ANALOG AND PULSE CIRCUITS

IV SEMESTER: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AECB11	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Learn the concepts of high frequency analysis of transistors.
II. Understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
III. Familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
IV. Construct various multivibrators using transistors.

COURSE OUTCOMES (COs):

CO 1: Discuss the frequency response and analysis of multistage amplifiers and transistor at high frequency
CO 2: Analyze the effect of feedback on Amplifier characteristics in feedback amplifiers
CO 3: Discuss the frequency response of various oscillators and analyze the large signal and tuned amplifiers
CO 4: Understand the linear wave shaping and different types of sampling gates with operating principles using diodes, transistors
CO 5: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors

COURSE LEARNING OUTCOMES (CLOs):

1. Understand the classification of amplifiers, distortions in amplifiers and different coupling schemes used in amplifiers.
2. Analyze various multistage amplifiers such as Darlington, Cascade etc.
3. Understand and remember the concept of Hybrid - model of Common Emitter transistor.
4. Analyze the importance of positive feedback and negative feedback in connection in electronic circuits.
5. Analyze various types of feedback amplifiers like voltage series, voltage shunt, current series and current shunt.
6. Understand the condition for Oscillations and various types of Oscillators.
7. Design various sinusoidal Oscillators like RC Phase shift, Wien bridge, Hartley and Colpitts oscillator for various frequency ranges.
8. Design different types of power amplifiers for practical applications of desired specifications like efficiency, output power, distortion, etc.
9. Design the tuned circuits used in single tuned amplifiers and understand its frequency response.
10. Analyze the response of high pass RC to different non sinusoidal inputs with different time constants and identify RC circuit's applications.
11. Understand the basic operating principle of sampling gates.
12. Analyze the response of low pass RC circuits to different non sinusoidal inputs with different time constants and identify RC circuit's applications.
13. Illustrate the Bistable multivibrator with various triggering methods and apply design procedures to different bistable multivibrator circuits.

14. Analyze the Monostable, Astable multivibrator circuits with applications and evaluate time, frequency parameters.
15. Evaluate triggering points, hysteresis width of Schmitt trigger circuit and also design practical Schmitt trigger circuit.

MODULE-I	MULTISTAGE AMPLIFIERS	Classes: 08

Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade amplifier, Darlington pair.
Transistor at High Frequency: Hybrid - model of Common Emitter transistor model, f_{α}, β and unity gain bandwidth, Gain band width product.

MODULE-II	FEEDBACK AMPLIFIERS	Classes: 10

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	Classes: 08

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	Classes: 10

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	Classes: 09

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

Text Books:

1. Jacob Millman, Christos C Halkias, "Integrated Electronics" McGraw Hill Education, 2nd Edition, 2010.
2. B.N.Yoganarasimhan, "Pulse and Digital Circuits", 2nd Edition, 2011.
3. A. Anand Kumar, "Pulse and Digital Circuits", PHI learning, 2nd Edition, 2005.

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.

Web References:

1. www.nptel.ac.in
2. notes.specworld.in/pdc-pulse-and-digital-circuits
3. http:// www.intronі.it/pdf/Millman-Taub- Pulse and Digital Switching Waveforms 1965.pdf
4. https://www.jntubook.com/pulse-digital-circuits-textbook-free-download/

E-Text Books:

1. https://www.jntubook.com/electronic-circuit-analysis-textbook
2. http://tradownload.com/results/neamen-electronic-circuit-analysis-and-design-.htm
3. http://www.igniteengineers.com
4. http://www.ocw.nthu.edu.tw