

13. MAPPING OF PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC  
OUTCOMES (PSOs) WITH COURSE OUTCOMES (COs)

S No	Course Outcome	POs										PSOs		
		1	2	3	4	5	6	7	8	9	10	01	02	
1	Identify electronic Components in given electronic circuit.	1	-	1	-	-	-	-	-	-	-	-	-	-
2	Select particular diode for different rectifier application, Filters and Regulator Circuits.	1	-	1	-	-	-	-	-	-	-	1	-	-
3	Distinguish the functioning of Uni-polar devices & Bi-polar Junction Transistor.	1	-	2	-	-	-	-	-	-	-	-	-	-
4	Use of electric machines & instruments for computer application	3	-	-	-	-	-	-	-	-	-	-	-	-
5	Select the need and application of protective devices	-	-	-	-	1	1	-	-	-	-	-	-	-

## Course Curriculum Design Committee

Sr No	Name of the faculty members	Designation and Institute
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COURSE TITLE- ELEMENTS OF ELECTRONICS & ELECTRICAL  
COURSE CODE 6S202

## PROGRAMME &amp; SEMESTER

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering / Information Technology	Second Semester

## 1. RATIONALE

It is necessary for the students of Computer Engineering and Information Technology to study and apply the basic principles, analyze and troubleshoot simple subsystems. To acquire this level of understanding, the basic knowledge of electronic devices and circuits is essential. Electrical engineering involves the conception, design, development, & production of the electrical or electronic products & systems needed by our technological society. This Course is one of the core subjects which is deals with construction, working principle of electronic devices, Electric circuits, different electrical machines with application of active components.

## 2. COMPETENCY

"Apply the basic electronic testing and fault finding of electronic and electrical components and circuits."

## 3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (Hours/ Credits)			Total Credits (L+T+P)	Examination Scheme (Marks)				Total
				Theory		Practical		
L	T	P	C	ESE	PT	ESE @ (PR/OR)	PA (1W)	150
04	-	02	06	80	20	25	25	
Duration of the Examination (Hrs)				03	01	02	--	

Legend : L-Lecture; T-Tutorial/Teacher Guided Theory Practice ; P- Practical; C- Credits; ESE- End Semester Examination; PT - Progressive Test, PA- Progressive Assessment, OR - Oral Examination, TW - Term Work, # External, @ Internal

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## 4. COURSE OUTCOMES

At the end of studying this course students will be able to :-

1. Identify electronic components in given electronic circuit.
2. Select particular diode for different rectifier application, Filters and Regulator Circuits.
3. Distinguish the functioning of Uni-polar devices & Bi-polar Junction Transistor.
4. Use of electric machines & instruments for computer application
5. Select the need and application of protective devices

## 5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Cognitive Domain Only)	Topics And Sub-Topics
Unit – I Electronic Components and Signals	1a. Differentiate between active and passive electronic components 1b. Differentiate between voltage and current source. 1c. Explain the different types of signal Parameters with sketches. 1d. Differentiate various types of ICs.	1.1 Active and passive components, Voltage and Current Source, Symbols of various Semiconductor Components. 1.2 Amplitude, Frequency, Phase, Wavelength, Signal, waveform, Time and frequency domain representation, Types of Signals: sinusoidal, triangular and square 1.3 Integrated Circuits – Analog and digital
Unit– II Diodes and Applications	2a. Describe V-I characteristics of PN junction diode with sketches 2b. Describe the application of PN Junction diode. 2c. Describe the working and applications of Zener diode. 2d. Describe V-I characteristics of Zener diode. 2e. Describe the applications of LED. 2f. Compare - 1. Types of Rectifiers 2. Types of Filters	2.1 Symbol, construction and working principle of P-N junction diode 2.2 Need of rectifiers, Half wave, Full wave and Bridge Rectifier, Working and block diagram of regulated power supply, Need of filters, "L", "C" and "π" Filter working. 2.3 Zener diode, Zener diode as voltage Regulator, Symbol, construction and working principle and V-I characteristics of Light Emitting Diode
Unit– III	3a. Differentiate unipolar and	3.1 Introduction to Unipolar and Bipolar

