

UEI201 ANALOG ELECTRONICS DEVICES AND CIRCUITS

L	T	P	Cr
3	1	2	4.5

PN Junction: Depletion region, Junction capacitance, Diode equation (no derivation), Effect of temperature on reverse saturation current, Construction and Working, V–I characteristics and simple applications of Junction diode, Zener diode and Tunnel diode.

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.

Field Effect Transistor (FET): Structure and working of JFET and MOSFET, output and transfer characteristics, Experimental arrangement for studying the characteristics and to determine FET parameters. Application of FET as voltage variable resistor and MOSFET as a switch, Advantages of FET over transistor.

Power Supplies: Rectifiers: Half–wave, Full–wave and bridge rectifiers, Efficiency, Ripple factor, Regulation, Harmonic components in rectified output, Types of filters: Choke input (inductor) filter, Shunt capacitor filters; Block diagram of regulated power supply, Series and shunt regulated power supplies, Three terminal regulators (78XX and 79XX), Principle and working of switch mode power supply (SMPS).

Amplifiers: Analysis and frequency response of single stage RC coupled CE amplifier. Feedback Amplifiers: Positive and negative feedback, Effect of feedback on gain, band width, noise, input and output impedances.

Oscillators: Condition for sustained oscillation, R–C phase shift, Hartley, Colpitts, Crystal and Wien Bridge Oscillators, Negative Resistance oscillator.

Wave shaping circuits: Switching characteristics of diodes and transistors including square wave response, High pass and low pass filters using R–C Circuits and operational amplifiers; R–L, R–L–C circuits, Attenuators, Clipping and clamping circuits, Clamping circuit theorem, Comparators.

Laboratory Work:

Familiarity with CRO and electronic components, Diodes and BJT characteristics, FET characteristics, Zener diode as voltage regulator, Series voltage regulator, RC coupled amplifier in CE mode, I/O characteristics of Transistor in CE mode, DC load line, Testing of diode and Transistor, Rectifiers. Use of Bistable, Astable and monostable multivibrator, Hartley and Colpitts Oscillator, Clipper and Clamper circuit, Computer simulation, Experiments in analysis, Design and characterization of electronics circuits.

COURSE LEARNING OUTCOME (CLO):The student will be able to

1. Understand transistor amplifier circuits, their analysis and frequency response.
2. Use various types of differential and tuned amplifiers in any project.
3. Understand the working of feedback amplifiers, oscillator and multivibrators.
4. Understand rectifiers, its types and power supplies.
5. Design and implement circuit using various electronic devices for the benefit of society and mankind.

Text Books:

5. *Boylestad R. L., Electronic Devices and Circuit Theory, Pearson Education (2007).*
6. *Millman, J. and Halkias, C.C., Integrated Electronics, Tata McGraw Hill (2006).*

Reference Books

1. *Neamen, Donald A., Electronic Circuit Analysis and Design, McGraw Hill (2006).*
2. *Sedra A. S. and Smith K. C., Microelectronic Circuits, Oxford University Press (2006).*

Evaluation Scheme:

Sr. No.	Evaluation Elements	Weightage (%)
1	MST	25
2	EST	35
3	Sessionals (May include Assignments/Projects/Tutorials/Quizzes/Lab Evaluations)	40