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 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

Specific outcome:

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.

CONTENT DETAILS

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

REFERENCE

1. David A Bell Electronic Devices and Circuits PHI