

PTSC-7.1

"PVCNSSK" GOVT. POLYTECHNIC BILASPUR at KALOL
PLANNED THEORY SYLLABUS COVERAGE

GPB

Department: Electrical Engg.

Subject: POWER ELECTRONICS

Sem. & Branch :4th & EE

Duration : 3years

SYLLABUS COVERAGE

Total Periods: Theory:56

| Sr No | Period No | Topic | Details | Instruction Reference | Additional Study Recommendations | Remarks |
|-------|-----------|---|--|-----------------------|----------------------------------|---------|
| 1. | 10 (1-10) | Power Electronic Devices | Power electronic devices Power transistor: 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. | | | |
| 2. | 12(11-22) | Thyristor Family Devices | SCR: construction, two transistor analogy, types, working and 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. | | | |
| 3. | 14(23-36) | Turn-on and Turn-off Methods of Thyristors | 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. SCR Turn-Off methods: Class A- Series resonant commutation circuit, Class B-Shunt Resonant commutation circuit, Class C- Complimentary Symmetry commutation circuit, Class D -Auxiliary commutation, Class E- External pulse commutation, Class F- Line or natural commutation. | | | |

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|-------|-----------|------------------------------------|--|-----------------------|----------------------------------|---------|
| 4. | 12(37-48) | Phase Controlled Rectifiers | <p>Phase control: firing angle, conduction angle.</p> <p>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.</p> <p>Different configurations of bridge controlled rectifiers: Full bridge, half bridge with common anode, common cathode, SCRs in one arm and diodes in another arm.</p> | | | |
| 5. | 08(49-46) | Industrial Control Circuits | <p>Applications: Burglar's alarm system, Battery charger using SCR, Emergency light system, Temperature controller using SCR and; Illumination control / fan speed control TRIAC, SMPS.</p> <p>UPS: Offline and Online</p> <p>SCR based AC and DC circuit breakers.</p> | | | |

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