

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Electronic Practice
(Code: 3312401)

Diploma Programmes in which this course is offered	Semester in which offered
Mechatronics Engineering	First Semester

1. RATIONALE

Electronic practice is the backbone of the real industrial work situation, which helps in development and enhancement of relevant skill required by the technician working in engineering industries and workshops. The main objective of this course is to impart knowledge of different electronics components used in electronic circuits and develop the ability to understand datasheets. The course also describes various electronic components for different applications. Moreover, the course is useful in the project designs. The course is aimed at providing knowledge of working of simple circuits & fabrication of PCBs, drilling and soldering technique.

2. LIST OF COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies:

- i. Use testing & measuring instruments to test various electronics components.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	100
0	0	4	4	0	0	40	60	

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit;
ESE - End Semester Examination; PA - Progressive Assessment

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Electronic Test Equipment	1.1 Describe the features associated with front panel controls of CRO, Power supply, Function generator, and Multi meters. 1.2 Operate test & measuring instruments.	1.1 Power Supply DC power supply, concept of dual power supply 1.2 CRO CRO probe, Front panel controls, AC/DC voltage measurement, frequency measurement 1.3 Function Generator Front panel controls, Functions: sine wave, square wave, triangular wave and Amplitude measurement 1.4 Digital Multi meter Front panel controls of DMM 1.5 Study of AC and DC Waveforms
Unit – II Basic Electronic Components	2.1 Identify various types of resistors, capacitors, inductors and transformer. 2.2 Use various types of resistors, capacitors and inductors & their usage. 2.3 Test various components	2.1 Resistors Concept of Resistors, Colour Coding, Tolerance, Maximum power rating, Application of LDR. 2.2 Capacitors Classification of capacitors, Coding of capacitors-using numerals, directly Printed values on capacitors, Ceramic capacitor and Electrolytic capacitor. 2.3 Inductors Concept of Inductors 2.4 Transformer Concept of Transformer, Types: step-up and step-down 2.5 Testing of components using Multi meter/LCR Q-meter
Unit – III Active Electronic Components	3.1 Identify Diodes, Transistors, IC, Switches, Relay. 3.2 Describe applications of various components 3.3 Test various diodes, transistors, IC, switches, relay.	3.1 Diodes Concept of Diode, PN junction diode, Zener diode, LED, Photo diode, Terminal identification 3.2 Transistors Types of transistor: NPN and PNP, terminal identification and testing 3.3 ICs Pin diagram, Integrated Circuits (ICs) like 7404, 7408, 7432, 7805, 555, 741 3.4 Switches Concept of switches, Application of Toggle, Rotary, push to on & push to off 3.5 Relay Concept of relays, Application of General purpose relay, NO,NC contact, reed relays, solid state relays.

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – IV Circuit Connections	4.1 Connect various circuits on breadboard. 4.2 Test output of various circuits.	4.1 Breadboard Study of breadboard connections 4.2 Circuits Construction of various electronic circuits on breadboard Circuits like: rectifiers, filter circuits, clipper, clamper, transistor amplifiers, logic gates, LED driver circuit, power supply, etc 4.3 Outputs Testing of outputs of various electronic circuits using test Equipment.
Unit – V Designing of PCB	5.1 Describe PCB design process. 5.2 Design a PCB. 5.3 Test prepared PCB.	5.1 PCB Study of printed circuit board, layout design, artwork, etching 5.2 Soldering Practice Soldering practice on general purpose PCB 5.3 Designing a PCB Select a basic electronic circuits as a mini project and prepare its PCB 5.4 Mounting Mounting of the component on the prepared PCB 5.5 Testing Testing of the complete project (do not prepare project report)
Unit – VI Use of simulation software and data books	6.1 Use Simulation Software for making circuit. 6.2 Use Data books, Internet.	6.1 Introduction to Simulation Software Software like: circuit maker, multi sim, etc. 6.2 Use of Data Books Use of data book for component specifications. 6.3 Search datasheet on Internet Use of internet for component specifications and IC datasheets.

