

Course code	Course name	L-T-P-Credits	Year Of Introduction
AE312	POWER ELECTRONICS	3-0-0-3	2016
<b>Prerequisite : Nil</b>			
<b>Course Objective</b>			
<ul style="list-style-type: none"> <li>To introduce various power semiconductor devices and converters used in industrial applications.</li> </ul>			
<b>Syllabus</b>			
Power semiconductor devices- Controlled rectifiers- DC choppers- DC to AC converters- DC and AC power supplies- Advanced control of power electronic circuits			
<b>Expected outcome</b>			
<ul style="list-style-type: none"> <li>At the end of the semester students will have idea regarding power semiconductor devices, controlled rectifiers, DC chopper, DC to AC converters, DC and AC power supplies and advanced control of power electronic circuits.</li> </ul>			
<b>Text Books</b>			
<ol style="list-style-type: none"> <li>M. H. Rashid, <i>Power Electronics: Circuits, Devices and Applications</i>, 3rd ed., Pearson Education, Delhi, 2002</li> <li>N. Mohan, T. M. Underland, and W. P. Robbins, <i>Power Electronics: Converter, Applications and Design</i>, John Wiley &amp; Sons, New York</li> <li>P. S. Bimbhra, <i>Power Electronics</i>, Khanna Publishers, New Delhi, 2002.</li> </ol>			
<b>Reference Books</b>			
<ul style="list-style-type: none"> <li>G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K. Sinha, <i>Thyristorised Power Controllers</i>, NewAge International Publishers, New Delhi, 1996</li> </ul>			
<b>Course Plan</b>			
Module	Contents	Hours	Semester Exam Marks
<b>I</b>	Power semiconductor devices: Power diodes-types, power transistors, thyristor family, SCRs, Triac, GTOs, power MOSFETs, IGBTs, MCTs-static and dynamic characteristics, protection circuits, series and parallel connections, turn-on characteristics, turn off characteristics	7	15%
<b>II</b>	Controlled rectifiers- single phase and three phase converters-power factor improvements-design of converter circuits-AC voltage controllers-single phase and three phase-cyclo converters-single phase and three phase, design of AC voltage controller circuits.	7	15%
<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	DC choppers – principle of step down and step up operations – step down chopper with RL load, Classes of chopper, MOSFET/IGBT choppers.	6	15%
<b>IV</b>	DC to AC converters: Thyristor inverters, McMurray-McMurray Bedford inverter, current source inverter, voltage control waveform control, inverters using devices other than thyristors, vector control of induction motors.	7	15%

<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	DC and AC power supplies: Switched mode, resonant, bi-directional and multistage conversions, buck, boost, buck boost regulators. UPS-block diagram, types. Drive requirements and design of simple drive circuits for power BJT, MOSFET and IGBT.	9	20%
<b>VI</b>	Advanced control of power electronic circuits using microprocessors, microcontrollers, isolation amplifier circuits, synchronization circuits.	6	20%
<b>END SEMESTER EXAMINATION</b>			

**QUESTION PAPER PATTERN:**

Maximum Marks:100

Exam Duration: 3 Hours

**Part A**

Answer any two out of three questions uniformly covering Modules 1 and 2 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

**Part B**

Answer any two out of three questions uniformly covering Modules 3 and 4 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

**Part C**

Answer any two out of three questions uniformly covering Modules 5 and 6 together. Each question carries 15 marks and may have not more than four sub divisions.

(20 x 2 = 40 marks)