COURSE TITLE	**LINE COMMUTATED AND ACTIVE RECTIFIERS**
COURSE CODE	**01EE1506**
COURSE CREDITS	**3**

Objective:

1 The course is aimed to provide exposure to learner about the basic uncontrolled and controlled AC to DC converter as well as PWM converters used in practice for different power electronics applications or as a building block of complex circuits.

Course Outcomes: After completion of this course, student will be able to:

1 Describe the operation of various line commutated converters with passive filters.
2 Apply the controlled converters for bidirectional power flow.
3 Demonstrate the use of various components and its configurations.
4 Analyze the performance of various line commutated converters.
5 Develop various power factor correction circuits.

Pre-requisite of course: Power Electronics

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**Uncontrolled Rectifiers with Passive Filters** Single phase full-wave diode rectifier with L, C and LC filter, Three phase diode rectifier with L, C and LC filter, continuous and discontinuous conduction mode of operation, Effect of passive filter on input current, effect of source inductance	8
2	**Controlled Rectifiers with Passive Filters** Single phase thyristor rectifier with L and RLE load, Three phase thyristor rectifier with L and RLE load, continuous and discontinuous conduction mode of operation, Effect of passive filter on input current, Thyristor converter in Rectification mode and inverting mode of operation	10
3	**Multipulse Converters** Concept of transformer phase shifting, Generation of 6-phase AC voltage from 3-phase AC, 6-pulse converter, and 12-pulse converters with R and RL loads, steady state analysis, commutation overlap, notches during commutation, introduction to 18 and 24 pulse converters	9

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Contents : Unit	Topics	Contact Hours
4	**Pulse Width Modulated Rectifiers** Concept of Pulse width modulated rectifier, Single switch AC-DC PWM converter, Single phase PWM converter, three phase PWM converter, AC-DC bidirectional Boost converter	7
5	**Power-Factor-Correction (PFC) Circuits and Designing the Feedback Controller** Operating Principle of Single-Phase PFCs, Control of PFCs, Example of Single-Phase PFC Systems, Feedforward of the Input Voltage	8
Total Hours		**42**

Textbook :

1 Power Electronics, M.D. Singh and K.B. Khanchandani, Tata McGraw-Hill Education, 2017

2 Power electronics: circuits, devices, and applications, M. H. Rashid, Pearson Education India, 2009

3 Power Electronics, P. S. Bimbhra, Khanna Publishers, New Delhi, 2012

References:

1 Power Electronics, Power Electronics, P. C. Sen, Tata McGraw Hill, 1987

2 Power Electronics: A First Course, Power Electronics: A First Course, Ned Mohan, John Wiley & Sons, 2011

3 Power Semiconductor Controlled Drives, Power Semiconductor Controlled Drives, Gopal K. Dubey, Prentice-Hall, 1988

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
20.00	30.00	25.00	15.00	10.00	0.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, case studies etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room.

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Instructional Method:

3 Students will use supplementary resources such as online videos.

Supplementary Resources:

1 https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-334-power-electronics-spring-2007/index.htm

2 https://www.coursera.org/course/powerelectronics

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