

COURSE TITLE : ELECTRONIC DEVICES AND CIRCUITS
COURSE CODE : 3044
COURSE CATEGORY : B
PERIODS PER WEEK : 5
PERIODS PER SEMESTER : 75
CREDITS : 5

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Transistor as amplifier.	18
2	Tuned amplifier and power amplifier.	19
3	UJT, FETs and feedback amplifiers.	19
4	Oscillators and wave shaping circuits.	19
TOTAL		75

Course General Outcome :

Module	GO	On completion of the study of this course the students will be able:
1	1	To comprehend the operation of transistor as an amplifier.
	2	To understand the operation of multistage amplifiers.
2	3	To comprehend the operation of tuned voltage amplifier.
	4	To understand the operation of power amplifiers.
3	5	To understand feedback amplifiers.
	6	To understand the working of UJT, FET and MOSFET.
4	7	To comprehend the working of various oscillator circuits.
	8	To understand the working of wave shaping circuits.

GO - General Outcome

On the completion of the study the student will be able:

MODULE I TRANSISTOR AS AMPLIFIER

1.1.0 To comprehend the operations of transistor as an amplifier.

- 1.1.1 To define load line.
- 1.1.2 To draw AC and DC load lines.
- 1.1.3 To define operating point.
- 1.1.4 To explain the need for stabilization of operating point.

- 1.1.5 To list the different transistor biasing circuits.
- 1.1.6 To illustrate the behaviour of common emitter configuration with fixed and potential divider biasing.
- 1.1.7 To explain the principles of operation of transistor amplifier in common emitter configuration.
- 1.1.8 To derive the expression for voltage gain, current gain, power gain, input and output impedances of CE configuration.
- 1.1.9 To define frequency response and bandwidth of an amplifier.
- 1.1.10 To list the features and applications of emitter follower.
- 1.1.11 To explain the working of emitter follower.

2.1.0 To understand the operation of multistage amplifiers.

- 2.1.1 To identify the need of multistage amplifier.
- 2.1.2 To explain the concept of multistage amplifiers.
- 2.1.3 To list the different methods of interstage coupling.
- 2.1.4 To explain the working principle of RC coupled, transformer coupled and direct coupled multistage amplifiers.
- 2.1.5 To illustrate the frequency response of RC coupled, transformer coupled and direct coupled multistage amplifiers.
- 2.1.6 To list the applications of RC coupled, transformer coupled and direct coupled multistage amplifiers.
- 2.1.7 To compare the performance of the RC coupled, transformer coupled and direct coupled multistage amplifiers.

MODULE II TUNED AMPLIFIER AND POWER AMPLIFIER

2.1.0 To comprehend the operation of tuned voltage amplifiers.

- 2.1.1 To explain series and parallel resonant circuits.
- 2.1.2 To derive the expression for the resonant frequency of series and parallel circuits.
- 2.1.3 To write the relation between resonance frequency, "Q" and bandwidth.
- 2.1.4 To explain the operation and frequency response of single tuned amplifier.
- 2.1.5 To list the applications of tuned amplifier.

2.2.0 To understand the operation of power amplifiers.

- 2.2.1 To distinguish between voltage amplifier and power amplifier.
- 2.2.2 To illustrate the importance of impedance matching in power amplifier.
- 2.2.3 To classify power amplifiers.
- 2.2.4 To explain the operation of single ended power amplifier.
- 2.2.5 To state the importance of heat sinks and heat dissipation in power amplifiers.
- 2.2.6 To explain the operation of class B push pull power amplifier.
- 2.2.7 To list the advantages, disadvantages and applications of the push pull amplifier.

MODULE III FETS AND FEEDBACK AMPLIFIERS

3.1.0 To understand feedback amplifiers.

- 3.1.1 To define positive and negative feedbacks in amplifiers.
- 3.1.2 To derive the expression for the gain of feedback amplifier.
- 3.1.3 To illustrate the types of negative feedback in amplifiers.
- 3.1.4 To explain the operation of typical voltage and current feedback amplifier circuits.
- 3.1.5 To explain the effects of negative feedback.

