Course Name : Electronics Engineering Group

Course Code : EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ED/EI/IU

Semester : Third

Subject Title : Electronics Devices and Circuits

Subject Code : 17319

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	04	03	100	25#	--	25@	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:

The past decades have witnessed several unprecedented and exciting developments in the field of electronics. A large number of solid state devices have been invented and used to design various electronics circuit. It will meet the pressing needs of learners who wish to gain a sound knowledge and understanding of the principles of electronics devices and circuits. It will stimulate the expert knowledge of electronics device and its applications. The subject plays a vital role in bridging the various electronics subjects.

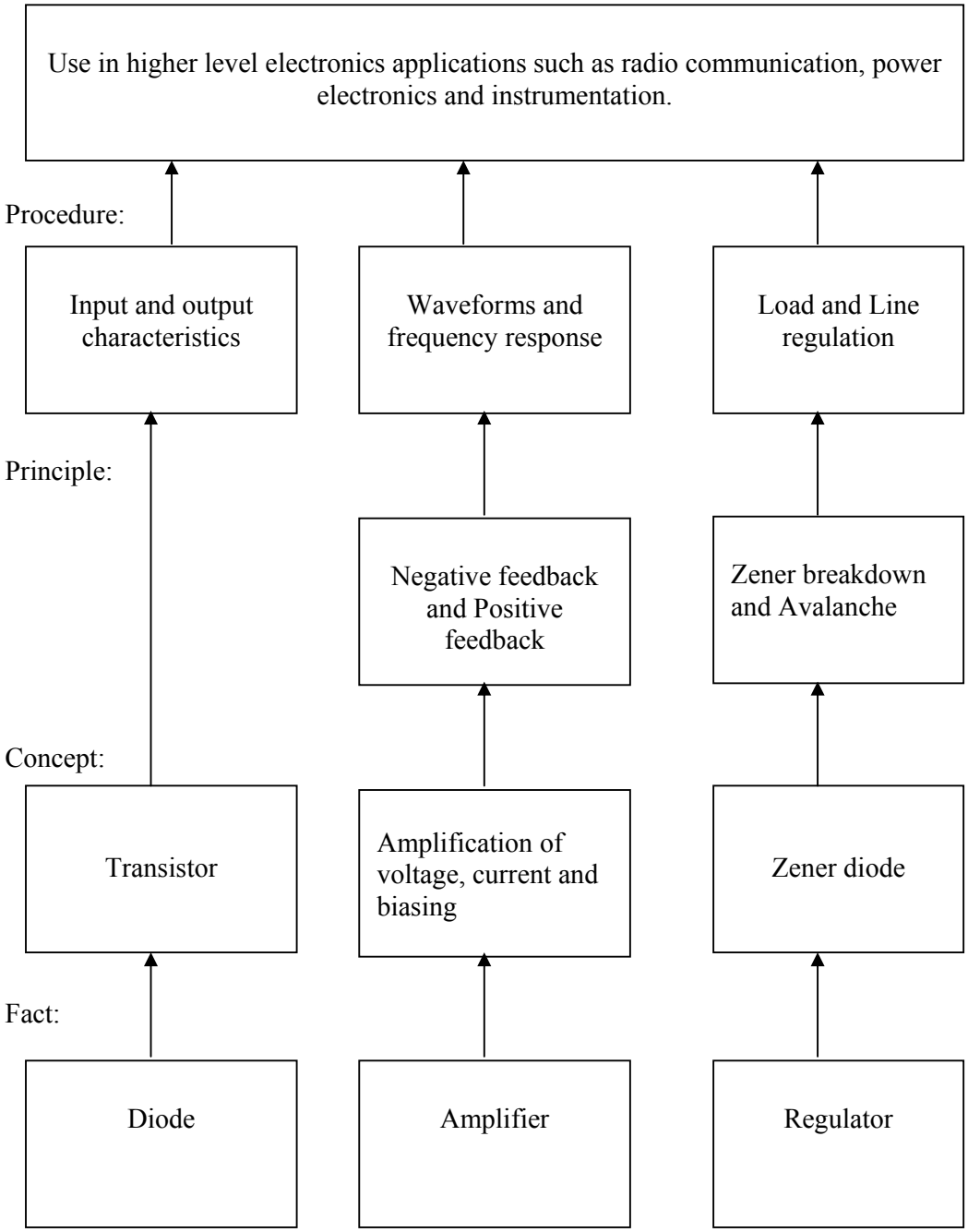
It intends to teach the operating principle and application of electronics circuits like amplifiers, regulators, time base generators, oscillators.

General Objectives:

The students will be able to:

1) Understand working principles of amplifiers, regulators and oscillators
2) Compare and classify amplifiers, oscillator time base generator, and regulator
3) Understand the use of these devices.

