

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT- <b>3</b>	Sheet No. 1/5
Branch	Electronics & Tele-communication		Semester	5	
Course Code	E03	Course Name	Power Electronics		
Course Outcome 1	Identify different Power Electronic devices , their characteristics and applications		Teach Hrs	Marks	
Learning Outcome 1	Classify different power diodes and power transistors and list their applications. ( <b>Cognitive</b> )		6	10	
Contents	Power Electronics: Concept, advantages, disadvantages, applications. Construction, working principle, symbol, characteristics, and applications of: <b>Power diodes -</b> Rectifier diodes, Schottky diode <b>Power transistors -</b> -Power MOSFET. -Special feature and Symbol of fast recovery diodes, MOS diodes, IGBT, Power BJT				
Method of Assessment	Internal				
Learning Outcome 2	Outline different members of the thyristor family ( <b>Cognitive</b> )		8	10	
Contents	Thyristor family and other triggering devices: working principle, symbols, characteristics and applications of SCR, DIAC, TRIAC, UJT  Special feature and symbols of MGT,GTO, ETO, MTO, Programmable Unijunction transistor (PUT), Complementary Unijunction transistor (CUJT), Silicon Unilateral Switch (SUS), Silicon Bilateral Switch (SBS).				
Method of Assessment	External				
Learning Outcome 3	Verify characteristics of power electronics devices ( <b>psychomotor</b> )		5	15	
Contents	Characteristics of power BJT, power MOSFET, IGBT, SCR UJT, Diac, Triac.				
Method of Assessment	External				

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Branch	Electronics & Tele-communication		Semester	5	
Course Code	E03	Course Name	Power Electronics		
<b>Course Outcome 2</b>	Analyze operation of SCR.			Teach Hrs	Marks
<b>Learning Outcome 4</b>	Discuss turn on method and protection techniques of Silicon Controlled Rectifier. <b>(Cognitive)</b>			8	10
<b>Contents</b>	Silicon Controlled Rectifier (SCR): dynamic characteristics, turn-on methods (High voltage turn-on, High temperature turn-on, Light turn-on, dv/dt turn-on, Gate turn-on). Overvoltage Protection, Overcurrent Protection, Gate Protection, Over temperature Protection of SCR.				
<b>Method of Assessment</b>	External				
<b>Learning Outcome 5</b>	State principle of firing circuits and commutation technique of SCR <b>(Cognitive)</b>			8	10
<b>Contents</b>	Firing Circuits: Main features of firing circuits, RC Firing Circuit, UJT Firing Circuit, DIAC Firing Circuit. Thyristor Turn-off Method (waveform, working and circuit diagram) Natural Commutation, Forced Commutation (Class A,B,C,D,E,F)				
<b>Method of Assessment</b>	External				
<b>Learning Outcome 6</b>	Demonstrate principle of firing circuits and commutation technique method of SCR <b>(psychomotor)</b>			5	10
<b>Contents</b>	Resistance-Capacitance Firing Circuit, UJT Firing Circuit, DIAC Firing Circuit commutation techniques (using kits or simulation software/tool)				
<b>Method of Assessment</b>	Internal				

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Branch	Electronics & Tele-communication			Semester	5
Course Code	E03	Course Name	Power Electronics		
<b>Course Outcome 3</b>	Compare uncontrolled and controlled rectifier			Teach Hrs	Marks
<b>Learning Outcome 7</b>	Analyze uncontrolled rectifier using diode. <b>(Cognitive)</b>			7	10
<b>Contents</b>	Circuit diagram, working, waveforms and formula with derivation of- Single Phase Half Wave Uncontrolled Rectifier with Resistive load,  Single Phase Full Wave Uncontrolled Rectifier - Mid-Point Configuration with Resistive load and Uncontrolled Bridge Rectifier				
<b>Method of Assessment</b>	External				
<b>Learning Outcome 8</b>	Analyze controlled rectifier using SCR. <b>(Cognitive)</b>			8	10
<b>Contents</b>	Circuit diagram, working, waveforms of - Single phase Half Wave Controlled Rectifier with Resistive load (formula with derivation),  Single Phase Full Wave Controlled Rectifier (formula without derivation)- Mid-Point Configuration with Resistive load, Controlled Bridge Rectifier with resistive load  Three Phase Controlled Rectifier (formula without derivation)- Half Wave Controlled Rectifier and Fully Controlled Bridge Rectifier with resistive load only.				
<b>Method of Assessment</b>	External				
<b>Learning Outcome 9</b>	Simulate uncontrolled and controlled rectifier (psychomotor)			5	15
<b>Contents</b>	Half Wave Uncontrolled Rectifier, Half Wave Controlled Rectifier, Full Wave Uncontrolled Rectifier, Full Wave Controlled Rectifier, three phase controlled rectifier(any simulation software or kit).				
<b>Method of Assessment</b>	External				

