

**B.E. ELECTRONICS ENGINEERING**  
**FOURTH YEAR SEMESTER VIII**

**SUBJECT: Power Electronics**

**Lectures: 4 Hrs per week**  
**Practical: 2 Hrs per week**

**Theory: 100 Marks**  
**Term Work: 25 Marks**  
**Oral: 25 Marks**

***Rationale:** The subject of Power Electronics shall create understanding and strong basic concepts in power devices and their applications in industry.*

**DETAILED SYLLABUS**

**Power Devices**

Construction, ratings, characteristics :- ( including SOA Rating ) Power transistors , SCR, TRIAC , GTO - SCR, IGBT, MCT.

**Drive Circuits**

Using BJT, UJT, DIAC. Isolation circuits using an optocoupler and transformer.

**Protection circuits**

Snubbers , MOVs , di / dt inductor , semiconductor fuses .

**Cooling of semiconductor devices**

Basic theory - thermal resistance, simple heat sink calculations. Types of cooling : ( a ) natural convection ( b ) forced air cooling ( c ) liquid cooling ( d ) vapour phase cooling.

**Half wave and full wave uncontrolled and controlled rectifier circuits**

With resistive load and R-L load. Output average and RMS voltages. Effect of freewheeling diode

**A.C. phase control circuits**

Using BJT, OP-Amps, Special IC's such as TCA 785. Firing scheme for 3 phase supply.

**Power Inverters**

Series, parallel and bridge inverter (single phase) working, important waveforms, control circuits and applications.

**Choppers**

Principle of operation, Jones chopper (working, important waveforms, control circuit and applications).

**Motor Controllers**

A.C. motor controllers:

Induction squirrel cage motor control - voltage control, V / F control, torque - speed characteristics.

Control of wound rotor motor.

Slip power recovery.

D.C. motor controllers:

armature voltage control of separately excited DC shunt motor.

IR compensation.

Field current control,

torque - speed characteristics.

Micro controller based control circuit for motor control. (Block diagram and working.)

### **BOOKS**

#### **Text Books:**

1. M . Rashid, Power Electronics , Prentice Hall of India Publication

#### **Additional Reading:**

1. Ned Mohan , Undeland , Robbins, Power Electronics , John Wiley Publication
2. Landers, Power Electronics, McGraw Hill
3. Dubey G.K. , Electrical Drives, Narosa Press
4. General Electric, SCR Manual
5. M.D. Singh & K.B.Khanchandani, Power Electronics, Tata McGraw Hill, first edition
6. P. C. Sen, Modern Power Electronics, Wheeler Publication.

### **TERM WORK**

Term work shall consist of at least 10 practicals and two assignments covering the topics of the syllabus. 2. A term work test shall be conducted with a weightage of 10 marks.

### **ORAL EXAMINATION**

An oral examination is to be conducted based on the above syllabus.