Learning Structure:



Theory:

Topics and contents	Hours	Marks
Topic 1) Transistors: Specific Objectives : ➢ Classify different types of BJT and their configuration. ➢ Select appropriate BJT based on application. ➢ State the need for biasing. Contents: 1.1 Introduction: [12] • Basic concept, • types of transistors, operation, • configuration (CB, CC & CE) & its input -output characteristics, • Comparison between CB, CC & CE, Transistor as switch 1.2 BJT Biasing: [12] • Need for biasing, • concept of DC load line, • operating point (Q), stabilization, thermal runaway • types of biasing i. Fixed biasing circuits. ii. Base biased with emitter feedback. iii. Voltage divider	14	24
Topic 2) Field Effect Transistors (FET): Specific Objectives : ➢ Select appropriate FET and MOSFET based on application. ➢ Appreciate the need for biasing. ➢ Identify the biasing circuit. Contents: 2.1 FET: Construction of JFET, (n-channel & p-channel), Working, principle & characteristics, (Drain characteristics & Transfer characteristics) 2.2 FET biasing: • Source self bias • Drain to source bias • Applications of FET 2.3 MOSFET: Introduction, types, construction, working & Applications.	08	12
Topic 3) Amplifier: Specific Objectives: ➢ Identify difference between small signal amplifier & power amplifier. ➢ Select the FET tuned amplifier for appropriate application. ➢ Compare different power amplifier. Contents: 3.1 Small Signal Amplifier: [08] • Concept of amplifier, • Single stage CE amplifier, • Frequency response, • Multistage amplifier, circuit diagram, working principle ,frequency	14	24

response.: • Types of amplifier coupling: Circuit diagram and operation of i. RC coupling, ii. Transformer coupling iii. Direct coupling. 3.2 FET Amplifier: [04] Common source, working principle and applications. 3.3 Power Amplifier: [08] • Comparison between small signal amplifier and power amplifier, • Classification: class A, class B, class AB & class C.with respect to operating point on load line,efficiency, • Single stage class A , power amplifier circuit: operation, input output waveforms. • Class B push-pull amplifier,operation ,input out waveforms and its advantages & disadvantages, applications of power amplifier. 3.4 Tuned Amplifier: [04] • Introduction & necessity of tuned amplifier, • basic tuned circuit, • Circuit diagram & operating principle of single & double tuned amplifiers.		
Topic 4) Feedback Amplifiers and Oscillators: Specific Objectives: ➢ Classify the feedback amplifier. ➢ Classify the oscillator**s.** Contents: 4.1 Concept of Feedback : [08] • Types of feedback: negative and positive feedback, • Types of feedback connections, voltage shunt, voltage series, current series & current shunt. • Advantages of negative feedback. 4.2 Introduction to Oscillators: [04] • Need and condition for oscillators (Barkhausen's criteria), • Type of oscillator: RC phase shift oscillator and crystal oscillator-Concept, working and applications. • Numericals on above topics.	08	12
Topic 5) Time Base Generators: Specific Objectives: ➢ Classify time base generators. ➢ Understand the use of transistor as a switch. Contents: 5.1 Unijuction Transistor (UJT): [04] • Construction, Working principle & characteristics. 5.2 Types of Time Base Generators: [08] • Free running time base generator, working principle of UJT as time base generators, (Relaxation oscillator). • Circuit diagram and working of	10	12

i. Voltage time base generator, ii. Current time base generator, iii. Bootstrap time base generator, iv. Miller's sweep generator & its applications.		
Topic 6) Voltage Regulators: Specific Objectives: ➢ Appreciate the need for voltage regulator. ➢ Classify the types of voltage regulators. Contents: 6.1 Regulators: [08] • Need of regulators, • Concept of load & line regulations, • Zener diode as voltage regulator. • Transistorized regulators: series voltage regulator, shunt voltage regulator. 6.2 Linear Regulators: [08] • Block diagram of DC Regulated power supply and functions of each block. • Fixed and variable voltage regulators using IC's, LM 723, 78XX, 79XX,	10	16
Total	**64**	**100**

Intellectual Skills:

1. Interpretation of circuits.
2. Locate faults in circuits.
3. Interpret the waveforms.

Motor Skills:

1. Draw the circuits.
2. Test the components using multimeter and CRO.
3. Sketch circuit/block diagram.

List of Practical

1) Input output characteristics of common base configuration.
2) Input output characteristics of common emitter configuration.
3) Switching characteristics of BJT
4) Drain and gate characteristics of JFET.
5) Switching characteristics of MOSFET
6) V-I characteristics of UJT.
7) Frequency response of single stage common emitter amplifier, determine gain and BW.
8) Frequency response of two stage RC coupled amplifier using BJT.
9) Frequency response of single tuned amplifier of BJT& determine tuned frequency and BW.
10) Frequency response and BW of amplifier without & with negative voltage series feedback
11) Draw input and output wave forms of class B push pull amplifier and determine efficiency.
12) Test and verify oscillation frequency of RC phase shift oscillator.
13) Determine Frequency of saw tooth oscillator using UJT and verify with actual value.
14) Determine T-on, T-off, duty cycle of Miller's sweep generator
15) Test & verify zener as regulator.

16) Determine the line and load regulation of series voltage regulator
17) Draw characteristics (Load and Line regulation) of fixed regulator circuit using IC's78xx.
18) Build dual voltage regulator & test unregulated input & regulated output voltage.
19) Draw characteristics for high voltage regulator using LM IC 723.

Learning Resources:
1. Books:

Sr. No.	Title	Author	Publisher
01	Applied Electronics	R.S. Sedha	
02	Electronics Devices and Circuits	Allen Mottershead	PHI(India), New Delhi
03	Electronics Circuit and Circuit Theory	Robert L.Boylestead Louis Neshelsky	Pearson
04	Electronics Device and Circuit	P.Ramesh Babu	Scitech
05	Electronic Devices and Circuits	David A. Bell	Oxford

2. Websites
1. www.nptel.com