3.2.0 To understand UJT, FET and MOSFET.

- 3.2.1 To explain the working principle of UJT.
- 3.2.2 To explain the working of relaxation oscillator using UJT.
- 3.2.3 To explain the working principle and construction of JFET.
- 3.2.4 To compare BJT and JFET.
- 3.2.5 To list different types of MOSFETs.
- 3.2.6 To explain the working principle and construction of MOSFET (Depletion type only).

MODULE IV OSCILLATORS AND WAVE SHAPING CIRCUITS

4.1.0 To comprehend the working of oscillators.

- 4.1.1 To explain the basic principle of operation of oscillators.
- 4.1.2 To state the Barkhausen criterion for oscillation.
- 4.1.3 To explain the working of RC phase shift oscillator.
- 4.1.4 To explain the working of Wien Bridge oscillator.
- 4.1.5 To list the applications of RC oscillators.
- 4.1.6 To explain the basic principle of LC oscillators.
- 4.1.7 To explain the working of Hartley and Colpitt's oscillators.
- 4.1.8 To list the applications of LC oscillator.
- 4.1.9 To define piezoelectric effect.
- 4.1.10 To explain the operation of Crystal oscillator.
- 4.1.11 To list the advantages and applications of Crystal oscillator.

4.2.0 To understand the working of multivibrators and wave shaping circuits.

- 4.2.1 To list the types of multivibrators.
- 4.2.2 To explain the operation of Astable multivibrator with the help of circuit diagram and waveforms.
- 4.2.3 To explain the working of Monostable multivibrator with the help of circuit diagram and waveforms.
- 4.2.4 To explain the operation of Bistable multivibrator with circuit diagram and waveforms.
- 4.2.5 To list the applications of multivibrators.
- 4.2.6 To explain the working of Schmitt trigger with circuit diagram and waveforms.
- 4.2.7 To define LTP and UTP.

- 4.2.8 To describe the RC differentiating and Integrating circuits.
- 4.2.9 To state the conditions for proper integration and differentiation.
- 4.2.10 To list the applications of integrator and differentiator circuits.

CONTENTS

MODULE I Transistor as amplifier

Load line - operating point - need for stabilization of operating point - transistor biasing circuits - CE configuration with fixed and potential divider biasing - transistor amplifier (CE) - principle of operation - expression for voltage gain, current gain, power gain, input and output impedances - frequency response and bandwidth - emitter follower - multistage amplifier - methods of interstage coupling - RC coupled, transformer coupled and direct coupled multistage amplifiers - working principle - frequency response - applications - comparison

MODULE II Tuned amplifier and power amplifier

Series and parallel resonant circuits - expression for resonant frequency - relation between resonant frequency, “Q” and bandwidth - single tuned amplifier - operation, frequency response, applications - voltage amplifier and power amplifier - comparison - impedance matching in power amplifier - classification of power amplifiers - single ended power amplifier - class B push pull power amplifier - operation - advantages and disadvantages - applications - heat sinks and heat dissipation in power amplifiers

MODULE III FETs and feedback amplifiers

Positive and negative feedback - expression for the gain of feedback amplifier - types of negative feedback - operation of typical voltage and current feedback amplifier circuits - effects of negative feedback - working principle of UJT - UJT relaxation oscillator - working principle and construction of JFET - comparison of BJT and JFET - types of MOSFETs - working principle and construction of MOSFET (depletion type only).

MODULE IV Oscillators and wave shaping circuits

Oscillators - principle of operation - Barkhausen criterion for oscillation - RC phase shift oscillator - Wien Bridge oscillator - applications of RC oscillators - principle of LC oscillators - Hartley and Colpitts oscillators - applications of LC oscillator - piezo-electric effect - crystal oscillator - operation - advantages - applications - multivibrators - types - operation- waveforms - applications -Astable multivibrator - Monostable multivibrator - Bistable multivibrator - Schmitt trigger - LTP and UTP - RC differentiator and integrator - conditions for proper integration and differentiation – applications.

Text Book

1. Basic Electronics and Linear Circuits - N N Bhargava, Kulshreshtha and S C Gupta – TMH.
2. Electronic Devices and Circuits – Bogart.
3. Electronic Devices and Circuits - Anil K Maini and Varsha Agarwal - Wiley India.