



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Third year of Bachelor of Engineering
(Electrical Engineering)
 With effect from: Academic Year 2019-20

Subject Code: EE505-N	Subject Title: Power Electronics - I
Pre-requisite	

Course Objective:

- To present a problem oriented introductory knowledge of power electronics.
- To focus on the study of electrical parameters & different engineering application based principles.
- To address the underlying concepts & methods of power electronics.

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
03	00	02	05	04	03	70	30	20	30	150

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Power Semiconductor Devices	08
2	Characteristics of SCR (Thyristor) and its Commutation techniques	12
3	AC-DC converter (Rectifier)	8
4	Three Phase controlled Rectifier	05
5	DC to DC Converters (Choppers)	12

Total Hours (Theory): 45

Total Hours (Lab): 30

Total Hours: 75



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Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weight age(%)
1	Power Semiconductor Devices: Introduction, Scope and Application, Classification of Power Converters, Construction and characteristics of MOSFET, IGBT, and Comparison of Controllable switches. Power Diode	08	20
2	Characteristics of SCR (Thyristor) and its Commutation techniques. Construction, Static V-I Characteristics, Turn ON Methods, Commutation techniques of SCR, R and R-C Firing Circuits for SCR. Two transistor Model of SCR	12	25
3	AC-DC converter (Rectifier): Uncontrolled rectifier, Principle of phase control, Full-wave controlled Converters. Single phase full wave converters, Single phase two pulse converters with discontinuous load and its performance.	8	25
4	Three Phase controlled Rectifier: Three phase SCR converters: half wave controlled, full and semi converters. Dual Converters. Effect of source impedance on performance of converter	05	10
5	DC to DC Converters (Choppers): Introduction, Classification, Principle and Operation, Control strategies, Chopper configurations, Multi Phase Choppers.	12	20
Total		45	100

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carries a weight age of five marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar /Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.



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Learning Outcome

On successful completion of the course

- The student can be acquired the basic knowledge of electric circuits, electrical fundamentals, thus being prepared to pursue any area of engineering spectrum in depth as desired.
- The students will be able to effectively employ electrical systems and lead the exploration of new applications and techniques for their use.

TEXT BOOKS:

1. P.S. Bimbhra, "Power Electronics" Khanna Publishers,
2. Rashid, M. H., 'Power Electronics Circuits, Devices, and Applications', Prentice-Hall of India Pvt. Ltd., New Delhi, 2nd edition, 1999
3. Ned Mohan, Tore M. Undeland and William P. Robbins, 'Power Electronics Converters, Applications, and Design', John Willey & Sons, Inc., 2nd Edition, 1999

REFERENCE BOOKS:

1. Sen P.C., 'Thyristor DC drives' John Wiley and sons, New York, 1981
2. B.K. Bose, 'Modern Power Electronics and AC drives', Prentice-Hall of India Pvt. Ltd., New Delhi
3. Dubey G.K., 'Power Semiconductor Controlled Drives', Prentice-Hall, Eaglewood Cliffs, New Jersey, 2002

Suggested List of Experiments:

Sr. No.	Name of experiment
1.	To study about of Power Electronics devices
2.	To study commutation circuits of SCR
3.	To perform open loop 1-phase control rectifier with R load for different firing angles.
4.	To perform open loop 1-phase control rectifier with RL load for different firing angles.
5.	To perform open loop 1-phase control rectifier with RL load with Free wheel diode for different firing angles.
6.	To perform open loop 1-phase control rectifier with RLE load for different firing angles.
7.	To perform open loop 1-phase control rectifier with RLE load with Free wheel diode for different firing angles.
8.	To perform open loop 3-phase 6-pulse SCR Bridge Rectifier.
9.	To perform open loop buck chopper and boost chopper.
10	Minor project involving soldering on GP PCB.