

Course Name : Computer Engineering Group

Course Code : CO/CM/IF/CD

Semester : Second

Subject Title : Electronics

Subject Code : 12025

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50@	--	--	150

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

RATIONALE:

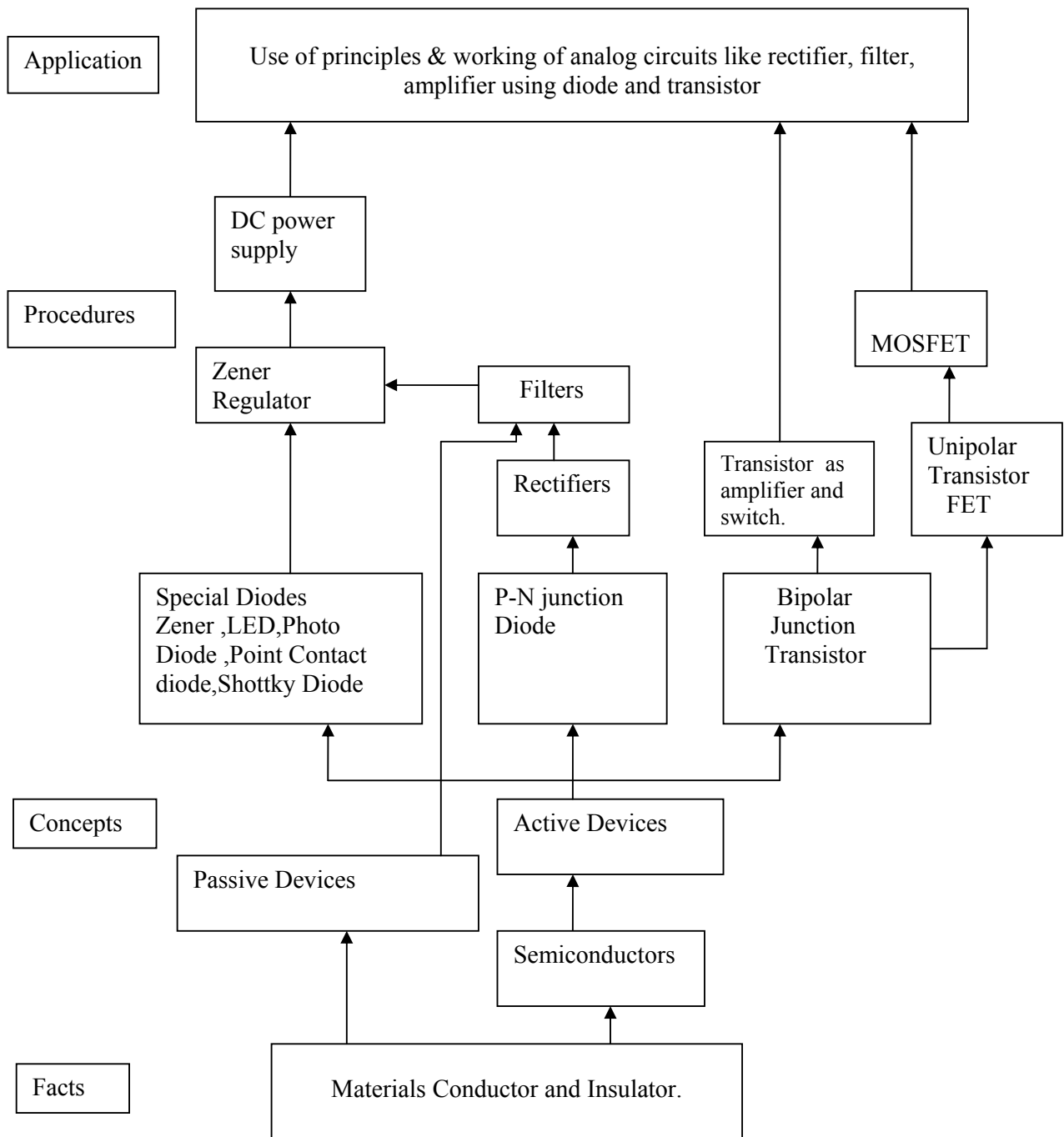
Electronics is a major part of our day to day life. In each and every field electronics systems are used. Basic electronics is one of the subject which is the base of all advance electronics. It starts with PN junction which makes the student to follow the functioning of all semiconductor based electronics. This is a core group subject and it develops cognitive and psychomotor skills.

OBJECTIVES:

Student will be able to

- 1) Describe the formation of PN junction.
- 2) Draw the characteristics of basic components like diode, transistor etc.
- 3) Draw and describe the basic circuits of rectifier, filter, regulator and amplifiers.
- 4) Compare voltage and power amplifiers.
- 5) Test diode and transistors.
- 6) Read the data sheets of diode and transistors.

