BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
HYDERABAD CAMPUS
SECOND SEMESTER 2021-2022
Course Handout (Part-II)

Date: 11.03.2022

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

Course No. : EEE F111
Course Title : ELECTRICAL SCIENCES
Instructor-in-charge : Mithun Mondal
Instructors: Lectures: Mithun Mondal
Instructors: Tutorials: Mithun Mondal

1. **Course Description:**

   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 the working 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 at a later stage in their career growth. For EEE, ECE and E&I students this course acts as 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	Chapter in the Text Book
1	Introduction	Introduction	
2-4	To study basic circuit elements and the laws;	Voltage and current sources, resistors and ohm's law, KCL, KVL; Instantaneous power	1.1 to 1.5
5-6	To study circuit analysis techniques and theorems.	Nodal and Mesh Analysis	2.1, 2.3
7-10	To study circuit analysis techniques and theorems.	Thevenin's and Norton's Theorems; Maximum Power Transfer Theorem,	2.5
11-14	To study circuit analysis techniques and theorems.	Linearity and Superposition application in circuit analysis, Source transformation,	2.6

Lect. No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
		Independent and Dependent sources	
15-16	Inductors and Capacitors	Inductors and capacitors and their integral relationships;	3.1 to 3.2
17-20	To study response of circuits having energy storing elements	First order circuits and natural response; First order circuits and complete response Second Order Circuits	3.3 to 3.6
21-23	Alternating current circuits	A.C. Voltage & Current, Complex numbers, Frequency and Time Domain analysis	4.1-4.3
24-25	Alternating current circuits	Power and Power-factors, Poly-Phase circuits	4.4 to 4.7
26-27	Magnetic Circuits	Fundamentals of Electromagnetics, Magnetic fields and their effects, Magnetic Circuits and Materials	14.1-14.2
28-30	Transformers	Introduction , Ideal transformer; Equivalent circuit; Non-ideal transformer;	14.3 -14.5
31-33	Electrical Machines	Motors and generators	15.4
34-36	Principles and Applications of Semiconductor Diodes, Diode Circuits	Semiconductors, doping, Diodes, Zener diodes, effects of capacitance, Half-wave and full wave rectifiers	6.1-6.7
37-38	Bipolar Junction Transistors	*pnp* and *npn* transistors, Characteristics and Applications of BJTs, Application to digital logic circuits	7.1-7.4
39-40	Digital Systems	Binary numbers, Binary Arithmetic, Digital logic circuits, Boolean Algebra	11.1-11.6, 12.1

6. Evaluation Scheme:

Evaluation Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid-Sem Exam	90 mins	30%	05/05 9.00 to 10.30am	Closed book*
Quizzes/ Assignments	TBA	30%	TBA	Open book
Comprehensive Exam	120 mins	40%	29/06 FN	Closed book*

***will be open book incase the exams are conducted online.**

7. Make-up policy: Make-up will be given only under **exceptional circumstances** and with **prior permission**. No Makeup will be given for a Quiz evaluation component.

8. Chamber consultation hour: To be announced in the class

9. Notices: Notices concerning the course will be displayed in the CMS.

10. **Mode of teaching:** Initially, it shall be online. Later, it shall be in offline mode

11. 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.

Dr. Mithun Mondal
INSTRUCTOR-IN-CHARGE
EEE F111