Electronics - Video course

COURSE OUTLINE

It is a basic introductory course on Electronics and its Principles. It starts with basics of p-n junctions leading to diodes and transistors. The circuit applications of transistors as amplifiers of various kind and their analysis is followed by an understanding of junction FET and MOSFET.

In the end, characteristics of differential and operational amplifiers leading to linear and non-linear applications are discussed.

COURSE DETAIL

TOPICS	Hrs.
UNIT # 1 p-n Diode n- and p- semiconductors. p-n junction formation. Junction properties: contact potential, junction capacitance. Currents in forward and reverse biased junction. Junction Breakdown. Zenor Diode.	4
UNIT# 2 Transistor (BJT) Transistor in equilibrium (no external bias). Transistor with external bias, Transistor Action. Efficiency Factors. Common Base, Common Emitter, Common Collector Configurations, I-V Characteristics; Bias and Bias Stability. Various biasing Schemes/circuits and Analysis.	6
UNIT # 3 Small Signal BJT Amplifiers h- parameters: Hybrid model for transistor amplifiers. Expressions for amplifier performance parameters in terms of h-parameters; r-parameters: Expressions for amplifier performance parameters in terms of r-parameters.	4
UNIT # 4 Feedback and Frequency Response in Amplifiers	5

NPTEL
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Physics

Pre-requisites:

Basics of Semiconductor Physics.

Coordinators:

Prof. D.C. Dube
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Negative and Positive feedbacks. Negative feedback Networks. Desired modifications in amplifier circuits using negative feedback. Changes in input, output impedance levels, band width etc.: Frequency Response, Coupling Methods, Multistage amplifiers.	
UNIT # 5 Field Effect Transistors (FETs) Junction field effect transistor (JFET), MOSFETs : Depletion MOSFET, Enhancement MOSFET; Biasing of MOSFETs. Small signal parameters. Common Drain, Common source and common gate amplifiers. Small signal analysis. FET constant current source. MOSFET as a register, MOS Capacitor, CMOS Circuits.	8
UNIT # 6 Power Amplifiers Classification of power amplifiers. Class A amplifiers. Power efficiency etc.:;Class B push-pull amplifiers. Signal distortion in class B amplifiers. AB operation. Biasing for AB push-pull amplifier. Performance characteristic; Class C- power amplifiers and their characteristics; MOSFET power amplifiers.	4
UNIT # 7 Differential and Operational Amplifiers Differential amplifiers: Inverting and non-inverting inputs. Various modes of operation. Operational amplifiers (Op amps): Op amp characteristics and specifications. Inverting and non-inverting amplifiers and their analysis; Summing, Scaling and Average amplifiers. Integrators and differentiators. Log amplifier etc. Active filters.	9

References:

1. Electronics: Circuits and analysis by D.C. Dube, Narosa Publications 2005.

2. Principles of Electronics by Malvino, Tata McGraw Hill.