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 Engineering	&	Communication	Engineering,Biomedical	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	Examination Scheme					
		Credits (L+T+P) Theory Marks		Practical Marks		Total Marks		
L	Т	Р	С	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.	1.1 Differentiate	1.1 RESISTORS		
Electronic	various types of	Concept of resistors, classification of resistors, materials used		
Components resistors, capacitors and inductors & the usage. 1.2 Test various components.		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,	2.1 Compare various	2.1 CABLES		
1 77		General specifications of cables- characteristic impedance,		
and Fuses	connectors and	current carrying capacity, flexibility. Types of cables -		
(More	fuses. 2.2 Describe	construction and applications of coaxial cable, 600 E telephone cable-PASP, Alpeth sheathed cable, FRC cable, twin core cable-		
weightage given to	applications of	twisted & shielded type, optical fiber cable		
practical)	various types of	2.2 CONNECTORS		
practicar)	cables,	General specifications of connectors- contact resistance,		
	connectors and	breakdown voltage, insulation resistance ,Constructional		
fuses.		diagram, applications of BNC, D series, Audio, Video, printer,		
	2.3 Test various	edge, FRC, RJ 45 connectors. constructional diagram and		
	cables,	applications of phone plug & jacks		
	connectors and	2.3 FUSES		
2 Cyvitalian	fuses.	Glass, ceramic fuse, resettable fuse, shunt fuse- MOV,HRC fuse 3.1 SWITCHES		
3. Switches and Relays	3.1 Differentiate the various Switches	Switch specifications – voltage rating, contact current rating,		
(More	and their usage.	contact resistance, characteristics of switch & relay - operating		
weightage	3.2 Explain	time, release time, bounce time, constructional diagram,		
given to	construction,	application of toggle, rotary, push to on & push to off, rocker		
practical)	working and	3.2 RELAYS		
	applications of	Construction, working and application of general purpose relay,		
	various types of	NO, NC contact, reed relays, solid state relays, difference		
4 DN	relays.	between switch & relay		
4.1 PN 4.1 Explain the 4.1 PN JUNCTION DIODES				
junction Diode and	characteristics of PN junction	Review of P-type and N-type semiconductor, characteristics of PN junction diode, forward voltage drop, reversed saturation		
Rectifiers	diode.	current, Power dissipation, breakdown voltage		
200011015	4.2Compare various	4.2 RECTIFIER		
	types of	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 SMD6.2 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)

			Distribution of Theory Marks				
Unit	Unit Title	Teaching Hours	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	
12 17		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	Madhuri Joshi	Shroff Publishers & Distributors
	Materials		Private Ltd.
2	Electrical & Electronics		
	Engineering Materials	S.K. Bhattacharya	Khanna
	Component		

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
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- Dr. Joshua Earnest, Professor and Head, Dept. of Electrical and Electronics Engg., NITTTR, Bhopal
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