## 11. LIST OF MAJOR EQUIPMENTS AND MATERIALS REQUIRED :

S. No.	Name of equipment	Brief specification
1.	Single/Dual regulated Power supply.	As per Electronics and Electrical industry specification
2.	Digital multimeter and ammeter, micro-ammeter.	As per Electronics and Electrical industry specification
3.	Dual trace CRO/DSO.	As per Electronics and Electrical industry specification
4.	Function generator.	As per Electronics and Electrical industry specification
5.	Trainer kits / breadboard for Rectifiers, regulator, Transistors, JFET and RC coupled single / two stage amplifiers.	As per Electronics and Electrical industry specification

## 12. LEARNING WEBSITE &amp; SOFTWARE

- <http://nptel.ac.in/courses/122104013/>
- <http://www.electronics-tutorials.com/>
- <https://learn.sparkfun.com/tutorials/transistors>
- <http://www.pitt.edu/~qtw4/Academics/ME2082/Transistor%20Basics.pdf>
- [http://faculty.cord.edu/huther/physics225/Handouts/transistors\\_handout.pdf](http://faculty.cord.edu/huther/physics225/Handouts/transistors_handout.pdf)
- <http://www.technologystudent.com/elect/transis1.htm>
- <http://www.learningaboutelectronics.com/articles/N-channel-JFET>
- <http://www.electrical4u.com/jfet-or-junction-field-effect-transistor>
- <http://www.electrical-technologies.com/>
- <http://electrical4u.com/>
- <http://www.electronics-tutorials.com/>
- <http://www.animations.physics.unsw.edu.au/jw/AC.html>



- h. SCRs, TRIACS, DIACS
- i. LEDs, LCDs
- j. Devices for industrial and residential illumination
- k. Heaters and furnaces
- l. Motors and Alternators
- m. Switches, micro-switches and relays
- n. Soldering, desoldering, welding devices and equipment.
- o. Fans, Blowers and pumps
- p. Smoke detectors, fire alarms used in electrical/electronics installations.
- q. High voltage devices and equipment used and their safety features.
- r. To study three phase induction motor parts & their identification & Study the UPS used in the electrical/electronics laboratory.

## 9. SUGGESTED SPECIFIC INSTRUCTIONAL STRATEGIES

These are sample strategies, which a teacher can use to facilitate the attainment of course outcomes.

1. Guide students in preparing charts and display boards.
2. Guide students in searching information regarding datasheets and electronic components.
3. Demonstrate practical thoroughly before the students perform.
4. Show Flash/Video/Animation clippings for functioning of instruments.
5. Observe continuously and monitor the performance of students in lab.
6. Assign different types of Mini-projects
7. Guide students in preparing Micro-projects.

## 10. SUGGESTED LEARNING RESOURCE

S.No.	Name of Book	Author	Publication
1.	A text book of Applied Electronics	R.S.Sedha	S.Chand & Co.
2.	Electronics Principles	Albert Paul Malvino	McGraw Hill
3.	Principles Of Electronics	V.K.Mehta, Rohit Mehata	S.Chand & Co.
4.	B.L. Theraja	Electrical Technology Vol. I & II	S. Chand & Co.
5.	Prasad P.V and Sivansagaraju S.	Electrical Engineering: Concepts and Applications	Cengage Learning India, New Delhi, 2012
6.	V. N. Mittal	Basic Electrical Engineering	Tata McGraw Hill, New

<b>Bipolar junction Transistor &amp; Field Effect Transistors(BJT &amp; FET)</b>	<p>bipolar devices.</p> <p>3b. Describe the applications of transistor.</p> <p>3c. Determine the effect of Current gain on the performance of the transistor.</p> <p>3d. List specifications and ratings of BJT</p> <p>3e. Describe the applications of JFET and MOSFET.</p> <p>3.f Differentiate BJT and JFET.</p>	<p>devices</p> <p>3.2 Symbol, construction and working principle of NPN transistor, Transistor as switch and amplifier, Input and Output characteristics of CE,CB and CC configurations, Regions – Cut-off, saturation and Active region, Transistor parameters-<math>\alpha</math>, <math>\beta</math>, input and output resistance and relation between <math>\alpha</math> and <math>\beta</math></p> <p>3.3 FET- Types (JFET and MOSFET), Classification of JFET, Symbol, construction and working principle of N-channel and P-channel JFET</p>
<b>Unit – IV Electric Circuit Fundamentals &amp; Machines</b>	<p>4a. State and explain Ohm's law.</p> <p>4b. Explain different Circuit condition.</p> <p>4c. Apply Kirchoff's law in different circuit.</p> <p>4d. Give characteristics of Inductance &amp; Capacitance.</p> <p>4e. Analyze Series and Parallel combination of circuits Practical examples of these circuits.</p> <p>4f. Describe the working principle of DC generator and alternator</p> <p>4g. Classify induction motors</p> <p>4h. Describe the working Principle of given induction motor</p>	<p>4.1 Current, Voltage- EMF and Resistance, Ohm's Law, Equivalent resistance of resistors connected in series and parallel Circuit conditions – open, close and short circuit, Kirchoff's voltage and current laws, Power and Energy, Meters used to measure Current.</p> <p>4.2 Voltage, Resistance, inductance and capacitance Power and Energy, Simple problems on ohm's and kirchoff's law.</p> <p>4.3 DC generator and alternator, Classification of induction motors, Construction, working principle, Squirrel cage and wound rotor induction motor</p>
<b>Unit-V Transformer and protective devices</b>	<p>5a. Describe the construction of a simple transformer.</p> <p>5b. Describe the types and uses of transformers</p> <p>5c. List the types of transformers used in various devices</p>	<p>5.1 General construction and principle of Transformers, Emf equation and transformation ratio of transformers, Applications of Transformers, Construction and uses of auto transformers.</p> <p>5.2 Different protective devices such as fuse,</p>

