

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ELECTRICAL ENGINEERING

SEMESTER: V

Subject Name: **Industrial Electronics**

Sr. No.	Course Content	Total Theory Hours
1.	Polyphase Rectifier and Controlled Rectifier: 1.1 Advantages and applications of polyphase rectifiers. 1.2 Three phase half wave rectifier. 1.3 Three phase full wave or bridge rectifier. 1.4 Six phase half wave rectifier. 1.5 Effect of transformer reactance. 1.6 Construction and characteristics of SCR, UJT, DIAC, TRIAC 1.7 Single phase half wave and full wave controlled rectifiers using SCR, UJT & phase shift circuits. 1.8 Construction and use of pulse transformer. 1.9 Understand principle of A.C. load control.	10
2.	Speed Control of D.C. Motor: 2.1 Speed control of D. C. motors using SCR, UJT & RC phase shift control. 2.2 Speed control of D.C. motors using techogenerator. 2.3 Need of armature voltage regulators & O.L. protection. 2.4 Speed control of small single phase A.C. motors	8
3.	Invertors for Ac Motor Control: 3.1 Commutation circuits to turn off SCRs. (a)Current commutation. (b)Voltage commutation. (c)Complementary commutation. (d)Line commutation. 3.2 Single phase series and parallel invertors. 3.3 Three phase series and bridge voltage invertors. 3.4 Pulse width modulation system, its advantages and disadvantages. 3.5 Transistorised PWM invertors & MOSFET invertors. 3.6 Current source invertors 3.7 New devices in power electronics. (a) I G B T (b) M C T 3.8 Lift control, compute Vdc, Idc, Efficiency, ripple factor, P.I.V. etc.	8

4.	Use of Choppers for Speed Control of Motor: 4.1 Class A Chopper. 4.2 Class B Chopper. 4.3 John's Chopper. 4.4 Chopper for speed control of slipring motor.	6
5.	High Frequency Applications: 5.1 High frequency induction heating. 5.2 High frequency dielectric heating. 5.3 X-Ray tubes, its properties and applications. 5.4 Ultrasonic waves, its properties and applications. 5.5 LASER and microwave and its applications.	7
6.	Resistance Welding Control: 6.1 A.C. / D.C. timers using solid state devices. 6.2 Synchronous and non synchronous timers, Sequence timer 6.3 Duty cycle of welding process. 6.4 Electronic welding controls 6.5 SCR as electronic contactor in welding 6.6 Heat control 6.7 Energy storage welding 6.8 Poly phase welding 6.9 Sequence timer using IC	6
7.	Industrial Applications of Photo-Electric Devices: 7.1 Photo electricity and photo devices. 7.2 Photo relays 7.3 Smoke detector. 7.4 Twilight relay (switch). 7.5 Flame failure relays. 7.6 Temperature control of furnace. 7.7 Level indicator.	6
8.	Power Supplies: 8.1 Uninterrupted Power Supplies. (UPS) 8.2 Switching Mode Power Supplies (SMPS) 8.3 Constant Voltage Transformers (CVT) 8.4 Servo Voltage Stabilizer.	5

Laboratory Experiences:

1. Establish the relationship between A.C. and D.C. voltage and calculate efficiency, voltage ratio and ripple factor.
2. Control the single phase controlled rectifier using R-C phase shift net work.
3. Control the single phase rectifier using SCR fired by UJT.
4. Control speed of single phase A.C. motor using SCR and UJT.
5. Control the speed of three phase Induction motor using solid state devices.
6. Control the speed of fan using DIAC and TRIAC.
7. Design and operate the Chopper circuit with load.
8. Operate high frequency, induction and dielectric unit and measure voltage and Current (demonstrate).
9. Operate photo electric relay using twilight switch.
10. Design and operate smoke detector circuit.
11. Operate SMPS/CVT and obtain its characteristic.

Reference Books:

1. Industrial electronic circuits, John E. Ryder.
2. Electronic in Industry, Chute & Chute.
3. Theory and applications of Industrial electronics, Cage.
4. Industrial Electronic circuits and applications - Benedict & Verner.
5. Thyristor, R. K. Sughandhi S.K. Sughandhi.
6. Industrial electronic. G. K. Mittal.