RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Electrical & Electronics Engineering, V-Semester

EX 502 Power Electronics

UNIT-I

Advantages and application of power electronic devices characteristics, Symbol & application of power diodes, power transistors, GTO, Triac, Diac, Power MOSFET, IGBT, LASCR, Fast recovery diode, schottey diode MCTs. Principle of operation of SCR, Two transistor analogy, brief idea of construction of SCR, Static characteristics of SCR, Condition of turn on & off of SCR Gate characteristics, Method for turning on of SCR, Turnoff methods, different commutation techniques (Class A,B,C,D,E, & F Commutation) firing of SCR, Resistance firing Ckt, Resistance capacitance firing circuit, UJT firing cut, and ramp triggering, firing for 3-Φ circuit. SCR rating & protection of SCR over voltage, Over current, Superior firing, Design of snubber circuit and protection of gate of SCR, heating, cooling & mounting of SCR series and parallel operation of SCR, String efficiency & problem associated with series and parallel operation of SCR.

UNIT-II

Operation and analysis of single phase (Half wave & Full Wave) and multiphase (Three Phase)uncontrolled and controlled rectifier circuit with resistive, resistive & inductive load (continuous & non continuous conduction, FW small & very large inductive loads) and RLE loads. Estimation of average load voltage and load current for above rectifier circuits active and reactive power input. Effect of freewheeling diode and source inductance on performance of these rectifier circuits . Comparison of mid-point & Bridge rectifier circuits.

UNIT-III

Series and parallel inverter, Voltage source & current source inverter, Single phase and three phase bridge inverter, Self-cumulated inverters,, Mc- murray& MC murray bed ford inverters, Voltage control of single phase and three phase bridge inverter, Harmonics & their reduction techniques.

UNIT-IV

Principle of chopper operation, Various control strategies in chopper, Step up & step-up/step down choppers, chopper configuration (Type A,B, C,D, & E), Steady state analysis of chopper circuits, Current & voltage commutation of chopper circuits Jones & Morgens chopper.

UNIT-V

Single phase (midpoint & bridge configuration) and three phase cyclo convertor configuration and operating principles. AC voltage controllers (using SCRs &Traics) single phase full wave controller with R and RL load, Estimation of RMS load voltage, RMS load current and input power factor, three phase AC voltage controller (Without analysis) Dual converter Switched mode voltage regulator buck, Boost, Buch & Boost, Ck regulators.

LIST OF EXPERIMENTS (EXPANDABLE)

1- VI Characteristics Of SCR
2- VI Characteristics Of DIAC
3- VI Characteristics Of BJT
4- Characteristics Of TRIAC
5- VI Characteristics Of MOSFET
6- Transfer Characteristics Of MOSFET
7- Output Characteristics Of IGBT
8- Transfer Characteristics Of IGBT
9- 9 - Single Phase SCR Half Controlled Converter With R Load
10- 1φ Scr Fully Controlled Converter With R-Load
11- Study Of 3φ SCR Half Controlled Converter
12- Study Of 3φ SCR Fully Controlled Converter
13- Study Of Classes Of Commutation A,B,C,D,E,F.

REFERENCE BOOKS

1- M.H. Rashid, Power Electronics Circuits, Devices and Applications, Pearson 2 Education, Singapore, 1993.
2- M Ramsmoorthy, An Introduction to transistor and their application, Affiliated East-West Press.
3- P.C. Sen, Power Electonics, TMH.
4- M.D. Singh, K.B. Khanchandani, Power Electronics, TMH, Delhi, 2001.
5- Chakravarti A., Fundamental of Power Electronics and Drives, Dhanpat Ray & Co.,
6- Dr. P.S. Bhimbhra, Power Electonics, Khanna Pub.

Vedam Subramanyam, Power Electronics New Age International Revised II ed. 2006.