<b>RGPV (DIPLOMA WING) BHOPAL</b>		<b>OBE CURRICULUM FOR THE COURSE</b>		<b>FORMAT- 3</b>	<b>Sheet No. 4/5</b>
<b>Branch</b>	<b>Electronics &amp; Tele-communication</b>			<b>Semester</b>	<b>5</b>
<b>Course Code</b>	<b>E03</b>	<b>Course Name</b>	<b>Power Electronics</b>		
<b>Course Outcome 4</b>	Select a power conversion device as per application.			<b>Teach Hrs</b>	<b>Marks</b>
<b>Learning Outcome 10</b>	Compare different types of inverters ( <b>Cognitive</b> )			7	10
<b>Contents</b>	Principle of inverters. Basic Classification of inverters. Circuit diagram, working and wave form of- Single phase voltage source inverter, Three Phase voltage source inverters with 180-degree mode. PWM Inverters –Single Pulse Modulation, Series Inverter, Parallel Inverter				
<b>Method of Assessment</b>	Internal				
<b>Learning Outcome 11</b>	Classify chopper circuits ( <b>Cognitive</b> )			6	10
<b>Contents</b>	Principle of choppers Control Strategies of choppers Time Ratio Control, Current-limit Control Basic classifications of Chopper Circuits Step-Up and Step-Down Choppers Applications Simple numerical				
<b>Method of Assessment</b>	External				
<b>Learning Outcome 12</b>	Analyze output of inverters and choppers ( <b>Psychomotor</b> )			5	10
<b>Contents</b>	Draw input output wave form of inverter and choppers on kits and/or on simulation software.				
<b>Method of Assessment</b>	Internal				

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<b>Branch</b>	<b>Electronics &amp; Tele-communication</b>		<b>Semester</b>	<b>5</b>	
<b>Course Code</b>	<b>E03</b>	<b>Course Name</b>	<b>Power Electronics</b>		
<b>Course Outcome 5</b>	Identify the applications of power electronic devices			<b>Teach Hrs.</b>	<b>Marks</b>
<b>Learning Outcome 13</b>	Summarize applications of power electronic devices ( <b>Cognitive</b> )			7	10
<b>Contents</b>	Introduction with functional block diagram of:- Induction Heating Di-electric heating (Principle, Applications, merits & demerits over other systems ) HVDC Transmission, types of HVDC link. SMPS, Concept of Switched Mode Power Supplies. UPS, Offline and Online UPS				
<b>Method of Assessment</b>	External				
<b>Learning Outcome 14</b>	Explore further applications of power electronic devices as a case study ( <b>Cognitive</b> )			5	10
<b>Contents</b>	<b>Suggested list for case study</b> - Ultrasonic Applications, Induction heater, Welding, Electronic Ignition, High power audio amplifier system, Alarm actuator, Speed control of d.c. motor /stepper motor/servo motor, ECM (electronic control module) of car.				
<b>Method of Assessment</b>	Internal				

### Suggested List of Experiments\*:

S.N.	Experiment
1	Characteristics of power BJT
2	Characteristics of power MOSFET
3	Characteristics of IGBT
4	Phase control of triac.
5	Diac-triac light dimmer circuit.
6	PUT relaxation oscillator.
7	SCR UJT light dimmer.
8	Demonstration of High frequency heating
9	Demonstration of induction heating
10	STUDY of Class A, B, C, D commutation circuit.
11	Single phase converter.
12	Three phase converter
13	Dual converter
14	Half wave controlled rectifier
15	Full wave controlled rectifier
16	Three phase controlled rectifier
17	Study of Series regulator.
18	Study of 723 regulator.
19	78xx Series Regulator.
20	Demonstration of SMPS.
21	Demonstration of UPS.

Ten experiments in a semester as per the discretion of the subject teacher.

### Suggestions for Practicals:

Experiments are expected to be performed

1. Using Trainer kits.
2. On virtual lab platforms available online

### Reference Books/Web Portals:

S.N.	Title	Author
1	Power Electronics	Khanna Publishers, ISBN No.:81-7409-056-8
2	Power	Muhammad H. Rashid, Elsevier

	Electronics Handbook	
<b>3</b>	<a href="http://www.nptel.ac.in">www.nptel.ac.in</a>	
<b>4</b>	<a href="http://www.swayam.gov.in">www.swayam.gov.in</a>	