



Technical Examination Board, Gujarat State, Gandhinagar

Electronic Product Testing

Title	ESDM110: Electronic Product Testing
Level	Certificate Course
Course Duration	Four Month (Part time) Three Week (Full Time) 120 Hrs (Th. 48 Hrs Pr. 72 Hrs)
Entry Qualification	B.E./B.Tech/Diploma/B.E. Sem.III onward/ Diploma Sem. IV onward (EC/IC/IT/CE or Similar Branch)/ BCA/MCA/B.Sc./M.Sc./Any other graduate(with Physics/IT)

Teaching Scheme:

Sub Code	Subject Name	Teaching Scheme		Examination Scheme				Term Work Marks	Total Marks
		Theory	Practical	Theory Marks	Hrs.	Practical Marks	Hrs.		
ESDM110	Electronic Product Testing	4	6	50	2	100	4	25	175

Total Week	= 12	Theory	= 1 hour slot
Total Teaching slot/Week	= 04	Practical	= 2 hour slot
Theory Periods	= 48	Total teaching	10 hours/week (Part-time) 06 hours/day (Full time)
Practical Periods	= 72		

ESDM 110: Electronic Product Testing

The conformance to technical specifications, quality, reliability and performance of electrical and electronics products is an important aspect for consumers as well as equipment / products manufacturers. The compliance to various national and international standards / specifications is usually carried out by testing and evaluations of such products.

Electronic testing helps to ensure the components you source meet your specifications and performance standards and are free from defects that may cause problems in the final product's safety and performance. Ultimately, it helps to detect and correct issues with the electronic components early on – before they affect the end product.

Course Objectives:

After completion of this course students will be able

- Identify & rectify faults in the Electronic Product.
- Maintain Electronic product.
- Test various Electronic Products using national and international safety standards.

ESDM110 : Electronic Product Testing

Unit-1	Fundamentals of Electricity and Electronics
1.1	Identification of basic electronic components, ICs, PCBs, Battery & Sensors.
1.2	Basics of electricity, wave form, frequency value, peak value, average value of voltage and current
1.3	Awareness of tools, testing and measuring instruments – CROs, Multimeter, Power supplies, LCRs, Signal Generator and Power Analyzer.
Unit -2	Soldering Practices
2.1	Handling of components, Instruments etc. ESD – (Electrostatic discharge).
2.2	Basics of SMD, its soldering and de-soldering
2.3	Basics of Transformer , ICs , thyristors and IGBT testing Pin configuration of some important ICs used in SMPS, UPS and Inverters, testing of Induction cookers
Unit -3	Types of Product Testing
3.1	Acceptance Testing, Type Testing , Safety Testing
3.2	Identification of legends, symbols, colour codes, Safety, safety standards, safety certificates (CE, UL and VDE)
3.3	Effect of environmental testing (refer to IEC 60068-1 for guidance)
3.4	General awareness of Quality Standards.
3.5	Quality management systems & documentation
3.6	Awareness on ISO 17025, ISO 9001
3.7	Calibration and Uncertainty of measurements
3.8	Awareness on disposal of Electronic waste
Unit -4	Testing Procedures
4.1	Testing of Basic Electronic Components: Resistor, Capacitor, Inductor, Diode Transistors-PNP and NPN, Transformer basics, ICs, Thyristors and IGBT testing, Pin configuration of some important ICs used in SMPS, UPS and Inverters, testing of Induction cookers.
4.2	Switch Mode Power Supply: Safety Testing (Earth Leakage current Test, Dielectric Test, Short Circuit Protection)
4.3	Performance Testing (Line Regulation, Load Regulation for a variation of Load Min to Max load and vice versa, Efficiency at nominal input and rated load)
4.4	Tubular Batteries: Test for Capacity, Test for voltage during discharge
4.5	Personal Computer: Safety Testing (Earth Leakage current Test, Dielectric Test), Performance Testing (Microprocessor used, RAM expansion Capacity, Clock Rate and RAM Capacity, Effect of Power Supply variations)
4.6	Inverter: Visual Inspection, High Voltage Test, Insulation Resistance Test, No-Load Test, Output Test
4.7	UPS: Steady State Input Voltage Tolerance, Output Normal Mode (No Load, Full Load, Overload, Short Circuit), Output Stored Energy Mode (No Load, Full Load, Overload, Short Circuit), Efficiency and Input Power factor
4.8	Electronic Ballast: Operating Supply Voltage, Total Circuit Power, Circuit Power factor, Supply Current
4.9	Safety Testing of Household Appliances: Definitions and Terminology, Protection against Shock, Power Input and Current, Leakage Current and Electric Strength at Operating Temperature, Earthlings
4.10	Testing of Electric Iron/Electric Kettle: Ground bond resistance, Touch Current, Temperature (Thermostatic Cut off) Power Consumption.

4.11	Audio Amplifier: Audio frequency response at various power levels, Response to various inputs sources like DVD player, IPOD, CD player, etc., audio output power, Power Consumption, Voltage range test, Touch Current
------	--

Suggested List of Practical's

Sr. No	Practical Name
1	Identify basic electronic components.
2	Measure frequency value, peak value, average value of voltage and current
3	Operate testing and measuring instruments of CROs, multimeter, Power supplies, LCRs, Signal Generator and Power Analyzer.
4	Practice soldering of electronic components and de-soldering.
5	Study Identification of legends, symbols, and colour codes, Safety, safety standards, safety certificates (CE, UL and VDE).
6	Identification, Testing & measurement of various parameters(like Res value, Cap value) of Electronic Components.
7	Test electronic components e.g. Resistor, Capacitor, Inductor, Diode, Transistors-PNP and NPN, Transformer , ICs, Thyristors and IGBT.
8	Perform safety testing of SMPS by following standard IS14886.
9	Perform safety testing of Personal Computer by following standard IS14886.
10	Perform safety testing of Inverter (IS 13314) and UPS (IEC 62040-3)
11	Perform safety testing of Electronic Ballast (IS 13021).
12	Test Various Household Appliances like Electric Iron, Kettle, and Audio amplifier.

Reference books:

- Fundamentals of Electrical Engineering and Electronics by B.L. Theraja.
- Basic electronics by V.K.Mehta S.Chand Publication.
- A text book of Electrical Technology vol.1 by B.L.Theraja S.Chand Publication.
- Electrical and Electronic Technology by Hughes, Pearson Education.
- AC Electrical Circuit Analysis: A Practical Approach, James M. Fiore, Mohawk Valley Community College, Open Textbook Library
- Electrical Product Compliance and Safety Engineering By Steli Loznen, Constantin Bolintineanu, Jan Swart
- Electrical Product Compliance and Safety Engineering, Volume 2 By Steli Loznen, Constantin Bolintineanu

Software/Tool list:

- Electronic workbench (includes CROs, multimeter, Power supplies, Signal Generator)
- Multisim
- SMPS, UPS, Inverter
- House Hold Appliances
- Electric Iron/Electric Kettle

Course Reference:

1. Short Term Courses- NIELIT, Gol
2. Short Term Courses- NCVET, Gol