BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
HYDERABAD CAMPUS
SECOND SEMESTER 2024-25
Course Handout (Part-II)

Date: 06.01.2025

In addition to the general handout for all courses appended to the timetable, this portion gives further specific details regarding the course.

Course No. : EEE F111
Course Title : ELECTRICAL SCIENCES
Instructor-in-charge : Sourav Nandi
Instructors: Lectures: Sourav Nandi, Alivelu Manga Parimi, Ravikiran Yeleswarapu
Instructors: Tutorials: Sourav Nandi, Alivelu Manga Parimi, Ravikiran Yeleswarapu, Arindam Kushagra

1. Course Description:

The course covers basic passive and active circuit elements; network theorems and analysis; introduction to single and three-phase systems; magnetic circuits; transformers; electrical machines; semi-conductor diodes and applications; transistors and applications; Digital electronics and commonly used measuring instruments.

2. Scope and objective of the Course:

A basic understanding of electrical and electronic circuits and instruments is essential for all engineers and scientists. This course is designed to give the students of all branches a preliminary exposure to this field. The need for basic understanding in this field will come for non-electrical or electronic students later in their career growth. For EEE, ECE and E&I students, this course is a good starting point for their CDCs.
To obtain basic knowledge on:

a. Electrical and Magnetic Circuits.
b. Electrical machines.
c. Semiconductor Diodes and BJTs; Digital electronics.

3. Text Book: Leonard S. Bobrow: Fundamentals of Electrical Engineering, Oxford University Press, Second Edition, 2005.

4. Reference Book:

Hughes: Electrical and Electronic Technology, Pearson Education, Ninth Edition, 2008.

5. Course Plan:

Lect. No.	Learning Objectives	Topics to be covered
1	Introduction	Introduction
2-4	To study basic circuit elements and the laws;	Voltage and current sources, Independent and Dependent sources, resistors and ohm's law, KCL, KVL; Current divider, Voltage divider rule
5-6	To study circuit analysis techniques and theorems.	Nodal and Mesh Analysis, Super Node and Super Mesh Analysis
7-9	To study circuit analysis techniques and theorems.	Thevenin's and Norton's Theorems; Instantaneous power, Maximum Power Transfer Theorem,
10-11	To study circuit analysis techniques and theorems.	Linearity and Superposition application in circuit analysis, Source transformation
12	Inductors and Capacitors	Inductors and capacitors and their integral relationships;
13-15	To study response of circuits having energy storing elements	First order circuits and natural response; First order circuits and complete response

Lect. No.	Learning Objectives	Topics to be covered
		Second Order Circuits
16-20	Alternating current circuits	A.C. Voltage & Current, Complex numbers, Frequency and Time Domain analysis
21-24	Alternating current circuits	Power and Power-factors, Poly-Phase circuits
25-26	Magnetic Circuits	Fundamentals of Electromagnetics, Magnetic fields and their effects, Magnetic Circuits and Materials
27-28	Transformers	Introduction , Ideal transformer; Equivalent circuit; Non-ideal transformer;
29-30	Electrical Machines	Motors and generators
31-33	Digital Systems	Binary numbers, Binary Arithmetic, Digital logic circuits, Boolean Algebra
34-36	Principles and Applications of Semiconductor Diodes, Diode Circuits	Semiconductors, doping, Diodes, Zener diodes, Half-wave and full wave rectifiers
37-38	Bipolar Junction Transistors	*pnp* and *npn* transistors, Characteristics and Applications of BJTs, Application to digital logic circuits
39-40	Field Effect Transistors	JFET, MOSFET
41-42	Transistor Amplifiers	Amplifiers

***Students are strongly advised to take notes during the lectures.**

5. **Evaluation Scheme**:

Component	Duration	Perecentage weightage	Maximum Marks	Date & Time	Nature
Midsem Test	90 min	30%	90M	06/03 9.30 - 11.00AM	CB
Quizzes surprise/announced	--	20%	60M	Will be announced later	CB
Class Participation	--	10%	30M	During lecture/tutorial classes	OB
Comprehensive Examination	3 Hrs.	20%	60M	08/05FN	OB
		20%	60M		CB

***CB – Closed Book; OB- Open Book**

Minimum Criterion for awarding valid grade:

A student should obtain **20%** of the **median marks of the class** to clear the course. If any student gets the marks lower than the prescribed standard mentioned above, the student may be awarded NC.

6. **Make-up policy**: Make-up will be given only under **exceptional circumstances** and with **prior written permission from IC**. No Makeup will be given for a Quiz evaluation component.
7. **Chamber consultation hour**: To be announced in the class
8. **Notices**: Notices concerning the course will be displayed in the LMS.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Prof. Sourav Nandi
INSTRUCTOR-IN-CHARGE
EEE F111