

NATIONAL INSTITUTE OF TECHNOLOGY, JAMSHEDPUR
JHARKHAND-831014
Department of Electronics and Communication
Autumn Semester 2020
COURSE HANDOUT

Course Code: EE1101 (1st Sem Civil Engg. and 1st Sem Computer Sc. Engg. 2020 Batch)

Course Title: Basic Electronics (Basic Electrical and Electronics Engineering)

Credit: 04 (2: Basic Electrical Engineering, 2: Basic Electronics Engg)

Instructor: Dr. Prashant Kumar

Basic Electronics Engineering – Course Outcomes	
CO1	Students will describe the fundamentals of semiconductor physics
CO2	Students will describe the working and basic applications of basic semiconductor device like diodes and BJTs.
CO3	Students will solve problems related to of basic semiconductor device like diodes and BJTs.
CO4	Students will describe the basic concepts of modern semiconductors devices like; MOSFETs, Operational Amplifiers etc.

Syllabus

Semiconductor devices: construction, working and V-I characteristics of diode, zener diode, LED, photodiodes, SCR, Diac, Triac and their applications.

Transistors: BJT, FET, MOSFET, Construction, working, type of configuration, V-I characteristics, biasing transistor circuits-fixed bias, emitter bias, feedback bias, voltage divider bias, transistor as an amplifier

Operational amplifier: introduction, parameters application-inverting, non-inverting amplifier unity follower, integrator, differentiator, summing circuit.

Introduction of logic gates.

Scope:

The students will be able to

- explain the construction of devices, characterise and model them.
- understand different basic circuits and analyse them

At the end of the course the students will be able to design basic electronics circuits.

Objectives:

This course will provide a sound understanding of semiconductor devices.

It will help students in applying the basic knowledge of electronics in understanding modern electronics and communication appliances, equipments and gadgets.

Text Books:

- [1] Electronics Device & Circuits-Boylsted and Nashelsky, Pearson International Edition
- [2] Integrated Electronics-Millman & Halkias, McGraw Hill Publication
- [3] Digital Systems: Principles and Applications- R.J Tocci, Pearson International Edition

Reference Books:

- [2] Micro Electronics-Milliman & Halkias, McGraw Hill Publication

Lecture Plan

Lecture no.	Learning objectives	Topics to be covered	Text book chapter
1-2	Semiconductor devices	Physic of Semiconductor electrons and holes, intrinsic, doping, extrinsic, n-type, p-type	T1:1.1-1.5
3	Diodes	Construction and working of diodes, depletion layer	T1:1.6
4	V-I characteristics of diode	Experiment with diode and modeling the device, diode equation	T1:1.7-1.8
5-6	Zener diode	Operation of diode in reverse bias condition, break down, Voltage regulator circuit	T1:1.15
7	LED, photodiodes	Semiconductor optical properties, band gap	T1:1.16
8	Transistors: BJT	Basic operation of 3-layer device α, β , current controlled operation	T1:3.1-3.7
9	Construction and working FET, MOSFET	Unipolar devices, gate, drain and source	T1:6.1-6.8
10-11	Type of configuration, V-I characteristics	voltage controlled operation	T1:7.12
12-13	Biasing transistor circuits-fixed bias	Analysis of transistor circuits	T1:4.1-4.3
14	Emitter bias, feedback bias, voltage divider bias	Solution of transistor circuits	T1:4.4-4.6
15	Transistor as an amplifier	A_v, A_i, R_i, R_o , Application of transistor as amplifier	T1:3.5, 5.24-5.25 T2:8.4
16	SCR	4-layer devices and V-I characteristics, role of gate	T1:17.2-17.6
17	Diac, Triac and their applications	Applications of 4-layer devices	T1:17.11-17.12
18	Operational amplifier: introduction, parameters application	Integrated circuits, features of OpAmps and various parameters	T1:10.1-10.4
19	Inverting, non-inverting amplifier	Basic OpAmp circuits, virtual ground	T1:10.5
20	Integrator, differentiator, summing circuit	Mathematical operation with OpAmps	T1:10.5
21	Introduction of logic gates	Binary numbers, logic variables and Boolean Algebra and Logic gates	T2:6.1, T3