Module Syllabus: Digital and Analogue Electronics

1. Module Information

- **Module Name:** Digital and Analogue Electronics
- **Module Code:** EEE60404
- **Credit Value:** 4 Credits
- **Prerequisites:** N/A
- **Department:** School of Engineering
- **Semester Offered:** January, March, August

2. Synopsis

This module covers two main areas: digital logic circuits and semiconductor-based analogue circuits.

- **Digital Logic:** The theory and practice of digital logic, digital information representation, and digital circuit design will be introduced.
- **Analogue Circuits:** The design and analysis of semiconductor diode rectifier and filter circuits will be demonstrated.
- **Components:** The module also covers the design and analysis of circuits involving Bipolar Junction Transistors (BJT), Field Effect Transistors (FET), and Operational Amplifiers.

The content provides knowledge of components that are key to electronic industrial innovation, supporting SDG9.

3. Learning Outcomes

Upon completion of the module, students should be able to:

1. **Binary Arithmetic:** Apply arithmetic operations to binary numbers.
2. **Logic Conversion:** Apply appropriate techniques including Karnaugh maps to transform

Boolean expressions to a logic circuit.

3. **Digital Design:** Design simple circuits including combinational and sequential circuits.
4. **Analogue Design:** Design simple analogue circuits including rectifiers or transistor amplifiers.

4. Teaching & Learning Approach

- **Delivery:** Lectures, tutorials, and practicals are delivered using a blended learning approach (face-to-face and online).
- **Online Platform:** Moodle (TIMES) is used for asynchronous online learning and activities.
- **Practical Labs:** Four practical sessions are conducted in groups of not more than 5 students, with each group submitting a comprehensive report.
- **Tools:** Technical simulation software is used to enhance the learning experience.

5. Assessment Breakdown

The module is assessed through a combination of tests, assignments, practicals, and a final exam[20].

Assessment Task	Weight	Description	Learning Outcomes
Test	**10%**	Conducted in Week 7, this assesses key concepts of digital electronics learned prior to that week.	LO1, LO2, LO3
Assignment	**20%**	**Case Study:** Students are given a case study scenario to design	LO3

		and build a circuit that addresses a specific problem.	
Final Exam	**30%**	A comprehensive exam covering all topics in digital and analogue electronics, including binary operations, Karnaugh maps, and circuit design.	LO1, LO2, LO3, LO4
Practical 1	**10%**	**Combinational Circuits:** Construct combinational logics (e.g., multiplexer, decoder) using basic gates and verify operations.	LO3
Practical 2	**10%**	**Sequential Circuits:** Construct latches and flip-flops, and apply them to perform functions like frequency dividing.	LO3
Practical 3	**10%**	**Diode as Rectifier:** Construct and	LO4

		analyze half-wave and full-wave rectifiers using diodes and capture results with an oscilloscope.	
Practical 4	**10%**	**BJT Analysis:** Construct a simple BJT transistor circuit, determine current/voltage, and plot the characteristic curve.	LO4