Service course to EEE

R-15

**II B.Tech I Sem**

## 15AEC04-ANALOG ELECTRONIC CIRCUITS

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**Course Objectives:**

1. To study the analysis and design of multistage amplifiers with compound connections, feedback amplifiers and oscillators.
2. To study various wave shaping circuits and their applications.
3. To study different circuits that produce non-sinusoidal waveforms (multivibrators) and their applications.

**Course Outcomes:**

Upon completion of this course, student will be able to :

a. Analyze the frequency response of the amplifiers at low and high frequencies and also design of pulse generating circuits.
b. Analyze and design of multistage amplifiers with compound connections, feedback amplifiers, oscillators and pulse generating circuits.
c. Design different analog electronic circuits based on the above concepts.

**UNIT I - Multistage Amplifiers:**

Classification of Amplifiers- Distortion in amplifiers, Analysis of CE amplifier with Emitter Resistance and Emitter follower, Different Coupling Schemes used in Amplifiers- RC Coupled Amplifier, Direct and Transformer Coupled Amplifiers, Design of Single stage RC Coupled Amplifier Using BJT, Analysis of Cascaded RC Coupled BJT Amplifiers, Darlington Pair, Cascade Amplifier, Illustrative design problems.

**UNIT II – High Frequency Response:**

Logarithms, Decibels, General Frequency considerations, Frequency Response of BJT Amplifier, Analysis at Low and High Frequencies, Effect of Coupling and bypass Capacitors, The Hybrid-pi ($\pi$)- Common Emitter Transistor Model, CE short Circuit Current gain, Current gain with Resistive Load, Single Stage CE Transistor Amplifier response, Gain-Bandwidth Product, Emitter follower at higher frequencies, Illustrative design problems.

**UNIT III - Feedback Amplifiers And Oscillators:**

**Feedback Amplifiers:** 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.

**Oscillators**: Conditions for Oscillations, RC and LC type Oscillators, RC-Phase shift and Wien-Bridge Oscillators, Generalized Analysis of LC Oscillators, Hartley and Colpitts Oscillators, Crystal Oscillators, Frequency and Amplitude Stability of Oscillators.

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**UNIT IV**

**Linear Waveshaping**

High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs.

**Clippers & Clampers**

Diode clippers, clipping at two independent levels, Comparators, applications of voltage comparators, clamping operation, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage.

**UNIT V**

**Multivibrators**

Transistor as a switch, Break down voltages, Transistor-Switching Times, Triggering circuits. Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger circuit using BJT.

**Text Books:**


1. Integrated Electronics, Jacob Millman, Christos C Halkias, 2nd Edition, Mc Graw Hill, 2002.
2. Pulse, Digital and Switching Waveforms, J.Millman, H.Taub and Mothiki S. Prakash Rao, 2nd Edition, Tata McGraw Hill, 2008.


**Reference Books:**


1. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson, 2008.
2. Solid State Pulse Circuits, David A. Bell, 4th Edition, PHI, 2002.
3. Electronic Circuit Analysis, K.Lal Kishore, 2nd Edition, BSP, 2004.
4. Pulse and Digital Circuits, A. Anand Kumar, 2nd Edition, PHI, 2011.