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**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Course Descriptive File**

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| 1 | CourseTitle | Power Electronics |
| 2 | CourseCode |  |
| 3 | CreditHours | 3+1 |
| 4 | Pre-requisites/Co-requisites | Electronic Devices and Circuits |
| 5 | Semester | VI |
| 6 | ResourcePerson | Nausheen Bilal |
| 7 | ContactHours(Theory) | 18 |
| 8 | ContactHours(Lab) | 18 |
| 9 | Office Hours | 9am to 3pm. |
| 10 | Email | [nausheen192@hotmail.com](mailto:nausheen192@hotmail.com) |
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| 11 | Course Outline as per Scheme of Studies ( SoS) | |
| 1. Electrical/ Electronic Variable Measurement. 2. Non-Electrical Variable Measurement. 3. Bio-Medical Variable Measurement. 4. AC and DC Bridge Circuits 5. Data Acquisition System | | |
| 12 | Course Objectives as per SoS | |
| In this course students will be able to learn about the construction, working and application of power electronic devices. | | |
| 13 | Books | |
| ***Text Book:***  Power Electronics by D.A.Bradley (2nd Edition)  ***Reference Books:***  Power Electronics by Muhammad H.Rashid | | |
| 14 | Course Learning Outcomes (CLOs) | |
| After successful completion, students will be able:   |  |  |  |  | | --- | --- | --- | --- | | **CLO**  **NO.** | **CLO STATEMENT** | **PLO** | **Domain** | | 1 | To understand the fundamentals of power semiconductor device. | 1 | Cognitive | | 2 | Understand the basic principles of uncontrolled and controlled rectifiers and their analysis under different loading conditions. | 2 | Cognitive | | 3 | Analyze and design converters for operation in steady state continuous and discontinuous Conduction Mode. | 3 | Cognitive | | 4 | Apply the knowledge of converter to design in lab environment working individually and as a group. | 5 | Psychomotor | | | |
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| 15 | Marks Breakup | |
| |  |  |  |  | | --- | --- | --- | --- | | Quizzes | | 10% | | | Homework/assignments | | 10% | | | Midterm exam | | 30% | | | Terminal exam(3 hours) | | 50% | | | Total (theory) | 100% | |   Theory | | |

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| 16 |
| **Week** | **Topic** | **CLO** | **Taxonomy**  **Level** | **Specific Outcome** | **Contact Hours** | **Assessment** |
| 1 | * **Introduction to converters**   (AC/DC converter, DC/AC converter, DC/DC converter, AC/AC converter)   * **Introduction to rectifiers**   (Controlled rectifiers, uncontrolled rectifiers, Semi controlled rectifiers) | 2 |  | After completing these contents student will be able to  Define the following terms:  Converters  Types of converters  Rectifiers  Type of Rectifiers | 3 | Assignment 1  Quiz 1 |
| 2 | **Semi-conductor-s**   * (Bipolar transistors, Diode, MOSFET) | 1 |  | After completing these contents student will be able to Understand the construction, working, characteristics and application of these semiconductor devices | 3 |
| 3 | **Power semi-conductors**   * (Power BJT, Power Diode, Power MOSFET) | 1 |  | After completing these contents student will be able to  Understand the construction, working, characteristics and application of these power semiconductor devices | 3 |
| 4 | **Power Semi-conductor**   * **Thyristor**   (Construction, Modes of Operation, Working) | 1 |  | After completing these contents student will be able to  Describe how a Thyristor/SCR is operated at different conditions, its working and construction. | 3 | Assignment  Quiz |
| 5 | **Thyristor**   * **Series/Parallel Combination** * **Characteristics** * **Switching Characteristics** | 1 |  | After completing these contents student will be able to  1. Connect the thyristors in series and parallel combination for various applications  2.Describe the characteristics of SCR | 3 |
| 6 | **Thyristor**   * **SCR Turn ON methods** * **SCR Turn OFF methods** * **SCR protection** * **SCR Ratings** | 1 |  | After completing these contents student will be able to understand  1.how to turn on and turn off the SCR by different methods  2.how to protect the SCR using protection methods  3.To use SCR by ratings. | 3 |
| 7 | **TRIAC**   * Construction * Working * Characteristics   **DAIC**   * Construction * Working * Characteristics | 1 |  | After completing these contents student will be able to  1.Understand the working of TRIAC  2. Understand the working of DIAC  3.differentiate the TRIAC and DIAC | 3 |
| 8 | **Numerical Problems related to:**   * SCR series/parallel combination * SCR Protection * SCR ratings | 1 |  | After completing these contents student will be able to  1.Solve the problems related to SCR. | 3 |
| 9 |  |  |  |  | 3 |
| 10 |  |  |  |  | 3 |
| 11 |  |  |  |  | 3 |
| 12 |  |  |  |  | 3 |
| 13 |  |  |  |  | 3 |
| 14 |  |  |  |  | 3 |
| 15 |  |  |  |  | 3 |
| 16 | **Revision** |  |  |  |  |

Every instructor have his/her plan for course material used for assignments and quizzes, table above is just a guideline.

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| 17 | **Course Learning Outcomes(CLOs)and Assessment Plan** |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | CLO  Activity | CLO 1 | CLO 2 | CLO 3 | CLO 4 | | Quiz 1 |  |  |  |  | | Assignment 1 |  |  |  |  | | MID TERM EXAM |  |  |  |  | | Quiz 1 |  |  |  |  | | Assignment 1 |  |  |  |  | | FINAL TERM EXAM |  |  |  |  |   \*Add columns according to number of course CLO’s and Lab CLO’s for your respective course. Complete as per your planned quiz and assignments for this session. | |