

# GUJARAT TECHNOLOGICAL UNIVERSITY

## Diploma in Automobile Engineering

Semester: 4

Subject Name AUTOTRONICS

Sr. No.	Course Content
1.	<b>BASIC ELECTRONICS :</b> Semiconductors; Diode :- PN Junction, Zener Diode, Symbols, Characteristics & Applications; Rectifier- Half, Full, Bridge type with filters; TR/AC, DIAC, Silicon Control Rectifier (SCR), Symbol & Working; Amplifier: - Common Emitter Configuration only; Power Device: - Photodiode, LED, LDR, Phototransistor Working; Concept of Oscillators; Concept of Integrated Circuits
2.	<b>DIGITAL ELECTRONICS :</b> Define Analog/Digital Signal; Study of Logic gates (NOT, OR, NOR, AND, NAND), Symbol & Truth Table; Study of Flip Flop only, RS&D: Symbol & Truth Table; Working principal with block diagram of shift register & counter; Working principal with block/logic diagram of Encoder/Decoder; Working principal with block/logic diagram of Multiplexer/Demultiplexer; Working of seven segment LED Display.
3.	<b>PROGRAMMABLE LOGIC CONTROLLER (PLC) :</b> Introduction / PLC Definition; Block Diagram; Difference Between Relay Panel and PLC; Concept of skin/source, set/reset, latch/unlatch; Advantage & Disadvantage; Installation / Troubleshooting / Maintenance.
4.	<b>TRANSDUCERS / SENSORS &amp; ACTUATORS AND THEIR APPLICATIONS :</b> Concept of general measurement system & difference between Mechanical and electrical/electronics instruments; Measurement of Pressure : Working of Thermocouple vacuum gauge And Pirani vacuum gauge; Measurement of Flow: Hot wire Anemometer, Ultrasonic flow meter; Measurement of Temperature : Working of Thermopiles and Thermister; Measurement of Speed : Contact less electrical tachometer, Inductive, Capacitive type tachometer, Stroboscope; Measurement of Force: Strain gauge load cell; Electrical method for moisture measurement; Electromechanical Type Transducer – Potentiometric resistance type, Inductive, Capacitive, Piezometric; Photoelectric type Transducer :- Photo emissive, Photovoltaic, Photoconductive; AC/DC Electronic timer block diagram study; Basic requirement of Sensors, Functions, Applications and Circuitry arrangement of various Sensors such as Mass Air flow rate sensor, Exhaust gas Oxygen concentration, Throttle plate angular position, Crankshaft angular position, Coolant temperature, Intake air temperature, Manifold absolute pressure (MAP), Vehicle speed Sensor. Transmission gear selector position, Methanol sensor, Rain Sensor; Working Principal and Functions of various Actuators such as Solenoid Actuators, Motorized

	Actuators, Stepper motors.
<b>5.</b>	<b>MICROPROCESSOR AND MICROCONTROLLER :</b> 8085 microprocessor Architecture, Pin configuration, Working of Microprocessor and application; 8051 Microcontroller Architecture, Pin configuration, Working of Microcontroller and application; Comparison of microprocessor and microcontroller; Advantages and disadvantages

#### **SUGGESTIVE LIST OF LABORATORY EXPERIMENTS:**

1. Testing of components like diode, LED, SCR, diac, triac, Zener diode, indicator, capacitor using multimeter.
2. Verify truth tables for logic gates: - NOT, AND, OR, NAND, NOR.
3. To measure shaft speed by using Stroboscope.
4. Study and observe the characteristics of LVDT.
5. Study of strain gauge.
6. Identification and demonstration of different sensors and actuators.
7. Demonstration of the working of various digital to analog and analog to digital converters.
8. Development of ladder diagram, programming using PLC for,
  - a) Measurement of speed of a motor.
  - b) Motor start and stop by using two different sensors.
  - c) Simulation of a pedestrian traffic controller.
  - d) Simulation of four road junction traffic controller.
  - e) Lift/elevator control.
  - f) Washing machine control.
  - g) Tank level control.
  - h) Soft drink vending machine control.
9. Case study and demonstration of various sensors and actuators for multi cylinder modern petrol engines.
10. Case study and demonstration of various sensors and actuators for multi cylinder diesel engines.

**Reference Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
1	Tom Denton	Automobile Electrical and electronic systems	Arnold
2	Understanding Automotive Electronics Vth Edition	William B. Ribbens	Newnes, Marcel Dekker.
3	Electronic Principles	Thomas Malvino	Tata Mc-Graw hill publishing company LTD.
4	Fundamentals of Electrical and Electronics Engineering	Theraja BL	NIrja Construction & Development Co Ltd.
5	Digital principles & Applications	Albert Paul Malvino, Donald Leach	Mc-Graw hill & company
6	Measurement System-applications & Design	Ernest Doebelin	Mc-Graw Hill International Edition
7	Electrical and Electronics measuring Instruments	A K Sawney	Dhanpat Rai and sons.
8	Automotive Electrical Equipments	P L Kohli	Tata Mc-Graw Hill
9	Mechatronics – Electronic control systems in Mechanical and Electrical Engineering	Bolton W.	Pearson Education Ltd.
10	Introduction to Mechatronics and Measurements system	Histand B.H. and Alciatore D.G.	Tata Mc-Graw Hill Publishing
11	Programmable Logic Controllers	John W. Webb and Ronald Reis	Prentice Hall of India