II B.Tech II Sem

15AEC13-ELECTRONIC CIRCUIT ANALYSIS & DESIGN

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Course Objectives: The aim of this course is

1. To familiarize the student with the analysis and design of multistage amplifiers with compound connections, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers.
2. To study and analyze the frequency response of amplifier circuits.

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

a. Analyze the frequency response of the BJT amplifiers at low and high frequencies.
b. Analyze and design multistage amplifiers with compound connections, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers.

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, Frequency Response of BJT Amplifier, Design of Single stage RC Coupled Amplifier Using BJT, Analysis of Cascaded RC Coupled BJT Amplifiers, Darlington Pair, Cascode Amplifier, Illustrative design problems.

UNIT II

High Frequency Response

Logarithms, Decibels, General Frequency considerations, Analysis of BJT amplifiers at High Frequencies, Effect of Coupling and bypass Capacitors, The Hybrid-pi (π)- 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

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, Illustrative design Problems.

UNIT IV: 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, Illustrative design problems.

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UNIT V:

Power Amplifiers: Classification, Series fed Class A Power Amplifier, Transformer Coupled Class A Amplifier, Efficiency, Push Pull Amplifier- Complementary Symmetry Class-B Power Amplifier, Amplifier Distortion, Power Transistor Heat sinking, Class C and Class D Power amplifiers, Illustrative design problems.

Introduction to Tuned amplifiers: Q-Factor, Single tuned, double tuned and stagger tuned amplifiers.

Text Books:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, 2nd Edition, Mc Graw Hill, 2002.
2. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson, 2008.

Reference Books:

1. Electronic Circuit Analysis, K.Lal Kishore, 2nd Edition, BSP, 2004.
2. Electronic Circuits Analysis and Design, Donald A Neamen, 3rd Edition, Tata McGraw-Hill, 2009.
3. Microelectric circuits, Sedra, Kenneth, Smith, 5th Edition, Oxford University Press, 2011.
4. Electronic Circuit and Applications, Mohammad H. Rashid, 3rd Edition, CENGAGE Learning, 2009..

Introductory Electronic Devices and Circuits, Robert T. Paynter, 7th edition, PEI, 2009.