5. SPECIFICATION TABLE (for theory)

There is no theory paper and hence specification table for theory is not applicable

6. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency. Following is the list of exercises/practical/experiments for guidance.

S. No.	Unit No.	EXERCISES/PRACTICAL/EXPERIMENTS
1	I	Identify the features and use of the front panel controls of AC/DC voltage sources.
2	I	Identify the features and use of the front panel controls of Digital Multi Meter (DMM).
3	I	Identify the features and use of the front panel controls of with CRO.
4	I	Identify the features and use of the Function Generator.

5	I	Measure voltage and periodic time of different waves using CRO.
6	II	Measure values of resistors using colour code and DMM.
7	II	Measure values of capacitors using DMM.
8	II	Measure values of voltages of transformer using DMM.
9	II	Measure component values using LCR Q-meter.
10	II	Identify and test different types of diodes.
11	III	Identify and test different types of zener diode and LED.
12	III	Identify and test different types of transistor configurations.
13	III	Identify and test different types of ICs.
14	III	Identify different types of switches and relays.
15	IV	Construct various electronic circuits on breadboard.
16	IV	Test outputs of various electronic circuits on breadboard.
17	V	Get familiar with PCB design process.
18	V	Make soldering practice on general purpose board.
19	V	Select a basic electronic circuit as a mini project.
20	V	Prepare and testing of circuit on general purpose PCB.
21	V	Prepare and testing of circuit on designed PCB.
22	VI	Use various simulation software.
23	VI	Read and interpret data sheets for component specifications.
24	VI	Surf internet to search IC datasheet.

* **Note:** Minimum 16 experiments/practical exercises should be performed from the above

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- i. Collect various electronic components & make a show case component wise.
- ii. Collect specifications, pictures of electronic components from internet & present in class room.
- iii. Build DC power supply or any simple circuit.
- iv. Visit nearby industry which manufacture any electronic component covered in this course

8. SUGGESTED LEARNING RESOURCES

A. List of Books

Sr. no	Title	Author	Publication
1	Electronic Components and Materials	Madhuri Joshi	Shroff Publishers & Distributors Private Ltd.
2	Electronics Engineering Materials	Rains & Bhattacharya	Khanna Publishers
3	Electronic Components Handbook	Thomas H.Jones	Reston Publishing
4	Handbook of components for electronics	Harper (Charles A.)	Laxmi Enterprise
5	Electronic Components and Materials	Grover &Jamwal	Dhanpat Rai & Sons
6	Principles of Electronics	V. K. Mehta	S. Chand Publishers

Other Learning Resources

- i. Practical Semiconductor Data manuals: BPB Publications; New Delhi
- ii. Some electronics engineering magazines like Electronics for You.

B. List of Major Equipment/ Instrument

- i. Function Generator
- ii. Multimeter
- iii. Cathode Ray Oscilloscope
- iv. D.C. Power supplies
- v. Educational Trainer Kits

C. List of Software/Learning Websites

- i. <http://www.efymag.com/>
- ii. <http://www.electronicsforu.com>
- iii. <http://www.kpsec.freeuk.com/symbol.htm>
- iv. http://en.wikipedia.org/wiki/Electronic_component

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

- Shri. H. A. Momaya**, Sr. Lecturer, EC Department, B. S. Patel Polytechnic, Kherva
- Prof. K. P. Patel**, HOD, Department of Mechatronics, B. S. Patel Polytechnic, Kherva

Coordinator and Faculty Members from NITTTR Bhopal

- Prof. (Mrs.) Susan S. Mathew**, Associate Professor, Dept. of Electrical & Electronics Engg., NITTTR, Bhopal.
- Dr. K.K. Jain**, Professor & Head, Dept. of Mechanical Engg, NITTTR, Bhopal