

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 1/5
Branch	Electrical Engineering			Semester	5 <sup>th</sup>
Course Code	503	Course Name	Power Electronics and Application		
<b>Course Outcome - 1</b>	Utilize SCR in different power electronic circuit and compare SCR with other power semiconductor devices.			Teach Hrs	Marks
<b>Learning Outcome E0150311</b>	Explain the fundamental of SCR and protection technique for thyristor. (Cognitive domain)			10 Hrs	12 Marks
<b>Contents</b>	Thyristor – SCR: Structure and Operation, Static Characteristics, Type of turn-on methods, Dynamic Switching Characteristics, Two transistor model, Thyristor Protection: Over voltage, over current, dv/dt, di/dt, Gate protection SCR operation: Overview of Series and parallel				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0150312</b>	Utilize auxiliary circuit for SCR and Illustrate various type of power semiconductor devices. (Cognitive domain)			8 Hrs	10 Marks
<b>Contents</b>	Firing Circuits for SCR: Main Features of Firing Circuits, Resistance and Resistance-capacitance Firing Circuits and Unijunction Transistor (UJT) Power semiconductor device (Structure, Static Characteristics, Rating, application): LASCR, DIAC, TRIAC, Power BJT, IGBT and MOSFET.				
<b>Method of Assessment</b>	Internal: Mid semester theory examination (Pen paper test)				
<b>Learning Outcome E0150313</b>	Explain commutation techniques used in power electronics circuit. (Cognitive domain)			6 Hrs	8 Marks
<b>Contents</b>	SCR commutation techniques: Class A commutation Class B commutation Class C commutation Class D commutation				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0150314</b>	Perform experiment for Static characteristics of power semiconductor devices and for SCR auxiliary Circuits. (Psychomotor domain)			9 Hrs	10 Marks
<b>Contents</b>	<ul style="list-style-type: none"> <li>Draw static Characteristics of SCR and find Latching and Holding Current</li> <li>To analyse variation of firing angle of UJT triggering circuit of SCR.</li> <li>Draw static characteristic of any one of given power semiconductor device- IGBT/MOSFET/TRIAC</li> </ul>				
<b>Method of Assessment</b>	External: Laboratory observation and viva voce.				

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Branch	Electrical Engineering		Semester	5 <sup>th</sup>	
Course Code	503	Course Name	Power Electronics and Application		
<b>Course Outcome -2</b>	Analyse phase controlled rectifiers for different loads.			Teach Hrs	Marks
<b>Learning Outcome E0150321</b>	Classify phase controlled rectifiers and compare half-wave converter output for various load. (Cognitive domain)			7 Hrs	10 Marks
<b>Contents</b>	Classification of phase controlled rectifiers Single-phase converter: Half-wave converter with R load, ( $V_{rms}$ and $V_{av}$ ) Half-wave converter with RL and RLE load				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0150322</b>	Use various phase controlled rectifiers. (Cognitive domain)			8 Hrs	10 Marks
<b>Contents</b>	Full wave converter with RL load- Mid-point, Bridge type full and semi converter, Effect of freewheeling diode Single-phase Dual Converters: RL load Three phase Half-wave converter with R load Advantages of polyphaser rectification				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0150323</b>	Analyse variation of output voltage of single phase controlled rectifier. (Psychomotor domain)			9 Hr	10 Marks
<b>Contents</b>	<ul style="list-style-type: none"> <li>To analyse variation of output voltage of single phase half wave controlled rectifier with R and R-L load.</li> <li>To analyse variation of output voltage of single phase bridge type full wave controlled rectifier with R and R-L load.</li> </ul>				
<b>Method of Assessment</b>	External: Laboratory observation and viva voce.				

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Branch	Electrical Engineering			Semester	5 <sup>th</sup>
Course Code	503	Course Name	Power Electronics and Application		
<b>Course Outcome – 3</b>	Examine different type of inverter.			Teach Hrs	Marks
<b>Learning Outcome E0150331</b>	Categorize single phase inverter and describe their construction, working and applications of bridge type inverter. (Cognitive domain)			7 Hrs	10 Marks
<b>Contents</b>	Classification of inverter Single phase voltage source inverter: Half bridge inverter and full bridge inverter.				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0150332</b>	Select inverter on bases of various techniques. (Cognitive domain)			7 Hrs	10 Marks
<b>Contents</b>	Series inverter and parallel inverter. Pulse width modulated inverter: Single pulse modulation and sinusoidal pulse with modulation. Overview of concept of harmonic.				
<b>Method of Assessment</b>	Internal: Mid semester theory examination (Pen paper test)				
<b>Learning Outcome E0150333</b>	Demonstrate function of inverter. (Psychomotor domain)			9 Hrs	10 Marks
<b>Contents</b>	<ul style="list-style-type: none"> <li>• Demonstrate characteristic of series inverter/parallel inverter.</li> <li>• Simulate Half bridge inverter and full bridge inverter.</li> </ul>				
<b>Method of Assessment</b>	External: Laboratory observation and viva voce.				