5d. State the differences of MCB and ELCB	M.C.B. and ELCB. HRC fuses, Uninterruptible Power Supplies (UPS), Protecting computer system against power transients, Earthing principles and pipe earthing
5e. State the need of HRC fuses.	
5f. Explain how to protecting computer against power transient.	
5g. Describe how earthing is done for a domestic building	

## 6. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No	Title Of Unit	Teaching Hours	Distribution Of Theory Marks			
			R level	U Level	A Level	TOTAL
I	Electronic Components and Signals	08	04	04	02	10
II	Diodes and Applications	16	04	06	10	20
III	Bipolar junction Transistor & Field Effect Transistors(BJT & FET)	16	02	08	10	20
IV	Electric Circuit Fundamentals & Machines	14	04	06	08	18
V	Transformer and protective devices	10	02	04	06	12
	Total	64	16	28	34	80

Legends: R – Remember, U – Understand, A – Apply and above (Bloom's revised Taxonomy)

## 7. LIST OF PRACTICAL / LABORATORY EXPERIENCES/ TUTORIALS

Sr. No.	Unit	Title Practical/ Lab. Work/ Assignments/ Tutorials	Hours
1	I	Measure parameters like amplitude, time period, frequency of sine wave and square wave using CRO and Function Generator	02
2	I	Measure the value of the resistance by using (i) Analog and Digital Multi-meters and (ii) by Color coding.	02
3	II	Test the working of PN junction diode.	02

4	II	Test the working of Zener diode.	02
5	II	Use rectifiers to convert AC signal into DC signal using Half wave and Full wave rectifier. Use of filters to get regulated DC.	04
6	II	Use rectifiers to convert AC signal into DC signal using Bridge rectifier. Use of filters to get regulated DC.	04
7	II	Test the working of Zener regulator.	02
8	III	Check input and output characteristics of NPN Transistor in CE Mode.	04
9	III	Measure voltage between terminals of AC/DC.	02
10	IV	Use ohm's law experimentally in a given circuit.	02
11	IV	Use Kirchoff's current & voltage law in a given circuit.	02
12	VI	Measure input & output quantities of single phase transformer.	02
13	VI	Measure ratings of various Protective devices.	02
<b>TOTAL</b>			<b>32</b>

## 8. SUGGESTED STUDENTS ACTIVITIES

Other than class room and laboratory activities following are the suggested guided co-curricular student's activities which need to be undertaken to facilitate the attainment of various course outcomes of this course. The students are required to maintain portfolio of their experiences which he/ she will submit at the end of the term.

Following is the list of proposed student activities like:

1. Prepare journals based on practical performed in laboratory.
2. Study of datasheet of electronic components.
3. Prepare charts of symbols of Electronic components.
4. Search information about Ratings and specifications of Regulator, diode transistors, CRO, function generator.
5. List analog and digital ICs and prepare charts of the same.
6. Students may be asked to make a list of following items used in electric and electronics circuits. Compare their properties, usage, cost and availability. Collections can be made for small inexpensive items. Each of these can be offered as a project.
  - a. Conductors - Copper, Aluminum, Graphite, Carbon, Nichrome, Tin
  - b. Commonly used insulators
  - c. Transistors
  - d. Capacitors
  - e. Resistors
  - f. Diodes and Rectifiers
  - g. Transformers