

Semester –III
Subject Name: Basic Electronics
Subject Code: 09EE2304
Diploma Branch in which this subject is offered: Electrical Engineering

Objective: This subject provides an opportunity for the students to get familiarized with all essential electronics components and study the characteristics of diodes, transistors etc. The students will deal with liner IC and build a circuit using electronics components. Also, the student will get the ability to do a simulation of corresponding circuits.

Credits Earned: 3 Credits

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

1. Develop the conceptual knowledge about the semiconductor and learn fundamentals of terminal characteristics of PN junction diode and analyze fundamental circuit based on PN junction diode
2. Develop fundamental knowledge of LDR, photovoltaic cell, photo diode, light emitting diode and varactor diode
3. Identify the limitation of diode and learning fundamentals of transistor structure, types and behavioural characteristics, and compare various transistor configurations.
4. Explore the DC load line, biasing methods, and comparisons in various amplifier configurations by understanding the effects of change in Q-point.
5. To troubleshoot electronic circuits and build basic circuits using liner IC's.

Pre-requisite of course: Basic knowledge of physics and basic electrical engineering

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
2	0	2	3	50	30	20	25	25	150

Contents:

Unit	Topics	Contact hours	Weightage (%)
1	Diode characteristics and its applications • Types of semiconductors. • P-N junction diode formation and characteristics.	11	39

	• Applications - Diode as rectifier, half wave, full wave and bridge rectifier, clipping and clamping circuit. • Need of filters. • C, L, LC, π filters. • Zener diode & it's application, • Photo diode • LDR • Photovoltaic Cell • Light Emitting Diode • Varactor Diode • Digital display		
2	Transistor characteristics and applications • PNP and NPN transistors, conduction through transistor leakage current, relationship between α and β. • Transistor configuration & characteristics for CB, CE, CC. • Load line and biasing methods of transistor. • Common emitter amplifier. • Common collector amplifier. • Multistage amplifier • Construction of JFET • Characteristics of JFET	8	28
3	Integrated circuits, Cables and Connectors • Need of IC's • Block diagram of operation amplifier • Characteristics and specification of op amp • Applications of op amp • Block diagram of IC555 • Working of IC555 • Applications of IC 555, Mono stable, bi stable, astable Multivibrator and timer circuit • Cables: coaxial cable, twisted pair cable and fiber optic cable • Connectors: coaxial cable connectors, RJ-45, RS-232, HDMI connectors.	9	33

Suggested Theory distribution:

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

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
35%	35%	20%	10%	0%	0%

Suggested List of Practical/Exercise/Tutorial:

Sr. No.	Unit No.	Name of Topics	Contact Hours
1	1	To use oscilloscope for measuring peak voltage, frequency and observing AC electrical quantities.	2
2	1	To use function generator for producing square and sine wave.	2
3	1	To Plot the V-I characteristics of PN junction diode under forward and reverse bias conditions and find the cut-in voltage, and Dynamic resistance of PN junction diode in forward bias using simulation.	2
4	1	To Obtain the forward bias and reverse bias characteristics of a Zener diode and find out the Zener break down voltage from characteristics using simulation.	2
5	1	To prepare Half-wave rectifier and observe the output.	2
6	1	To prepare full wave rectifier and observe the output.	2
7	1	To design and implement clipper circuits and draw its output voltage wave form.	2
8	2	To Plot the input and output VI-characteristics of NPN BJT in common emitter configuration using simulation.	2
9	2	To Configure and test NPN BJT as a switch.	2
10	2	To prepare fixed bias NPN BJT amplifier and observe its output waveform using simulation.	2
11	3	To operate op amp as comparator.	2
12	3	To build and analyze timer circuit using 555 timer IC using simulation.	2
13	3	To operate IC555 in Bistable mode and observe output.	2
14	3	To operate IC555 in mono stable mode and observe output.	2

Instructional Method:

- The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.
- e. Show video or animation of working of various types of wiring system and electrical transmission and distribution network

References:

- 1. V.K.Mehta , “*Principle of Electronics*”, S.Chand & Co, latest edition.
- 2. Albert Paul Malvino, “*Electronics Principles*”, McGraw Hill, latest edition.
- 3. Robert L. Boylestad, “*Electronics Devices and Circuit Theory*”, Pearson, latest edition.
- 4. John Kadick, “*Cables and Connectors*”, AVO International, latest edition.

Supplementary Resources:

- 1. https://onlinecourses.nptel.ac.in/noc17_ee02/preview
- 2. <https://electronicsforu.com/>
- 3. <http://www.ni.com/multisim/>
- 4. <http://www.circuitbasics.com/make-custom-pcb/>