Paper Code(s): ECC-211
Paper: Analog Electronics – I

Course Objectives:	
1.	To develop understanding of operation, characteristics, parameters and applications of p-n junction diode
2.	To develop understanding about BJT and FET in terms of structure, operation, configurations and characteristics. Also analyse stability and amplifier circuit using small signal models
3.	To impart knowledge of cascade amplifiers, coupling schemes, power amplifiers and their analysis
4.	To impart knowledge of Feedback amplifiers and oscillators
Course Outcome (CO):	
CO 1	Ability to understand of operation, characteristics, parameters and applications of p-n junction diode
CO 2	Ability to understand about BJT and FET in terms of structure, operation, configurations and characteristics and able to analyse stability and amplifier circuit using small signal models
CO 3	Ability to understand and analyse cascade amplifiers, coupling schemes in amplifiers and power amplifiers
CO 4	Ability to understand feedback amplifiers and oscillators

Course Outcomes (CO) to Programme Outcomes (PO) Mapping (Scale - 1: Low, 2: medium, 3: High)

CO/PO	**PO01**	**PO02**	**PO03**	**PO04**	**PO05**	**PO06**	**PO07**	**PO08**	**PO09**	**PO10**	**PO11**	**PO12**
CO 1	3	3	3	3	2	1	1	-	2	1	-	2
CO 2	3	3	3	3	2	1	1	-	2	1	-	2
CO 3	3	3	3	3	2	1	1	-	2	1	-	2
CO 4	3	3	3	3	2	1	1	-	2	1	-	2

UNIT – I

Open circuit P-N junction diode, Forward and reverse biased diode, I-V characteristics of diode, Diode Equation, Temperature dependence of diode. Breakdown phenomena, diffusion and transition capacitance of diode. Diode equivalent circuit, Ideal diode. Solar cell.

Diode circuits: half-wave and full-wave rectifiers with capacitor filter, clamping and clipping circuits. Zener diodes as voltage regulator.

UNIT – II

Bipolar Junction transistor (BJT): Structure, modes of operation, Configurations, I-V characteristics, early effect, junction voltages; Transistor Biasing: Need of biasing, load line concept, fixed bias, self-bias, collector to base bias, stability factors, Current Mirrors; hybrid model of BJT amplifier, small signal analysis of CE BJT amplifier using h parameter

JFET: Physical structure, I-V characteristics; MOSFET: Depletion and enhancement types, Physical structure and I-V characteristics; FET small-signal model (low & high frequency); MOSFET as resistance and switch,

UNIT – III

Cascade amplifiers: Analysis of cascade amplifier (voltage gain, current gain, input and output impedances); Darlington pair, Cascode amplifier; Types of coupling: DC, RC and Transformer; RC coupled Amplifier and its frequency response; Diff erential Amplifier: diff erential and Common mode operation, CMRR.

Power Amplifiers: Classification of output stages (Class A, B, C & AB), Class A Amplifier, Transformer coupled class A amplifier, Push pull amplifiers: Class A and Class B, Harmonic distortion, efficiency, crossover distortion, class AB operation, Class C amplifier.

UNIT – IV

Feedback Amplifiers: classification, Feedback concept, basic feedback topologies, Characteristics of Negative Feedback, Feedback and stability, gain margin, Noise margin,

Sinusoidal Oscillator, Barkhausen criterion, RC phase shift, LC (Colpitt's, Hartley, Clapp), Crystal Oscillator.

Textbook(s):

1. J. Millman, C.C. Halkias and Satyabrata Jit, "Electronic Devices and Circuits", Tata McGraw Hill, 4th ed. , 1998
2. R. L. Boylestad and N. Nashlesky, "Electronic Devices and Circuit Theory", Pearson Education, 11th Ed., 2014

References:

1. Adel S. Sedra and Kenneth C. Smith, "Micro Electronic Circuits Theory and Applications," 5th Edition , OUP, 2004.
2. B. Kumar and S. B. Jain, "Electronic Devices and Circuits"", Prentice Hall of India, 2007
3. S Salivahanan, and N. Suresh Kumar, "Electronic Devices and Circuits", McGraw Hill Education (India), 2018
4. B.P. Singh and Rekha Singh, "Electronic Devices and Integrated Circuits", Pearson Education, 2009.
5. J. J. Cathey, "Schaum's Outline of Theory and Problems in Electronic Devices and Circuits", McGraw Hill, 2002.

Paper Code(s): ECC-257

Paper: Analog Electronics – I Lab

Instructions:

1. The course objectives and course outcomes are identical to that of (Analog Electronics - I) as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement under intimation to the office of the Head of Department / Institution in which the paper is being offered from the list of practicals below. Atleast 10 experiments must be performed by the students, they may be asked to do more. Atleast 5 experiments must be from the given list.

1. To plot V-I characteristics of a semiconductor diode & Calculate Static & Dynamic Resistance.
2. To Study the Reverse characteristics of Zener diode
3. To Study the Rectifier circuit (With and Without Filter).
    a. Half Wave Rectifier
    b. Centre Tapped Rectifier.
    c. Bridge Rectifier.
4. Plotting input and output characteristics and calculation of parameters of a transistor in com mon emitter configuration.
5. Transistor biasing circuit. Measurement of operating point (Ic and Vce) for a :-
    a. fixed bias circuit
    b. potential divider biasing circuit.
6. Plot the FET characteristics & MOSFET characteristics.
7. To measure the overall gain of two stages at 1 KHz and compare it with gain of Ist stage, Also to observe the loading effect of second stage on the first stage
8. To plot the frequency response curve of two stage amplifier.
9. To study Emitter follower circuit & measurement of voltage gain and plotting of frequency response Curve.
10. Feedback in Amplifier. Single stage amplifier with and without bypass capacitor, measurement of voltage gain and plotting the frequency response in both cases.
11. To determine and plot firing characteristics of SCR by varying anode to cathode voltage, and varying gate current.
12. To note the wave shapes and voltages at various points of a UJT relaxation oscillator circuit.
13. For Transistorized push pull amplifier Measurement of optimum load, maximum undistorted power (by giving maximum allowable signal) Efficiency and percentage distortion factor.

14. To study the characteristics of single tuned & double tuned amplifier.