

Kadi Sarva Vishwavidyalaya Faculty of Engineering & Technology Fourth Year Bachelor of Engineering (Electrical Branch)

With effect from: Academic Year 2020-21

Subject Code: EE705-N-A	Subject Title: Advanced Power Electronics - I
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Course Objective:

The educational objectives of this course are

- To understand advanced power electronic their role
- To study the topologies of various converter.

A. <u>Teaching / Examination Scheme</u>

	Teac	hing sch	eme							
L	т	Р	Total	Total Credit	Theory		IE Marks	CIA Marks	Pract. Marks	Total Marks
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
4	0	2	6	5	3	70	30	20	30	150

B. Outline of the Course:

Review of Basic Electrical and Magnetic Circuit Concept:

Introduction, Electric Circuit, Magnetic Circuit, Magnetic Design Considerations in Power Supplies-Transformer Design, DC Inductor, Magnetic Saturation.

Gate Drive Circuits:

Introduction, MOSFET Gate Drive, BJT Base Drive, Isolation of Gate and Base Drive, Thyristor Firing Circuits, Thyristor Converter Gating Circuits, Gate Drive ICs.

Power Supplies

Introduction, DC Power supplies-Switch Mode, Fly back, Forward, Push-Pull, Half-Bridge, Fill-bridge, Resonant DC, Bidirectional. AC Power Supplies- Switch Mode, Resonant AC, Bidirectional AC, Multistage conversions, Control Circuit.



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Resonant Pulse Inverter

Introduction, Series Resonant Inverters, Frequency response of Series Resonant Inverters, Parallel Resonant Inverter, Voltage Control of Resonant Inverters, Class E resonant Inverter, Class E resonant Rectifier, ZCS and ZVS resonant converters, Resonant DC link Inverters.

Simulation:

Introduction, Use of Simulation Tools for Design and Analysis, Simulation of Power Electronics Circuits, Various simulation of Power Electronics Circuits.

C. Lesson Planning

	Lectures	Weightage	Торіс
SK No.	(Hours)	in % in Exam	
1	9	15	Introduction, Electric Circuit, Magnetic Circuit, Magnetic Design Considerations in Power Supplies-Transformer Design, DC Inductor, Magnetic Saturation.
2	9	15	Introduction, MOSFET Gate Drive, BJT Base Drive, Isolation of Gate and Base Drive, Thyristor Firing Circuits, Thyristor Converter Gating Circuits, Gate Drive ICs
3	15	25	Introduction, DC Power supplies-Switch Mode, Fly back, Forward, Push- Pull, Half-Bridge, Fill-bridge, Resonant DC, Bidirectional. AC Power Supplies- Switch Mode, Resonant AC, Bidirectional AC, Multistage conversions, Control Circuit
4	15	25	Introduction, Series Resonant Inverters, Frequency response of Series Resonant Inverters, Parallel Resonant Inverter, Voltage Control of Resonant Inverters, Class E resonant Inverter, Class E resonant Rectifier, ZCS and ZVS resonant converters, Resonant DC link Inverters
5	12	20	Introduction, Use of Simulation Tools for Design and Analysis, Simulation of Power Electronics Circuits, Various simulation of Power Electronics Circuits
	60	100	



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D. Instructional Method & 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. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory 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 carry an importance of ten 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.

E. <u>Students Learning Outcomes</u>

On successful completion of the course, student should be able to apply power electronics topology for power conversion.

TEXT BOOK:

- <u>Ned Mohan</u>, <u>Tore M. Undeland</u>, 'Power electronics: converters, applications, and design', John Wiley &Sons., 3rd edition.
- Muhammad H. Rashid , "Power Electronics circuits, devices and applications", Prentice Hall of India, 2nd edition.
- 3. M.D. Singh, K B Khanchandani, 'Power Electronics', second edition, TATA McGraw Hill.

REFERENCE BOOKS:

- 1. P. S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi.
- Power Electronics Devices, Converters and Applications", by Vedam Subramanyam Revised 2nd edition, New Age Publications.
- 3. Thyristorised controller by Dubey, Joshi & Doradla, New age Publication.
- 4. B. K. Bose, 'Modern Power Electronics & AC Drives', Prentice Hall India.