

COURSE TITLE	FUNDAMENTALS OF ELECTRONICS
COURSE CODE	01EE0105
COURSE CREDITS	5

Objective:

- 1 The objective of this course is to equip students with essential knowledge and skills for understanding electronic components and systems, which is crucial for designing, building, and maintaining computer hardware and integrated systems.

Course Outcomes: After completion of this course, student will be able to:

- 1 Understand operation of different semiconductor devices used in electronics circuits
- 2 Describe the construction and working of semiconductor devices.
- 3 Apply critical thinking and problem-solving skills to troubleshoot electronic circuits.
- 4 Develop various electronics circuit based on application.
- 5 Demonstrate the application of linear IC based electronics circuits.

Pre-requisite of course:NONE

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Fundamentals of DC Circuits Voltage source and Current source, Ohm's law, Kirchoff's law, Resistor in Series and Parallel connection, Voltage divider and Current divider, Power in DC circuit	9
2	Semiconductor Diodes Atomic structure and Covalent Bonding of semiconductor material, Energy levels, Intrinsic and extrinsic semiconductor materials, Construction and working of PN junction diode, Characteristic of PN junction diode, DC and AC resistance of diode, Diode equivalent circuits, Construction and working of Zener diode, Optical diodes, Solar cell	12
3	Diode Applications Series and Parallel diode configurations, Rectifiers, Clippers, Clampers, Zener voltage regulator	8

Contents : Unit	Topics	Contact Hours
4	Bipolar Junction Transistor Transistor Construction and Operation, Transistor configuration, Input and output characteristics of CB, CE, and CC Configurations, Definition of alpha, beta and gamma and their interrelations, Transistor casing and terminal identification, Biasing: Fixed bias, emitter bias and voltage divider bias	12
5	BJT Applications Transistor as a Switch application, Transistor as an Amplifier, Load line and operating point, Gain of the amplifier	7
6	Introduction to IC based Circuits Op-amp symbol, terminals, packages, and specifications , Block diagram Representation of op-amp, ideal op-amp, non-idealities in an op-amp, 555 Timer as a Monostable and Astable multivibrator, Basics of Voltage Regulator, 79xx and 78xx IC based voltage regulators	8
Total Hours		56

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiment-1 To verify Kirchoff's Voltage Law and Kirchoff's Current Law.	2
2	Experiment-2 To obtain the V-I characteristic of PN junction Diode	2
3	Experiment-3 To obtain the V-I characteristic Zener Diode.	2
4	Experiment-4 To verify the application of the Zener Diode as voltage regulator	2
5	Experiment-5 To analyse the Half Wave rectifier using PN junction diode with and without filter capacitor.	2
6	Experiment-6 To analyse the Full Wave rectifier using PN junction diode with and without filter capacitor.	2
7	Experiment-7 Design and analyses the clipper circuits using PN junction diode.	2
8	Experiment-8 Design and analyses the clamper circuits using PN junction diode.	2
9	Experiment-9 To obtain input and output characteristics of bipolar junction transistor.	2
10	Experiment-10 To study and plot the frequency response curve of BJT as an amplifier.	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
11	Experiment-11 To verify the operation of transistor as a switch.	2
12	Experiment-12 To verify the operation of 555 Timer as a monostable and an Astable multivibrator..	2
Total Hours		24

Textbook :

- 1 Electronic Devices and Circuit Theory, Robert Boylestad and Louis Nashelsky, Pearson Education, 10th Edition, 2009
- 2 Electronics Principles, Albert Malvino and David Bates, Tata McGraw-Hill, 7th Edition, 2006

References:

- 1 A Textbook of Electrical Technology- Vol-III, A Textbook of Electrical Technology- Vol-III, B. L. Theraja and A. K. Theraja, S. Chand Publication, 2020
- 2 Electronic Devices: Conventional Current Version, Electronic Devices: Conventional Current Version, Thomas L. Floyd, Pearson Education India, 2015

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	30.00	25.00	15.00	10.00	0.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs, etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and classroom.
- 3 Practical examinations will be conducted at the end of the semester to evaluate the performance of students in the laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, and Virtual Laboratory.

Supplementary Resources:

- 1 https://onlinecourses.nptel.ac.in/noc21_ee55/preview
- 2 <https://www.electronics-tutorials.ws/>
- 3 <https://archive.nptel.ac.in/courses/117/103/117103063/>