GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Electronic Components & Practice
(Code: 3311101)

Diploma Programmes in which this course is offered	Semester in which offered
Electronics & Communication Engineering,Biomedical Engineering	**First Semester**

1. RATIONALE

This course is intended to help the students to get clear idea of fundamentals of electronic components and develop practical skills in using various types of electronic components employed in electronic industries. It will also make the students familiar with the suitability of various electronics components for different applications. More over this course is intended to develop skills of testing components that will be really needed for the project and setting up of many experiments in other basic and applied technology courses. This course will also enable the student to develop the ability to understand datasheets.

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 and simple devices.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	200
4	0	4	8	70	30	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 CONTENT

Unit	Major Learning Outcomes	Topics and Sub-topics
1. Electronic Components	1.1 Differentiate various types of resistors, capacitors and inductors & their usage. 1.2 Test various components.	1.1 RESISTORS Concept of resistors, classification of resistors, materials used for resistors, resistors general specification: - maximum power rating, tolerance , temperature co-efficient, .Construction, specification and application of carbon film resistors, standard wire wound resistors, color coding , construction, working, application and characteristic curves of LDR 1.2 CAPACITORS Classification of capacitors, materials used for capacitors, capacitors specification:-capacitor working voltage, fixed capacitor- construction, specification and application of disc, ceramic capacitor, aluminum electrolytic capacitor, variable capacitor-application of air gang ,PVC gang capacitor, Trimmer capacitor – mica, Coding of capacitors-using numerals, colour band system, directly printed values on capacitors, capacitive reactance 1.3 INDUCTORS Faradays laws of electromagnetic induction, self & mutual induced emf inductor specifications- definitions and expressions of: - self inductance, mutual inductance, coefficient of coupling, Q factor, inductive reactance. construction and application of air core, iron core, ferrite core inductor, frequency range inductors- A.F. ,R.F., I.F., toroidal inductor
2. Cables, Connectors and Fuses (More weightage given to practical)	2.1 Compare various types of cables, connectors and fuses. 2.2 Describe applications of various types of cables, connectors and fuses. 2.3 Test various cables, connectors and fuses.	2.1 CABLES General specifications of cables- characteristic impedance, current carrying capacity, flexibility. Types of cables - construction and applications of coaxial cable, 600 E telephone cable-PASP, Alpeth sheathed cable, FRC cable, twin core cable-twisted & shielded type, optical fiber cable 2.2 CONNECTORS General specifications of connectors- contact resistance, breakdown voltage, insulation resistance ,Constructional diagram, applications of BNC, D series, Audio, Video, printer, edge, FRC, RJ 45 connectors. constructional diagram and applications of phone plug & jacks 2.3 FUSES Glass, ceramic fuse, resettable fuse, shunt fuse- MOV,HRC fuse
3. Switches and Relays (More weightage given to practical)	3.1 Differentiate the various Switches and their usage. 3.2 Explain construction, working and applications of various types of relays.	3.1 SWITCHES Switch specifications – voltage rating, contact current rating, contact resistance, characteristics of switch & relay - operating time, release time, bounce time, constructional diagram, application of toggle, rotary, push to on & push to off, rocker 3.2 RELAYS Construction, working and application of general purpose relay, NO, NC contact, reed relays, solid state relays, difference between switch & relay
4. PN junction Diode and Rectifiers	4.1 Explain the characteristics of PN junction diode. 4.2Compare various types of	4.1 PN JUNCTION DIODES Review of P-type and N-type semiconductor, characteristics of PN junction diode, forward voltage drop , reversed saturation current, Power dissipation, breakdown voltage 4.2 RECTIFIER Need of rectifier, definition, types of rectifier – half wave rectifier

Unit	Major Learning Outcomes	Topics and Sub-topics
	rectifiers. 4.3Build power supply with a filter.	voltage (no derivation) ,ripple, ripple factor, ripple frequency, PIV of diode used, transformer utilization factor, efficiency of rectifier of three types of rectifier 4.3 FILTERS Need of filters ,types of filters: shunt capacitor , series inductor, LC filter
5. Introduction to Transistors	5.1 Differentiate various Transistor Construction and configuration	5.1 Transistor construction ,Types of transistor (NPN & PNP) Transistor operation and amplifying action. 5.2 Transistor Configuration,(CB,CE,CC configuration.) 5.3 Relation between current gain, alpha and beta.
6. Introduction to IC and SMD	6.1 Compare various IC's and SMD 6.2 Interpret the datasheets	6.1 IC'S Classification of IC's, monolithic IC, advantages , disadvantages of IC's thick & thin film IC, hybrid IC, linear IC, digital IC , IC packages-SIP, TO 5 ,Flat , DIP, pin Identification, temperature ranges, device identification 6.2 SMD Concept of SMT & SMD, advantages & disadvantages of SMD. SMD resistor ,capacitor, IC, transistor, land pattern of SMD resistor, capacitor, transistor & IC's SMD packages (SOT,PLCC)

