Basic Electronic Devices and Circuits

(Only for EEE during I B.Tech., II Semester)

Course Code: EE2T4 **Credits: 3**
Lecture : 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

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Course Objectives:

- To study in detail about construction of several electronic devices.
- To analyse the characteristics of various electronic devices and circuits.
- To analyze Small signal BJT Amplifiers at low & high frequencies
- To analyze different BJT Oscillator circuits

Learning Outcomes:

- Will get knowledge about the Semiconductor Devices like Diode, BJT,Uni-polar devices like JFET, MOSFET.
- Will be able to analyze rectifiers circuits.

PRE-REQUISITE: Semi Conductor Physics.

UNIT-I: SEMI CONDUCTOR JUNCTION DIODE

PN Junction: Open circuited P N Junction, Forward and Reverse Bias, Current components in PN Diode,Volt-Amper Characteristics, Diffusion capacitance and Diode Resistance (Static and Dynamic), Energy Band Diagram of PN Diode, Avalanche and Zener Break Down, ZenerDiode, Tunnel Diode, Varactor Diode, LED, Photo Diode.

Diode as a Rectifier:,Halfwave Rectifier, Full wave Rectifier with Center-tapped Transformer, Bridge Full wave Rectifier, derivation of Ripple factor, Form factor, peak factor, Efficiency of Rectifiers. Capacitor filter and Inductor filter.

UNIT-II: TRANSISTOR CHARACTERISTICS

Bi-polar Junction Transistor:Construction of BJT, Transistor current components, Transistor as an amplifier, Characteristics of Transistor in Common Base and Common Emitter Configurations, Typical transistor junction voltage values.

Field Effect Transistor: Classification of FET, JFET construction and working , MOSFET construction and working (Enhancement and depletion mode).

UNIT-III: TRANSISTOR BIASING

BJT Biasing and Thermal Stabilization: Operating point, Basic Stability, fixed bias, Collector to Base Bias, Self Bias circuits, Stabilization factors S, S', S''(Definitions only), Bias Compensation, Thermistor and Sensitorcompensation, Compensation against variations in V_{BE}, I_{co}. Thermal runaway, Thermal stability.

FET Biasing: Introduction, Fixed Bias, Self Bias, Voltage divider bias.

UNIT-IV: SMALL SIGNAL ANALYSIS OF SINGLE STAGE TRANSISTOR AMPLIFIERS(BJT only)

Transistor hybrid model, Analysis of Transistor amplifier using h-parameters, CB,CE and CC amplifiers analysis using exact and approximate analysis.

Transistor at high frequencies, , CB,CE and CC amplifiers analysis at high frequencies, Determination of high frequency parameters in terms of low frequency parameters.

UNIT-V: FEEDBACK AMPLIFIERS & OSCILLATORS (BJT only)

Feedback concept, Feedback topologies, Negative feedback advantages & disadvantages, Analysis of feedback amplifiers.

Oscillators principle, Condition for oscillations, types of oscillators, RC phase shift oscillator, Wien bridge oscillator, Hartley oscillator &Colpitt's oscillator.

Learning Resources:

Text Books:

1) Electronic Devices and Circuits, J.Milliman, C.C Halkias, Tata Mc-Graw Hill, 2nd Edition, 2007.

2) Integrated Electronics - J.Milliman, C.C Halkias, Tata Mc-Graw Hill, 2nd Edition, 2007.

References:

1)Electronic Devices and Circuits, David A.Bell, Oxford, 5th edition, 2009.

2) Electronic Devices and Circuits Theory, Boyelstad, Pearson Education, 8th Edition, September 2011.

e-learning resources:

http://nptel.ac.in/courses.php

http://jntuk-coeerd.in/