# Department of Electrical & Electronics Engineering

## COURSE MODULES OF THE SUBJECT TAUGHT FOR THE ODD SESSION

## COURSE SYLLABI WITH CO'S

| Faculty Name: **Dr Sathish K R** | | | | Academic Year: 2025 - 2026 | | | | |
|---|---|---|---|---|---|---|---|---|
| Department: **Electrical & Electronics Engineering** | | | | | | | | |

| Lab Code | Lab Title | Core/Elective | Prerequisite | Contact Hours | | | Total Hrs/ Sessions |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| **BEEL504** | **Power Electronics Laboratory** | **Core** | **Basic Electronics, Analog Electronic Circuits** | - | - | **2** | - |

| **Objectives** | • To conduct experiments on semiconductor devices to obtain their static characteristics.<br>• To study different methods of triggering the SCR<br>• To study the performance of single-phase controlled full wave rectifier and AC voltagecontroller with R and RL loads.<br>• To control the speed of a DC motor, universal motor, and stepper motor.<br>• To study single-phase full bridge inverter connected to resistive load. |
|---|---|

| **Experiments Covered as per Syllabus** | |
|---|---|
| 1 | Static Characteristics of SCR. |
| 2 | Static Characteristics of MOSFET and IGBT. |
| 3 | Characteristic of TRIAC. |
| 4 | SCR turns on a circuit using a synchronized UJT relaxation oscillator. |
| 5 | SCR digital triggering circuit for a single-phase controlled rectifier and AC voltage regulator. |
| 6 | Single-phase controlled full wave rectifier with R and R L loads,R-L-E load with and without freewheeling diode. |
| 7 | AC voltage controller using a TRIAC and DIAC combination connected to R and RL loads. |
| 8 | Speed control of DC motor using single semi converter. |
| 9 | Speed control of stepper motor. |
| 10 | Speed control of universal motor using AC voltage regulator. |
| 11 | Speed control of a separately excited D.C. Motor using an IGBT or MOSFET chopper. |
| 12 | Single phase MOSFET/IGBT-based PWM inverter. |

| **Revised Bloom's Taxonomy Level**: | **L1 – Remembering; L2 – Understanding; L3 Applying; L4 – Analyzing;** |
|---|---|
| **Course outcomes:** At the end of the course, the students will be able to: | |
| **CO.1**. Obtain static characteristics of semiconductor devices to discuss their performance. | |
| **CO.2**. Trigger the SCR by different methods | |
| **CO.3**. Verify the performance of a single-phase controlled full-wave rectifier and AC voltage controller with R and RL loads. | |
| **CO.4**. Control the speed of a DC motor, universal motor, and stepper motors. | |
| **CO.5**. Verify the performance of a single-phase full-bridge inverter connected to a resistive load. | |
| **List of Text Books** | |
| 1. "Power Electronics: Circuit Devices and Applications", Mohammad H Rashid, 4th Edition 2014<br>2. "Power Electronics: Converters, Applications and Design", Ned Mohan, 3rd Edition 2014. | |

| | | |
|---|---|---|
| 3. | "Power Electronics", Daniel W Hart, 1st Edition 2011 | |
| 4. | "Elements of Power Electronics", Philip T Krein, Oxford, Indian Edition, 2008. | |

**List of URLs, Textbooks, Notes, Multimedia Content, etc**

- http://www.ece.rutgers.edu/332_460

- Ned Mohan, et al,. Power Electronics, Wiley Eastern Ltd, 1989.
- Shepherd, et al,. Power Electronics and Motor Control., Cambridge University Press, 1998

**Internal Assessment Marks: 50 (Record is evaluated for 30 marks and the test is for 20 marks)**

## THE CORRELATION OF COURSE OUTCOMES (CO'S) AND PROGRAM OUTCOMES (PO'S)

| Course Code: | BEEL504 | | TITLE: Power Electronics Laboratory | | | | | | | | | | PSO's | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List of Course Outcomes | Program Outcomes | | | | | | | | | | | | PSO 1 | PSO 2 |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO 11 | PO 12 | | |
| CO-1 | 3 | 3 | 2 | 2 | - | - | - | - | 1 | - | - | - | 3 | - |
| CO-2 | 3 | 2 | 3 | - | 1 | - | - | - | 1 | - | - | - | 3 | - |
| CO-3 | 3 | 3 | 3 | 2 | 1 | - | - | - | 1 | - | - | - | 3 | - |
| CO-4 | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | - | - | 3 | - |
| CO-5 | 3 | 2 | 3 | 2 | 1 | - | - | - | 1 | - | - | - | 3 | - |

**Note:**   3 = Strong Contribution   2 = Average Contribution   1 = Weak Contribution "-"= No Contribution