evaluation Type</th><th>Marks</th><th>Total</th></tr>
<tr><td colspan="3">Lecture</td><td>75</td><td colspan="3">Practical</td><td>25</td><td rowspan="6">100</td></tr>
<tr><td>a)</td><td colspan="2">ESE</td><td>50</td><td>a)</td><td colspan="2">ESE</td><td>15</td></tr>
<tr><td>b)</td><td colspan="2">CCA</td><td>25</td><td>b)</td><td colspan="2">CCA</td><td>10</td></tr>
<tr><td></td><td>i</td><td>*Test Paper</td><td>10</td><td></td><td>i</td><td>Punctuality</td><td>3</td></tr>
<tr><td></td><td>ii</td><td>**Assignment/ Book-Article review</td><td>10</td><td></td><td>ii</td><td>Skill</td><td>4</td></tr>
<tr><td></td><td>iii</td><td>Seminar/ Viva-Voce</td><td>5</td><td></td><td>iii</td><td>Record</td><td>3</td></tr>
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*Best out of two test papers

** or any other activities like quiz, open book exam, group activity