

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI- HYDERABAD CAMPUS****INSTRUCTION DIVISION****FIRST SEMESTER 2016-2017****Course Handout**

Date: 01.08.2016

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 : Alivelu M Parimi  
Instructors : Alivelu M Parimi, Ayyagari Ravi Teja, Sandeep Kumar, Balasubramaniyan

**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 and ECE students this course acts as a good starting point for their CDCs.

To obtain basic knowledge on:

- Electrical and Magnetic Circuits.
- Electrical machines.
- Semiconductor Diodes and BJTs ; Digital electronics.

**3. Text Books:** Leonard S. Bobrow: Fundamentals of Electrical Engineering, Oxford University Press, Second Edition, 2005.  
Hughes: Electrical and Electronic Technology, Pearson Education, Ninth Edition, 2008.**4. Course Plan:**

| Lect. No. | Learning Objectives  | Topics to be covered  | Bobrow Chapters | Hughes Chapters  |
|-----------|--|---|-----------------|--|
| 1         | Introduction   |   |                 |  |
| 2         | 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      | 2.1 to 2.12<br>3.1 to 3.8  |
| 3         | To study circuit analysis techniques and theorems.           | Nodal and Mesh Analysis   | 2.1, 2.3        | 4.1 to 4.4   |
| 4-5       | To study circuit analysis techniques and theorems.           | Thevenin's and Norton's Theorems; Maximum Power Transfer Theorem,   | 2.5             | 4.6 to 4.8   |
| 6-7       | To study circuit analysis techniques and theorems.           | Linearity and Superposition application in circuit analysis, Source transformation, Independent and Dependent sources | 2.6             | 4.5  |
| 8         | Inductors and Capacitors                                     | Inductors and capacitors and their integral relationships;  | 3.1 to 3.2      | 5.4 to 5.7   |
| 9-11      | To study response of circuits having energy storing elements | First order circuits and natural response; First order circuits and complete response<br>Second Order Circuits        | 3.3 to 3.6      | 5.14 to 5.19;<br>8.1 to 8.3 and<br>8.6 to 8.10                   |
| 12        | Alternating current circuits                                 | A.C. Voltage & Current  | 4.1             | 9.3 to 9.6   |
| 13        | Alternating current circuits                                 | Complex numbers   | 4.2             | 9.8 to 9.9   |
| 14-16     | Alternating current circuits                                 | Frequency and Domain analysis   | 4.3             | 10.2 to 10.4;<br>10.6 to 10.10;<br>11.1 to 11.5;<br>13.1 to 13.8 |
| 17-18     | Alternating current circuits                                 | Power and Power-factor, OpAmps  | 4.4 to 4.5      | 12.2 to 12.8   |
| 19        | Alternating current circuits                                 | Poly-Phase circuits   | 4.6 to 4.7      | 33.1 to 33.9   |

| Lect. No. | Learning Objectives   | Topics to be covered   | Bobrow Chapters | Hughes Chapters            |
|-----------|---|--|-----------------|----------------------------|
| 20-22     | Magnetic Circuits   | Fundamentals of Electromagnetics, Magnetic fields and their effects, Magnetic Circuits and Materials                   | 14.1-14.2       | 6.1 to 6.5, 7.1 to 7.6     |
| 23        | Transformers  | Introduction   | 14.3            | 34.1 to 34.4               |
| 24-25     | Transformers  | Ideal transformer; Equivalent circuit; Non-ideal transformer; ; Regulation and efficiency                              | 14.4-14.5       | 34.5 to 34.11              |
| 26        | DC Machines   | DC and AC machine Basics   | 15.4            | 35.1-35.4, 41.1 to 41.6    |
| 27-30     | 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         | 20.1 to 20.7, 21.1 to 21.3 |
| 31-36     | Bipolar Junction Transistors  | <i>pnp</i> and <i>npn</i> transistors, Characteristics and Applications of BJTs, Application to digital logic circuits | 7.1-7.4         | 22.1 to 22.6               |
| 37-38     | Field Effect Transistors  | JFET, MOSFET   | 8.1-8.2         | 23.1 to 23.4               |
| 39-40     | Transistor Amplifiers   | H parameters   | 9.1             | 22.9 to 22.15              |
| 41-42     | Digital Systems   | Binary numbers, Binary Arithmetic, Digital logic circuits, Boolean Algebra   | 11.1-11.6, 12.1 | 27.1 to 27.14              |

5. Evaluation Scheme:

| Component                 | Duration  | Maximum Marks | Date & Time          | Remarks | % weightage |
|---------------------------|-----------|---------------|----------------------|---------|-------------|
| Test 1                    | 1 hour    | 75M           | 9/9 & 2.30- 3.30PM   | CB      | 25%         |
| Test 2                    | 1 hour    | 75M           | 24/10 & 2.30- 3.30PM | CB      | 25%         |
| Surprise Quiz             | In class  | 30M           | Tutorials            | CB      | 10%,        |
| Comprehensive Examination | 1.5 hours | 60M           | 05/12 FN             | CB      | 20%,        |
|                           | 1.5 hours | 60M           | 05/12 FN             | OB      | 20%,        |

6. Make-up policy: Make-up will be given only under **exceptional circumstances** and with **prior permission**.

7. Chamber consultation hour: To be announced

8. Notices: Notices concerning the course will be displayed on the EEE notice boards and in CMS.

Instructor-in-charge  
**EEE F111**