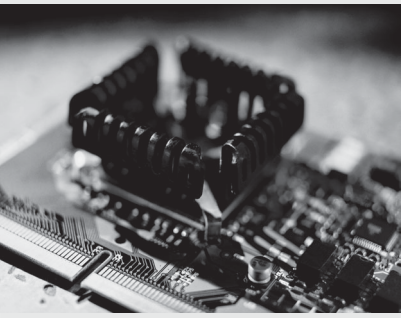

16EE208 ANALOG ELECTRONICS

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
5	40	1	8	5	1

Course Description and Objectives:

This course is an extension of electronic devices and circuit theory and deals with feedback amplifiers, oscillators, multistage amplifiers, OP-amps, ADC, DAC, 555 timers and PLL. The objective of the course is to design simple circuits using these devices.

Course Outcomes:

The student will be able to:

- understand and analyze the working of feedback amplifiers.
- understand and analyze the working of high frequency multistage amplifiers.
- design of simple electronics circuits by OP-amps.
- understand the applications of 555 timer.

SKILLS:

- ✓ *Analyze the operation of transistor based multistage and feedback amplifiers.*
- ✓ *Design and simulate amplifier circuits using multisim.*
- ✓ *Design and analysis of OP-amp based function generator.*
- ✓ *Realization of multivibrator circuits using 555 timer.*
- ✓ *Data acquisition using ADC and DAC.*

UNIT – 1 **L-10**

FEEDBACK AMPLIFIERS: Concept and types of feedback amplifiers, Effects of feedbacks, Different topologies of feedback amplifiers and their analysis.

OSCILLATORS: Barkhausen's crieterion for oscillations, Frequency of oscillation for hartley, Colpitts, RC phase shift, Weinbridge and crystal oscillators.

UNIT – 2 **L-8**

HIGH FREQUENCY TRANSISTOR AMPLIFIER CIRCUITS: High frequency model of transistor and its cut-off frequencies, Single stage and multistage amplifiers at high frequencies, Calculation of gain and bandwidth for single and multistage amplifiers.

UNIT - 3 **L-9**

OP-AMP AND ITS APPLICATIONS: Introduction to integrated circuits, Basic information of Op-amp, Ideal and practical Op-amp, Internal circuit, DC and AC characteristics of Op-amp, Modes of operation - Inverting, Non-inverting and differential; Basic application of Op-amp - V to I and I to V converters, Sample and hold circuits, Multipliers, Dividers, Comparators, Differentiators and integrators.

UNIT – 4 **L-9**

555 TIMER: Introduction to 555 timer and its functional diagram; Applications of 555 timer - Schmitt Trigger, Monostable and astable multivibrators, Frequency divider, Linear ramp generator and symmetrical square wave generator.

PHASE LOCKED LOOPS: Introduction to PLL, Principles and description of individual blocks of 565; Applications of PLL - Frequency multiplier and frequency synthesizer.

UNIT – 5 **L-9**

D/A AND A/D CONVERTERS : Introduction to D/A and A/D converters, Basic DAC techniques - Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, and IC1408 DAC; Different types of ADCs - Parallel comparator type ADC, Counter type ADC, Successive approximation ADC and dual slope ADC; DAC and ADC specifications.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 30

1. Design of oscillator circuits.
2. Non-linear wave shaping – clippers.
3. Non-linear wave shaping – clampers.
4. Schmitt trigger using 555 timer.
5. Design of astable multivibrator using 555 timer.
6. Design of monostable multivibrator using 555 timer.
7. Design of basic arithmetic circuits such as adder and subtractor.
8. Design of Integrator and differentiator.
9. Design of voltage comparators using OP-Amp.
10. Digital to analog converter (R-2R ladder).
11. Design of parallel comparator type ADC.

TEXT BOOKS :

1. J. Millman and C.C.Halkias, "Electronic Devices and Circuits", 9th edition, Tata Mc-Graw Hill, 2012.
2. D. Roy Chowdhury, "Linear Integrated Circuits", 3rd edition, New Age International (P) Ltd, 2010.

REFERENCE BOOKS:

1. David A. Bell, "Solid State Pulse circuits", 5th edition, Prentice Hall of India, 2011.
2. Ramakanth A. Gayakwad, "Op-Amps and Linear ICs", 5th edition, Prentice Hall of India, 2011.
3. R.L.Boylestad and Lovis Nashelsky, "Electronic Devices and Circuits Theory", 10th edition, Pearson Education, 2010.

ACTIVITIES:

- *Design of colpitts oscillator for a specific frequency.*
- *Design of Hartley oscillator for a specific frequency.*
- *Design of OP-amp based square wave generator.*
- *Design of pulse generator for triggering SCR.*
- *Design of basic arithmetic based circuits such as adder and subtractor.*
- *Design of Integrator and differentiator.*