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Electronic components	16	5	5	10	**20**
II	Cables and connector	6	0	2	4	**6**
III	Switches and Relays	6	0	2	4	**6**
IV	PN junction Diode and Rectifiers	12	4	6	8	**18**
V	Introduction to Transistor	10	4	4	4	**12**
VI	Introduction to IC and SMD	08	2	2	4	**08**
	Total	56	**15**	**21**	**34**	**70**

Legends:

R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's Taxonomy)

6. SUGGESTED LIST OF EXPERIMENTS

The experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency.

S. No.	Unit No.	Experiment
1	ALL	Test AC/DC voltage sources with Digital Multimeter (DMM).
2	I	Identify, find value and test different types of resistors.
3	I	Identify, find value and test different types of capacitors.
4	I	Identify, find value and test different types of Inductors.
5	I	Make use of resister, capacitor, inductor in series and parallel connection.
6	II	Identify different types of cables & test it. Discover their application.
7	II	Identify different types of connectors & discover their application.
8	II	Identify different types of fuses & test it.
9	III	Identify different types of Switches and discover its usage.
10	III	Identify different types of Relays and discover its usage.
11	IV	Operate CRO & function Generator so as to become familiar with their external controls.
12	IV	Measure amplitude & frequencies of different sine waveform using CRO & Function Generator.
13	IV	Measure amplitude & frequencies of different square waveform using CRO & Function Generator.
14	IV	Test half wave rectifier and observe waveforms with and without filter.
15	IV	Test full wave rectifier and observe waveform with and without filter.
16	IV	Test bridge rectifier and observe waveforms with and without filter.
17	V	Test various transistor configuration.
18	VI	Identify various IC packages.
19	VI	Identify various SMD.
20	IV	Read and interpret data sheet of various junction diodes and Transistors.
21	V	Read and interpret data sheet of various IC and SMD components.

*** Note: Minimum 16 experiments should be performed**

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.
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	Electrical & Electronics Engineering Materials Component	S.K. Bhattacharya	Khanna

3	Basic Electronics	Debashis De	Pearson
4	Electronic Components Handbook	Thomas H. Jones	Reston Publishing Co.
5	Electronic Components and Materials	Dhir	Tata McGraw Hill
6	Handbook of components for electronics	Charles A. Harper	Laxmi Enterprise
7	Electronic Components and Materials	Grover & Jamwal	Dhanpat Rai & Sons
8	Electrical Engineering Materials	M.L. Gupta	Dhanpat Rai & Sons
9	Text book of Applied Electronics	R.S. Sedha	S. Chand

Other Learning Resources

i. Practical Semiconductor Data Manuals: BPB Publications; New Delhi
ii. Some electronic engineering magazines.

B. List of Major Equipment/ Instrument

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

C. List of Software/Learning Websites

i. http://www.electronics-tutorials.com/
ii. http://www.efymag.com/
iii. http://www.electronicsforu.com
iv. http://www.kpsec.freeuk.com/symbol.htm
v. http://en.wikipedia.org/wiki/Electronic_component
vi. http://forum.shaarpmind.com/showthread.php/2159-How-to-Check-Basic-Electronic-Components-Using-a-Multi-Meter

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. R.D Raghani** HOD, EC Dept., L. E. College, Morbi
- **Shri. M.Y. Kantharia** I/C HOD , EC Dept., BBIT , V V Nagar
- **Smt. G N Acharya** , Lecturer, EC Dept., Govt. Poly., Ahmedabad

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Joshua Earnest,** Professor and Head, Dept. of Electrical and Electronics Engg., NITTTR, Bhopal
- **Prof.(Mrs.) Susan S. Mathew,** Associate Professor, Dept. of Electrical and Electronics Engg., NITTTR, Bhopal