

ECE226:ANALOG ELECTRONIC DEVICES AND CIRCUITS

L:3 T:0 P:0 Credits:3

Course Outcomes: Through this course students should be able to

- CO1 :: demonstrate the working and applications of the p-n junction diode.
- CO2 :: analyze BJT in various configurations with and without using hybrid parameters.
- CO3 :: analyze the working and characteristics of FETs.
- CO4 :: apply the concepts of feedback in amplifiers and oscillators.
- CO5 :: focus on op-amp characteristics and applications in various configurations.
- CO6 :: apply op-amps for wave generation and filtering.

Unit I

PN Junction : Depletion region, Junction capacitance, Diode equation, Effect of temperature on reverse saturation current, Construction and Working, V-I characteristics, Junction diode rectifiers, Half wave, Full wave rectifiers, Efficiency, Zener diode

Unit II

Bipolar Junction Transistor (BJT) : PNP and NPN transistors, Current components in BJT, BJT static characteristics (Input and Output), Early effect, CB, CC,CE configurations, Cut off, active, and saturation regions, CE configuration as two port network, h parameters, h parameter equivalent circuit. Biasing and load line analysis., understanding datasheets of BJTs

Unit III

Field Effect Transistor (FET) : Structure and working of JFET, Structure and working of MOSFET, Output and transfer characteristics, FET parameters, Application of FET as voltage variable resistor, MOSFET as a switch, Advantages of FET over transistor

Unit IV

Amplifiers and Oscillators : Analysis and frequency response of single stage RC coupled CE amplifier., Feedback Amplifiers: Positive and negative feedback, Effect of feedback on gain, Effect of feedback on gain, band width, noise, input and output impedances, Condition for sustained oscillation, R-C phase shift, Hartley, Colpitts Oscillators, Wien Bridge Oscillators, Negative Resistance oscillator.

Unit V

Operational Amplifiers and Applications : Introduction to Op-Amp, Block Diagram and Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, CMRR, Slew Rate, Differential Amplifier Configurations, Op-Amp Applications Inverting and Non-Inverting amplifiers, Concept of Virtual Ground, Summing and Difference Amplifiers, Voltage Follower, Differentiator and Integrator, Comparators, understanding datasheets of op-amps

Unit VI

Active Filters and Wave Shaping Circuits : Introduction to active filters, First order low pass Butterworth filter, First order high pass Butterworth filter, Band pass filter, Band reject filter, All pass filter, Square wave generator, Triangular wave generator, Sawtooth wave generator, Voltage controlled oscillator, 555 timer pin configuration and operating modes, recent trends in electronics

Text Books: 1. ELECTRONICS DEVICES AND CIRCUITS by JACOB MILLMAN &HALKIAS, MCGRAW HILL EDUCATION

References: 1. OP-AMPS AND LINEAR INTEGRATED CIRCUITS by RAM GAYAKWAD, PEARSON

