COURSE TITLE : ANALOG DEVICES AND CIRCUITS
COURSE CODE : 3031
COURSE CATEGORY : B
PERIODS/WEEK : 4
PERIODS/SEMESTER : 60
CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Rectifiers Wave shaping Circuits	15
2	Amplifiers & Feedback Concept	15
3	Oscillators & Multivibrators	15
4	Operational Amplifiers Applications	15
	Total	**60**

Course Outcome:

Sl.	Sub	**On completion of this course the student will be able:**
1	1	To understand the working of rectifiers.
	2	To know the working of wave shaping circuits.
2	1	To understand different types of amplifier circuits.
	2	To understand the feedback concept.
3	1	To understand the oscillator circuits.
	2	To understand the multi-vibrator circuits.
4	1	To know the principle of operation of op-amp.
	2	To understand the applications of op-amp.

Specific Outcome:

MODULE I Rectifiers and Wave shaping Circuits

1.1.0 To understand the working of rectifiers.

1.1.1 To explain active and passive components.
1.1.2 To describe the construction and principles of Half-wave rectifying circuits with wave forms.
1.1.3 To describe the construction and principles of full wave-(Centre tap and Bridge) rectifying circuits with wave forms.
1.1.4 To determine the Peak inverse Voltage, Ripple factor, regulation and efficiency
1.1.5 To differentiate different types of rectifiers-half wave, full wave
1.1.6 To compare different types filter circuits and wave forms of rectifiers
1.1.7 To using capacitor input filter, Inductor &π Filter
1.1.8 To describe regulator using zener diode
1.1.9 To describe the working of regulator using 7805, 7905 ICs

1.2.0 To know the working of wave shaping circuits.

1.2.1 To categorize clipping circuits– (series, shunt, biased, Double Ended)
1.2.2 To categorize clamping circuits - (positive, negative,)
1.2.3 To differentiate clipping and clamping circuits

MODULE II Amplifiers & feedback concept

2.1.0 To understand different types of amplifier circuits.

2.1.1 To describe transistor as an amplifiers.
2.1.2 To describe circuit diagram and working of Common Base amplifier and Common emitter amplifier.
2.1.3 To categorize different schemes of amplifier coupling- Importance.
2.1.4 To discriminate R.C. coupled, transformer coupled and direct coupled amplifiers
2.1.5 To plot frequency responses of R.C coupled, transformer coupled and direct coupled amplifiers and write necessary justification.
2.1.6 To define lower and upper cut off frequencies, band width, and 3dB points.
2.1.7 To identify the importance of impedance matching in power amplifier.
2.1.8 To analyze the operation of a single stage amplifier.
2.1.9 To analyze the operation of Class A, Class B and class C amplifiers.
2.1.10 To describe the push pull amplifier.
2.1.11 To explain complimentary, symmetry, push pull amplifiers.

2.2.0 To understand the feedback concept

2.2.1 To define the concept of feedback.
2.2.2 To describe the positive and negative feedback.

MODULE III Oscillators & Multivibrators

3.1.0 To understand the oscillator circuits.

3.1.1 To describe the principle of oscillation.
3.1.2 To state the concept of Barkhausen's criterion.
3.1.3 To illustrate the conditions of sustained oscillation.
3.1.4 To describe the operation of the following oscillators.
a) Tuned collector
b) Hartley
c) Colpitts
d) R-C phase shift
e) Crystal

3.2.0 To understand the multi-vibrator circuits.

3.2.1 To explain astable multi vibrator circuits.
3.2.2 To explain mono stable multi vibrator circuits.
3.2.3 To explain bistable multi vibrator circuits.
3.2.4 To distinguish working of different multi vibrator circuits with wave forms-applications.
3.2.5 To describe the working of astable & mono stable multi vibrator circuits using IC 555.
3.2.6 To explain the Schmitt trigger circuit, meaning of UTP and LTP.
3.2.7 To list out the applications of Schmitt trigger.

MODULE IV Operational amplifiers & applications

4.1.0 To know the principle of operation of op-amp.

4.1.1 To illustrate the characteristics of an ideal operational amplifier.
4.1.2 To explain the concept of virtual ground.
4.1.3 To describe the characteristics of ideal op-amplifier.
4.1.4 To explain inverting & non inverting amplifiers using op-amplifier.

4.2.0 To understand the applications of op-amp.

4.2.1 To describe adder, subtractor using op-amplifier.
4.2.2 To describe Integrator, differentiator using op-amplifier.
4.2.3 To explain Op-Amp as comparator.
4.2.4 To identify the zero crossing detector, level detector, Schmitt trigger using op-amplifier.
4.2.5 To describe the working principle of half wave precision rectifiers.
4.2.6 To describe the working principle of full wave precision rectifiers.

CONTENT DETAILS

MODULE I

Introduction. Active and passive components-different types of resistors-different types of capacitors-inductors. Rectifiers - Regulators & wave shaping - Half wave - full wave(Centre tap and bridge type) rectifiers using diodes – wave forms – Peak Inverse voltage - ripple factor – regulation& efficiency - comparison of different types of rectifiers, filters – different types-capacitor input, inductor input & π filter-zener diode regulator- Regulator using 7805,7905 ICs-Clipping circuits – series – shunt – biased type – double Ended clipper circuits - Clamping circuits – positive -negative clamping circuits

MODULE II

Amplifiers - Principle of amplification , Common Base, Common Emitter Amplifiers using Transistors– Types of Amplifiers – Different scheme of coupling -R.C coupled and transformer coupled , direct coupled – frequency response – 3dB -upper and lower cut off frequencies – Bandwidth – concept of Voltage& Power amplifiers – Operation of single stage Amplifiers –Class A, B &C types –comparison of push pull amplifiers- working – advantage – complimentary symmetry push pull amplifier- working – feedback in amplifier – types of feedback (positive, Negative)-applications of feedback.

MODULE III

Oscillators and Multi vibrators - Concept of Barkhausen's criterion - condition for oscillations – Classifications of oscillators – tuned collector, Hartley , Colpitts , RC-Phase shift - multi vibrator circuits - astable, monostable Bistable multivibrators – applications. Astable& Monostable multivibrator using IC 555- Schmitt trigger – UTP and LTP –applications.

MODULE IV

Introduction to Operational amplifies - Characteristics of ideal and actual op-amp - concept of virtual ground – Input offset voltage, input offset current, input bias current, output offset voltage, CMRR Op-amp circuits- inverting amplifier, non-inverting amplifier (derivation needed), voltage follower, comparator, difference amplifier, summing amplifier, integrators, differentiators - Application of op-amp - Zero crossing detector, positive and negative voltage level detector – Schmitt trigger, Half-wave and full wave precision - Rectifier using Op-Amps.

TEXT BOOKS

1. V.K.Mehta. Principles of Electronics. S Chand &co.
2. R.S. Sedha. Applied Electronics. S Chand &co.
3. Ram Gayakwad. Op-Amps and Linear Integrated Circuits. Prentice hall India

REFERENCES

1. B.L.Theraja. Electrical Technology. Vol-IV: S Chand &co.
2. Kumar A. Anand. Fundamentals of Digital circuits: PHI Learning