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<b>Branch</b>	<b>Electrical Engineering</b>			<b>Semester</b>	<b>5<sup>th</sup></b>
<b>Course Code</b>	<b>503</b>	<b>Course Name</b>	<b>Power Electronics and Application</b>		
<b>Course Outcome – 4</b>	<b>Use power semiconductor devices in chopper, cycloconverter and AC voltage controller circuit.</b>			<b>Teach Hrs</b>	<b>Marks</b>
<b>Learning Outcome E0150341</b>	Select converter for various application and Explain AC voltage controller. (Cognitive domain)			<b>8 Hrs</b>	<b>10 Marks</b>
<b>Contents</b>	Chopper: Classification, Step up, stepdown and 4-quadrant operation of choppers operation Cycloconverter: Classification, single phase step up and stepdown cycloconverter operation (Bridge type and Mid-Point Type) AC voltage controller: Single phase AC voltage controller with R and RL load				
<b>Method of Assessment</b>	<b>External: End semester theory examination (Pen paper test).</b>				
<b>Learning Outcome E0150342</b>	Demonstrate function of various converter. (Psychomotor domain)			<b>9 Hrs</b>	<b>10 Marks</b>
<b>Contents</b>	Demonstrate working of step down chopper / step up chopper. Demonstrate working of single phase step down cycloconverter. Simulate single phase step up cycloconverter. Simulate single phase AC voltage controller with R Load.				
<b>Method of Assessment</b>	<b>Internal: Laboratory observation and viva voce.</b>				

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Course Code	503	Course Name	Power Electronics and Application		
<b>Course Outcome – 5</b>	Examine power electronics devices based circuit for different application.			Teach Hrs	Marks
<b>Learning Outcome E0150351</b>	Illustrate power electronics device and circuit. (Cognitive domain)			7 Hrs	10 Marks
<b>Contents</b>	SMPS, UPS, Static AC circuit breaker, Static DC circuit breaker, AC Static switch and DC Static switch, solid state relays				
<i>Method of Assessment</i>	Internal: Assignment and Quiz				
<b>Learning Outcome E0150352</b>	Utilize power electronic devices based circuit for speed control of electric motors. (Cognitive domain)			7 Hrs	10 Marks
<b>Contents</b>	Speed control of Motors - Advantages of electronic speed control DC drive (block diagram only): single phase and three phase Chopper drive (block diagram only): Speed control, 4-quadrant operation AC drive (block diagram only): Stator voltage control, Stator frequency control and Stator voltage and frequency control.				
<i>Method of Assessment</i>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0150353</b>	Analyze the speed control of motors and examine working of power electronics device and circuit (Psychomotor domain)			9 Hrs	10 Marks
<b>Contents</b>	Demonstrate speed control of single phase induction motor using TRIAC and DIAC.  Demonstrate speed control of three phase induction motor/ DC motor.  Demonstrate any one of given circuit-UPS, SMPS, Static AC circuit breaker, Static DC circuit breaker, AC Static switch and DC Static switch, solid state relays				
<i>Method of Assessment</i>	Internal: Laboratory observation and viva voce.				

**REFERENCE BOOKS:**

<b>S.N.</b>	<b>Title &amp; Publication</b>	<b>Author</b>
1.	Power Electronics, Khanna Publishers, ISBN: 9788174092793, 9788174092793	Bimbhra, P. S.
2.	Power Electronics, Publisher: Pearson Education India, ISBN: 9789332584587, 9789332584587	Rashid Muhammad H.
3.	Power Electronics, Publisher: Tata McGraw-Hill Publishing limited, New Delhi ISBN-13: 9780070583894, ISBN-10: 0-07-058389-7	Singh M. D. and Khanchandani, K. B.
4.	Power Electronics, Publisher: Nirali Prakashan, ISBN: 9789389825909	Sen, P.
5.	Power Electronics - A Conceptual Approach, Publisher: Technical Publication Pune, ISBN: 9788184314182, 8184314183	Chitode, J. S.
6.	Power Electronics, Publisher: Prentice-Hall of India Pvt.Ltd, ISBN: 9788120341968, 9788120341968	Jagannathan V.
7.	पॉवर इलेक्ट्रॉनिक्स एंड ड्राइव, Publisher: Neelkanth Publishers Pvt. Ltd., ISBN: 9788184446401, 8184446403	Mohar Singh