

# GUJARAT TECHNOLOGICAL UNIVERSITY

Semester: 4

## Diploma in Electronics & Communication

**Subject Name** INDUSTRIAL ELECTRONICS

Sr.No	Course content
1.	<b>CONTROL SYSTEM</b> 1.1 Introduction to automatic control system 1.2 Open loop control systems 1.3 Close loop control systems 1.4 Basic elements of a serve mechanism 1.5 Example on automatic control systems 1.6 System performance 1.7 Synchros 1.8 Servo-Motor AC and DC 1.9 Stepper motor
2.	<b>THYRISTORS</b> 2.1 Introduction 2.2 Thyristor construction 2.3 Principle of operation of an SCR 2.4 Two transistor analogy of SCR 2.5 Diac, Triac and UJT: construction, operation and applications 2.6 Rectifier circuit using SCR 2.7 SCR as a static switch
3.	<b>POLYPHASE RECTIFIER AND INVERTERS</b> 3.1 Advantages of polyphase Rectifiers. 3.2 Types of polyphase Rectifiers- Three phase half wave and full wave, Three phase half wave with interphase transformer using solid state devices. 3.3 Principles of operation of controlled rectifiers. 3.4 Parallel, series & Bridge Invertors 3.5 DC & AC Choppers. 3.6 Single & three phase cycloconvertors. 3.7 Un-interrupted power supply (UPS). 3.8 Different methods of forced communication.
4.	<b>SOLID STATE CONTROL OF A.C. and D.C. MOTORS</b> 4.1 Advantages of electronic control of Devices. 4.2 D.C. motor speed control 4.3 Speed control of D.C. shunt motors using thyristor 4.4 Over voltage protection of D.C. motors 4.5 Over load protection of D.C. motors 4.6 A.C. motor control 4.7 Speed control of a single phase induction motor

	4.8 Speed control of a universal series motors
5.	<b>TIMERS AND AUTOMATIC CONTROLLERS</b> 5.1 Principles of R.C. timing circuit. 5.2 R.C. timer using transistor or I.C. 5.3 SCR delay timer. 5.4 Light Operated photo relay
6.	<b>RF HEATING &amp; RESISTANCE WELDING</b> 6.1 Resistance heating 6.2 Induction heating: principle, advantages and applications 6.3 Oscillator circuit for Induction heating 6.4 Electronics heaters used for Induction heating using transistor circuit 6.5 Di-electric heating: principle, advantages and applications 6.6 Resistance welding 6.7 Sequential timer used in welding control 6.8 Electronic line contactors using Thyristors 6.9 Synchronous and non synchronous control using thyristors
7.	<b>BIO-MEDICAL ELECTRONICS</b> 7.1 Source of Bio-electric potential 7.2 Types of Bio-potential electrodes 7.3 Electrocardiography [E C G] 7.4 Electroencephalography [E E G] 7.5 Electromyography [E M G] 7.6 X-RAY, production and application 7.7 Ultrasonic generation and application 7.8 Endoscope and laparoscope
8.	<b>PROGRAMMABLE LOGIC CONTROLLERS</b> 8.1 Programmable Logic Control 8.2 Characteristics of PLC 8.3 Block diagram of PLC with description 8.4 Application of PLC

### LABORATORY EXPERIENCES:

The sample experiments to be performed include, but are not limited to the following.

1. To plot the V-I characteristics of a diode
2. To plot the characteristics curve of Uni Junction transistor (UJT)
3. To perform UJT as a relaxation oscillator
4. To plot the characteristics of TRIAC
5. To study the phase control using TRIAC
6. To plot the characteristics of SCR
7. To study of the forced commutation
8. To plot the characteristics of zener voltage regulator.
9. To plot the characteristics of synchros.
10. To perform the position control using synchro transmitter & synchro receiver.

11. To perform the error detector using synchro
12. To study the biomedical Instruments
13. To demonstrate the operation of the photo electric relay.
14. To demonstrate principle and working of D.C. motor controller using SCR.
15. To study the timer circuits using IC 555.
16. To study invertors circuit.
17. To study working and operation of biomedical instruments

**Reference Books:**

1. Industrial Electronics & control - S.K.Bhattacharya and S.Chatterjee - TTTI, Chandigarh
- 2..Power Electronics P S bhimbhra
3. Industrial Electronics - G.K. Mithal - Khanna
4. Electronics Instrumentation in Medical Practice - R.S. Khanpur - Kothari
5. Bio-medical Instrumentation and Measurements - Leslie Cromwell - PHI
6. Power Electronics - M.H. Rashid – Pearson