ANALOG AND PULSE CIRCUITS

IV Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AECC09	Core	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisites: There are no prerequisites to take this course.

I. COURSE OVERVIEW:

This course provides circuit analysis to design high frequency amplifiers and wave shaping circuits using discrete components. It covers multistage amplifiers, power amplifiers, feedback concepts, sampling gates and multivibrators. Analog electronics are widely used in radio and audio equipment and in many applications where signals are derived from analog sensors and transducers.

II. COURSE OBJECTIVES:

The students will try to learn:

I The design and analysis of transistor amplifiers using low frequency and highfrequency signals.

II The response for a linear wave shaping circuits of low pass filter and high passfilters.

III The generation of non-linear oscillations by using regenerative feedback circuitfor multi vibrators.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Illustrate** Bipolar Junction Transistor (BJT) amplifier circuits and their frequency responses at low, mid and high frequencies for determining amplifier characteristics.	Understand
CO 2	**Summarize** the concept of feedback in amplifiers for the distinction between negative and positive feedback.	Understand
CO 3	**Obtain** the expression to find frequency of oscillations for RC and LC type oscillator circuits.	Understand
CO 4	**Identify** the suitable large signal amplifiers or power amplifiers for practical applications with given specifications.	Apply
CO 5	**Analyze** the response of linear and non-linear wave shaping circuits for impulse and pulse inputs with different time constants.	Analyze
CO 6	**Build** bitable, constable and a stable multi vibrator circuits using transistors for real time applications.	Apply

IV. SYLLABUS:

MODULE – I: MULTISTAGE AMPLIFIERS PROBABILITY (08)

Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Millers theorem and its dual for single stage amplifier, Frequency response and Analysis of multistage amplifiers, Cascode amplifier, Darlington pair. Transistor at High Frequency: Hybrid - model of Common Emitter transistor model, fα, β and unity gain bandwidth, Gain band width product.

MODULE – II: FEEDBACK AMPLIFIERS (08)

Concepts of feedback, classification of feedback amplifiers, general characteristics of negative feedback amplifiers, effect of feedback on amplifier characteristics, voltage series, voltage shunt, current series and current shunt feedback configurations.

MODULE – III: OSCILLATORS AND LARGE SIGNAL AMPLIFIERS (12)

Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators, generalized analysis of LC oscillators, hartley and colpitts Oscillators, frequency and amplitude stability of

Oscillators, crystal Oscillator.

Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class C Amplifiers. Tuned Amplifiers: Single Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.

MODULE – IV: LINEAR WAVE SHAPING AND SAMPLING GATES (08)

Linear wave shaping circuits: High pass RC and low pass RC circuits, response to step and square inputs with different time constants, high pass RC circuit as a differentiator, low pass RC circuit as an integrator.
Sampling gates: basic operating principle of sampling gate, uni and bi directional sampling gates.

MODULE – V: MULTIVIBRATORS (09)

Multivibrators: Bistable multivibrator, unsymmetrical triggering, symmetrical triggering; Schmitt trigger; Monostable multivibrator, Astable multivibrator.

IV. TEXT BOOKS:

1. Jacob Millman, Christos C Halkias, "Integrated Electronics" McGraw Hill Education, 2nd Edition, 2010.
2. Thomas L. Floyd, "Electronic Devices Conventional and Current Version", Pearson Education,2015.
3 A. Anand Kumar, "Pulse and Digital Circuits", PHI learning, 2nd Edition, 2005.

V. REFERENCE BOOKS:

1. David A. Bell, "Electronic Devices and Circuits", Oxford, 5th Edition, 1986.
2. Robert L. Boylestead, Louis Nashelsky, "Electronic Devices and Circuits Theory", Pearson Education, 11th Edition, 2009.
3. Millman J., Taub, "Pulse, Digital and Switching Waveforms", Tata McGraw-Hill, 2nd Edition, 2007.

VI. WEB REFERENCES:

1. www.nptel.ac.in
2. notes.specworld.in/pdc-pulse-and-digital-circuits
3. http:// www.introni.it/pdf/Millman-Taub- Pulse and Digital Switching Waveforms1965.pdf
4. https://www.jntubook.com/pulse-digital-circuits-textbook-free-download/