



POWER ELECTRONICS

PROF. G. BHUVANESHWARI

Department of Electrical and Electronics Engineering
IIT Delhi

TYPE OF COURSE : Rerun | Core | UG

COURSE DURATION : 12 weeks (20 Jul' 20 - 9 Oct' 20)

EXAM DATE : 18 Oct 2020

PRE-REQUISITES : Basic Electrical Engineering, Circuit theory, signals and systems

INTENDED AUDIENCE : UG students and instructors

INDUSTRIES APPLICABLE TO : UPS manufacturing, SMPS manufacturing and power electronic converter industries

COURSE OUTLINE :

The course discusses power processing electronic circuits like rectifiers, AC voltage controllers, Frequency converters, DC-DC converters and inverters apart from introducing the basics of power semiconductor devices like SCRs, power BJTs, IGBTs and MOSFETs. The analysis of these power circuits are presented in detail along with the waveforms and control techniques. Finally, applications of power electronic technology in generation sector, transmission sector and also in day-to-day applications like battery charger, motor drives, power supplies are described.

ABOUT INSTRUCTOR :

Prof. Bhuvaneshwari has been working as a faculty member in the Department of Electrical Engineering IIT Delhi since 1997. She did her BE from College of Engineering, Guindy, Anna University and then completed her M.Tech and PhD from IIT Madras in 1987 and 1992 respectively. She worked as a lecturer in College of Engineering, Madras after which she was working for the electric utility company ComEd in Chicago, IL, USA before joining as a faculty member in IIT Delhi. She has more than 150 international and National journal and conference papers to her credit. She is Fellow of IEEE-USA, IETUK, IETE, IE(I) and a life member of ISTE. Her areas of interest are power electronics, electrical machines, drives, power quality, power conditioning and renewable energy.

COURSE PLAN :

Week 1: Introduction to Power Electronics

Week 2: Power devices : Diodes, SCRs, GTO, BJT, MOSFET, IGBT- Characteristics, working, selection and protection

Week 3: AC-DC converter: half wave & full wave; uncontrolled, semi-controlled & fully controlled; single-phase and three-phase

Week 4: Assignment No. 2 and 3 on single-phase and three-phase converters and simulations

Week 5: AC-AC converters: AC voltage controllers and cycloconverters

Week 6: Non-isolated DC-DC converters: Buck, Boost, Buck-boost & Cuk

Week 7: Isolated DC-DC converters

Week 8: DC-AC Inverters: Single-phase and three-phase, modulation techniques

Week 9: Current Source inverter

Week 10: Applications of Power Electronics in Generation, Transmission, Distribution & utilization sectors

Week 11: Assignment No. 6 on Isolated DC-DC converters: Problems and simulation

Week 12: Assignment No. 7&8 on DC-AC inverters (single-phase and three-phase): problems and simulation