Learning Structure:



CONTENTS: Theory

Chapter	Name of the Topic	Hours	Marks
1	<p>INTRODUCTION TO ELECTRONICS Definition of Electronics Application of Electronics i) Communication and Entertainment ii) Defense iii) Industrial Application iv) Medical Sciences v) Instrumentation 1) PASSIVE COMPONENTS Resistor: definition, symbol, unit. Types of resistors : fixed, variable, LDR, Thermistor (symbol and list of application only) Resistor colour code, wattage (w.r to size) 2) Capacitor : definition, symbol, unit Types of capacitor(to be shown in practical, no theory) Fixed : mica, paper, ceramic, electrolytic Variable : Gang capacitor 3) Inductor : definition, symbol, unit Types of Inductors : fixed ,variable Transformer :symbol, types (step up and step down), application</p>	04	04
2	<p>SEMICONDUCTOR THEORY * Structure of an atom * Energy level diagram * Energy Band diagram * Conductor, Insulator, Semiconductor (based on Band theory) * Intrinsic semiconductor : Si, Ge * Doping * Extrinsic semiconductor: P type. N type</p>	04	10
3	<p>SEMICONDUCTOR DIODE Diode (symbol) P-N junction P-N junction with no external bias (barrier potential, depletion region) P-N junction with external bias (forward and reverse bias) circuit for V-I characteristics of diode : knee voltage, static resistance, dynamic resistance, reverse breakdown voltage Types of diode : Zener diode (symbol, V-I characteristics, operating principle, Zener voltage, Zener breakdown, avalanche breakdown), Symbol, operating principle, application related to computers of LED, Photo diode, point contact diode, varactor diode. shottky diode Testing of diode using analog multimeter (practical only)</p>	08	20

4	<p>RECTIFIERS FILTERS AND REGULATORS</p> <p>Need of DC power supply</p> <ul style="list-style-type: none"> * Basic block diagram of Regulated Power Supply * Rectifier : definition, need of Rectification, Types of rectifiers :Half Wave Rectifier Full Wave Rectifier : Centre Tap and Bridge Circuit diagram ,operation, i/p - o/p waveforms, V_{av} (V_{dc}), V_{rms}, I_{av}(I_{dc}) I_{rms} Ripple factor, efficiency, PIV(No derivation expected) For all types Rectifiers, Comparison of Rectifiers * Filter : Need of filters , Types of filters : L,C,LC,CLC () Circuit diagram, working principle, I/P O/P waveform, Formula of Ripple factor for each type, Comparison of filters * Regulator : Need of Regulators Zener diode as Regulator Regulation factor :Load and line Regulation 	08	20
5	<p>BIPOLAR JUNCTION TRANSISTOR</p> <ul style="list-style-type: none"> • Introduction – Transistor (Definition) • Types :NPN, PNP junction transistors Symbol, operating principle (NPN Transistor only) Transistor Configuration :Common Emitter (CE) , Common Base (CB) , Common Collector (CC) <ul style="list-style-type: none"> - characteristics in CE configuration - circuit diagram, I/P – O/P characteristics, different points of characteristics(cut off, active, saturation),Input resistance, output resistance, current gain α & β, and relation between α and β <p>Introduction to Transistor Biasing, need of biasing, DC-load line, operating point Types of biasing</p> <ul style="list-style-type: none"> • Transistor as an amplifier (CE configuration only) Graphical representation Current gain Voltage gain Power gain (No derivation) Single stage CE amplifier - Circuit diagram, function of each component, frequency response and bandwidth Need of cascade amplifier Types of coupling :R-C couple, Transformer couple, Direct couple (circuit diagram and function of each component) Application of each amplifier <p>Transistor as a switch – Circuit diagram, operation, application</p>	12	30

6	FIELD EFFECT TRANSISTOR (UNIPOLAR TRANSISTOR) Introduction Types, symbols, working principles Characteristics of FET Circuit diagram for drain characteristics Operating regions of characteristics Drain resistance, mutual conductance, amplification factor and their relation Pinch off voltage of FET Comparison of BJT and FET MOSFET Types, symbol, working principle Application of FET and MOSFET	08	10
7	INTREGATED CIRCUITS Introduction , classification of integrated circuits, Advantages and limitations of integrated circuits Difference between linear and non linear ICs	04	06
Total		48	100

Practical:

Skills to be developed:

Intellectual Skills:

- 1] To identify active and passive components.
- 2] Understand working principle of basic components.
- 3] Understand the basic circuits in electronics.

Motor Skills:

- 1] Ability to draw of front panel of electronics equipments.
- 2] Ability of measurement of electrical quantities.
- 3] Ability to draw circuits & discriminate among them.
- 4] Ability to construct the basic circuits on Breadboard.

List of Practical:

1. Know your Electronics Laboratory.
2. study front panel of electronic equipments
3. Identify various components used in different electronic circuits.
4. To draw diode characteristics (forward and reverse)
5. To draw Zener Diode characteristics. (forward and reverse)
6. To determine D.C. output of Rectifier circuits (HWR And Bridge)

7. Study of reduction in ripple component of rectifier using Filter circuits
8. Operation of Zener diode as regulator.
9. To determine Transistor characteristics (CE mode)
10. Use of Transistor as switch.
11. Frequency response of CE amplifier.

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher & Address
1	Allen Motorshed	Electronic Devices & Circuits	Prentice Hall of India
2	N. N. Bhargava, D.C. Kulashreshtha, S.C. Gupta	Basic Electronics & Linear Circuits	Tata McGraw Hill
3	Malvino	Electronic Principles	Tata McGraw Hill
4	NIIT	Basics of Electronic Devices	Prentice Hall of India