Unit-I

Syllabus : Power electronic devices, Power transistors : Construction, Working principle, V-I characteristics and uses. IGBT : Construction, Working principle, V-I characteristics and uses. Concept of single electron transistor (SET) - Aspects of nano technology.

Syllabus : SCR : Construction, Two transistor analogy, Types, Working and V-I characteristics. SCR mounting and cooling. Types of thyristors : SCR, LASCR, SCS, GTO, UJT, PUT, DIAC and TRIAC. Thyristor family devices : Symbol, Construction, Operating principle and V-I characteristics. Protection circuits : Over-voltage, Over-current, Snubber, Crowbar.

Unit-III

Syllabus : SCR Turn on methods : High voltage thermal triggering, Illumination triggering, dv/dt triggering, Gate triggering. Gate trigger circuits : Resistance and Resistance, Capacitance circuits. SCR triggering using UJT, PUT : Relaxation oscillator and synchronized, UJT circuit. Pulse transformer and opto-coupler based triggering.

Syllabus : SCR turn off methods : Class A - Series resonant commutation circuit, Class B - Shunt resonant commutation circuit, Class C - Complementary Symmetry commutation circuit. Class – D - Auxiliary commutation, Class E - External pulse commutation, Class F – Line or natural commutation.

Unit-IV

Syllabus : Phase control : Firing angle, Conduction angle, Single phase half controlled, Full controlled and midpoint controlled rectifier with R, RL load : Circuit diagram, Working, Input-Output waveforms, Equations for DC output and effect of freewheeling diode, Different configurations of bridge controlled rectifiers : Full bridge, half bridge with common anode, Common cathode, SCRs in one arm and diodes in another arm.

Syllabus : Applications : Burglar's alarm system, Battery charger using SCR, Emergency light system, Temperature controller using SCR and Illumination control / Fan speed control using TRIAC. SMPS, UPS : Offline and online, SCR based AC and DC circuit breakers.

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