

20PE005 - SWITCHED MODE POWER SUPPLIES AND UPS

UNIT - I

DC-DC Converters : Performance analysis of buck, boost, buck-boost, cuk, sepic and quadratic converters – Modes of operation, Equivalent circuits and steady state waveforms.

UNIT – II

Switching Mode Power Converters : Performance analysis of forward, fly-back, push-pull, Luo, half-bridge and full-bridge Converters – Modes of operation, Equivalent circuits and steady state waveforms.

UNIT – III

Resonant Converters : Series Resonant Inverters: Series Resonant Inverter with unidirectional switches – Modes of operations, Waveforms, Types – Based on coupled inductors, Half-Bridge and Full-Bridge resonant inverters. Series Resonant Inverter with bidirectional switches – Types – Half-Bridge and Full-Bridge resonant inverters. Parallel Resonant inverters, Voltage control of resonant inverters, Class E resonant inverter and rectifiers.

UNIT – IV

ZCS and ZVS Resonant Converters : Zero-Current-Switching Resonant Converter: Types – L-Type and M-Type ZCS, Equivalent circuit, Modes of operation and Waveforms. Zero-Voltage Switching Resonant Converters: Equivalent circuit, Modes of operation, Waveforms and Two quadrant ZVS resonant converters. Resonant DC-link inverters – Basic concept, Waveforms, Three phase DC-link inverter – Operation and Waveforms. Active clamp dc-link resonant inverter – Operation and Waveforms. Comparison of ZVS and ZCS.

UNIT – V

Power Conditioners, UPS & Filters : Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for PE applications – Selection of capacitors.

TEXT BOOKS:

1. Muhammad H. Rashid, Power Electronics: Circuits, Devices and Applications, Pearson Education, 4th Edition, 2014.
2. Ned Mohan, T. M. Undeland, W.P. Robbins, Power Electronics: Converters, Applications and Design, Wiley, 3rd Edition, 2007.

REFERENCE BOOKS:

1. M. D. Singh & K. B. Kanchandhani, Power Electronics, Tata McGraw – Hill Publishing Company, New Delhi, 3rd Edition, 2008.
2. Dr. P. S. Bimbhra, Power Electronics, Khanna Publishers, New Delhi, 4 th Edition, 2012.