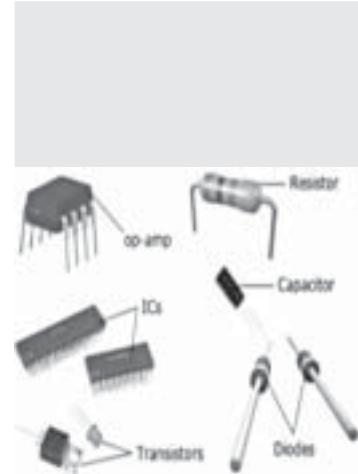


# 19EC201 ELECTRONIC DEVICES AND CIRCUITS

Hours Per Week :

L	T	P	C
3	-	2	4



**SOURCE:**  
[https://www.elprocus.com/wp-content/uploads/2016/06/2016-06-10\\_11-36-59.jpg](https://www.elprocus.com/wp-content/uploads/2016/06/2016-06-10_11-36-59.jpg)

**PREREQUISITE COURSE:** Engineering Physics (A).

## COURSE DESCRIPTION AND OBJECTIVES:

This course is aimed at offering fundamental concepts of semiconductor devices and circuits. It starts with the concepts of the Junction Diode, Transistor, FET and other basic devices that are designed with semiconductor materials. As a first-level course in electronics, the objectives of this course is to form the basis for the understanding of advanced electronic courses that are offered in subsequent semesters.

## COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes.

COs	Course Outcomes
1	Understand and apply the usage of semiconductor devices concepts in circuit making.
2	Analyze characteristics of BJT and FET devices.
3	Investigate the position of operating point under various biasing conditions.
4	Understand the various types of feedback amplifiers and oscillators.
5	Experiment and demonstrate the application of analog electronic circuits using Electronic components.

## SKILLS:

- ✓ *Identify a Semiconductor Diode for a specific application and power handling capacity.*
- ✓ *Identify the transistor type for a given application (switch/amplifier).*
- ✓ *Recognize the required specifications of the transistor.*
- ✓ *Identify the amplification factor of the given transistor.*
- ✓ *Test the working condition of the transistor.*

**UNIT - I** L-9

**P-N JUNCTION DIODE:** Formation of PN junction, Energy band diagram of open circuited PN junction, operation of forward and reverse biased PN junction diode, Volt-Ampere characteristics, Temperature dependence on V-I characteristic, Diode resistances and capacitances, Diode current equation; Special diodes - breakdown mechanisms, zener diode, zener diode as voltage regulator, tunnel diode, varactor diode.

**UNIT - II** L-9

**APPLICATIONS OF DIODES:** Rectifiers - Analysis of half wave, Full wave and bridge rectifiers; Filters - inductor filter, capacitor filter, L- section filter and  $\pi$ - section filter, analysis in terms of ripple factor; Clipping and clamping circuits - elementary diode clippers and clamping circuits.

**UNIT - III** L-10

**TRANSISTOR:** Bipolar Junction Transistor (BJT) - construction and working of BJT, BJT characteristics; Junction Field Effect Transistor (JFET) - construction and working of JFET, JFET characteristics; MOSFET - construction and working of MOSFET, MOSFET characteristics, MOS capacitor, CMOS; Comparison of BJT, JFET and MOSFET.

**UNIT - IV** L-9

**TRANSISTOR BIASING:** Introduction to amplifier, Need for biasing-DC load line, AC load line and Operating point; Thermal runaway, Thermal stability - stabilization against variations in  $I_{CO}$ ,  $V_{BE}$  and stability factors; Types of stabilization, Stabilization techniques, Compensation techniques, Small Signal model of CE amplifier.

**UNIT - V** L-8

**FEEDBACK AMPLIFIERS:** Feedback amplifiers - concept and types of feedback, effects of negative feedback; Classification of feedback amplifiers - voltage series, current series, voltage shunt, current shunt, block diagrams and expressions for gain, input and output resistances.

## LABORATORY EXPERIMENTS

### LIST OF EXPERIMENTS

**TOTAL HOURS: 30**

1. P-N Junction diode characteristics.
2. Zener diode characteristics and Zener diode as Voltage regulator.
3. Determination of the ripple factor and efficiency of Half wave Rectifier with and without filter.
4. Determination of the ripple factor and efficiency of Centre tapped Full wave Rectifier with and without filter.
5. Determination of the ripple factor and efficiency of Bridge Rectifier with and without filter.
6. Construction of various diode clipping circuits.
7. Transistor CB characteristics (Input and Output).
8. Transistor CE characteristics (Input and Output).
9. Transistor CC characteristics (Input and Output).
10. FET characteristics.
11. Determination of the voltage gain of CE amplifier.

### TEXT BOOKS:

1. J. Millman and C.C.Halkias, "Electronic Devices and Circuits", 4<sup>th</sup> edition, Tata Mc-Graw Hill, 2015.
2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson/Prentice Hall, 4<sup>th</sup> edition, 2015.

### REFERENCE BOOKS:

1. J. Millman and Christos C. Halkias, "Integrated Electronics", 2<sup>nd</sup> Edition, Tata Mc-Graw Hill, 2017.
2. Salivahanan and N Suresh Kumar," Electronic Devices and Circuits", 4<sup>th</sup> edition, Tata Mc-Graw Hill, 2016.
3. K. Thomson, "Electronic Switching Circuits", 2<sup>nd</sup> edition, Oxford University Press, 2012.
4. K. Satya Prasad, "Electronic Devices and Circuits", 2<sup>nd</sup> edition, VGS Book Links, 2014.