

# Kadi Sarva Vishwavidyalaya

**Faculty of Engineering & Technology** 

### Master of Engineering Semester II

### (Electrical Power System)

(With effect from Academic Year 2017-18 (CBCS))

Subject Code: MEEE204-N	Subject Title: Advanced Power Electronics
Pre-requisite	

#### A. Course Objective:

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

	Teac	hing sch	ieme		Evaluation Scheme					
L	т	Р	Total	Total Credit	Theory		IE Marks	CIA Marks	Pract. Marks	Total Marks
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
04	00	02	06	05	03	70	30	20	30	150

### B. Outline of the Course:

Sr.	Title of the Unit	Minimum Hours		
No	The of the offic			
1	Introduction:	6		
2	AC-DC converter:	16		
3	DC-AC converters:	16		
4	Multilevel inverters:	12		
5	Advance Electrical Drives:	10		

Total Hours (Theory): 60 Total Hours (Lab): 30 Total Hours: 90



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#### **Detailed Syllabus**

Sr.	Торіс	Lecture	Weight
	Introduction:	nours	uge(///
1	Review of power semiconductor devices: Thyristor, IGBT, MOSFET, IGCT, GTO and, role of SiC in power semiconductor technology	6	10
2	AC-DC converter:		
	Uncontrolled rectifier, semi-controlled rectifiers, fully controlled rectifiers with R, RL and RLE load, effect of source inductance on performance of converter, firing schemes and circuits,		
	<b>MULTIPULSE CONVERTERS:</b> Multi-pulse converters: 12,18 pulse converters, phase shifting transformers	16	25
	POWER FACTOR: power factor improvement techniques,		
	PWM rectifiers: equal area PWM, sine PWM, Single Phase and Three phase boost rectifier circuits		
3	DC-AC converters:		
	Voltage Source Inverter: 120° and 180° conduction modes,		
	<b>PWM techniques of voltage fed converters:</b> Selective Harmonic Elimination (SHE), sine modulation, Third harmonic injection, Hysteresis Current Control, Sigma-Delta Modulation, Space Vector Pulse Width Modulation: under modulation and over modulation and their implementation	16	25
	Current Source Inverter: Current Source inverters and their role in high power drives,		
4	Multilevel inverters:		
	Diode Clamped MLI, Flying Capacitor MLI, Cascaded H-Bridge topology: operation with equal and unequal DC voltages,		
	Carrier modulation schemes of multilevel inverter, SVPWM of Multilevel inverter, Neutral Point Balancing schemes	12	20
5	Advance Electrical Drives:		
	Brushless DC motor:	10	20
	Sinusoidal and Trapezoidal BLDC motor, Electronic Commutator, Torque production in BLDC motor, Control of Brushless DC drives		-
	Total	60	100



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### C. 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.

### D. 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.

### E. Text Books & Reference Books:

- Rashid, M. H., 'Power Electronics Circuits, Devices, and Applications', Prentice-
- Hall of India Pvt. Ltd., New Delhi, 2nd edition, 1999
- Dubey G.K., '*Power Semiconductor Controlled Drives*', Prentice-Hall, Eaglewood Cliffs, New Jersey, 2002
- Ned Mohan, Tore M. Undeland and William P. Robbins, 'Power Electronics Converters, Applications, and Design', John Willey & Sons, Inc., 2ndEdition, 1999
- Bin Wu, 'High power converters and ac drives', Wiley-IEEE Press, 2002
- Sen P.C., 'Thyristor DC drives' John wiley and sons, New York, 1981
- B.K. Bose, 'Modern Power Electronics and AC drives', Prentice-Hall of India Pvt. Ltd., New Delhi