



Kot Bhalwal, Jammu



Model Institute of Engineering  
& Technology (Autonomous)  
**Course Handout**

## **COURSE HANDOUT**

**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (ECE-201)**

**BE-2<sup>ND</sup> SEMESTER**

**ACADEMIC YEAR (2024-25)**

**Dr. Suhaib Ahmed Batt**

Assistant Professor

Department of Electronics and Communication Engineering



Department of Electronics and Communication Engineering

Model Institute of Engineering & Technology (Autonomous)

KotBhalwal, Jammu - 181122

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Dr. Arun K. Gupta Teaching-Learning Centre

Version 1.1



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| Course Code | Course Name                                  | Course Type | Cd | L | T | P | Marks     |            |       |
|-------------|----------------------------------------------|-------------|----|---|---|---|-----------|------------|-------|
|             |                                              |             |    |   |   |   | Sessional | Final Exam | Total |
| ECE-201     | Basic Electrical and Electronics Engineering | PCC         | 4  | 3 | 1 | 0 | 50        | 100        | 150   |

### COURSE OUTCOMES

|                                                       |                                                                                                  |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| At the end of the course the student will be able to: |                                                                                                  |
| CO1                                                   | Learn about application of network laws and theorems to design electric circuits.                |
| CO2                                                   | Examine sinusoidal waveforms and classify measuring instruments.                                 |
| CO3                                                   | Explain the construction and principle of operation of single-phase transformers and DC machines |
| CO4                                                   | Understand the characteristics of semiconductor devices and rectifier circuits.                  |
| CO5                                                   | Interpret the principle of various transistor configuration and characteristics.                 |

### Unit-I

Elementary Concepts of DC and AC Circuits: Recent advancements in Electrical Engineering, DC Circuit elements (R, L and C), Voltage and Current sources, Kirchhoff's Current and Voltage laws, mesh, and nodal analysis. Superposition, Maximum power transfer, Thevenin and Norton theorems.

(8 Hours)

### Unit-II

Representation of Sinusoidal Waveforms: Peak and RMS values, Phasor representation, Real power, Reactive power, apparent power, power factor. Analysis of single-phase AC circuits. Classification of Instruments: Operating principle of Measuring Instruments.

(8 Hours)

### Unit-III

Single phase Transformers and Machines: Principle of operation, ideal and practical transformer, equivalent circuit, losses in transformers, transformer testing, regulation and efficiency, Principle of operation of DC and AC machines.

(6 Hours)

### Unit-IV

Semiconductor Devices and Applications: Evolution in Electronics (vacuum tubes to nano-electronics), Types and specifications of Resistor, Inductor, Capacitor and Color coding, PN junction and Zener diode characteristics, Types of diodes (Tunnel diode, Schottky diode, LED, photodiode, Varactor diode), Voltage Regulators, Wave Shaping Circuits (rectifiers, filters, clippers, and clamps).

(8 Hours)

### Unit-V

Transistors and Biasing Circuits: BJT: Principle and operation of NPN transistor, configuration and characteristics (CB, CE, and CC), types of biasing circuit. Hybrid Parameters Introduction. Two port networks, hybrid model for CE, CC, CB configuration and their analysis using h-parameters, Miller theorem. FET: Principle of Operation and characteristics of JFET, biasing of FET, MOSFET and CMOS.

(10 Hours)

### Textbooks

| S.No | Name of the Books            | Name of the Author              | Publisher Name   | Edition (Pub.Yr.)      |
|------|------------------------------|---------------------------------|------------------|------------------------|
| 1    | Basic Electrical Engineering | D. P. Kothari and I. J. Nagrath | Tata McGraw Hill | 4 <sup>th</sup> (2019) |
| 2.   | Integrated Electronics       | Millman and Halkias             | Tata McGraw Hill | 4 <sup>th</sup> (2015) |



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## Reference Books

| S.No | Name of the Books                      | Name of the Author                                     | Publisher Name    | Edition (Pub.Yr.)       |
|------|----------------------------------------|--------------------------------------------------------|-------------------|-------------------------|
| 1    | Basic Electrical Engineering           | A. E. Fitzgerald, David E Higginbotham and Arvin Gabel | Tata McGraw Hill  | 5 <sup>th</sup> (2009)  |
| 2    | Electronics Devices and Circuit Theory | Boylstead                                              | Pearson Education | 11 <sup>th</sup> (2015) |
| 3    | Electronic Principles                  | Melvino Leach                                          | Tata McGraw Hill  | 7 <sup>th</sup> (2017)  |

## COURSE PLAN

### Unit-I Elementary Concepts of DC and AC Circuits

| S.No | Topics                                                            | Recommended Books |
|------|-------------------------------------------------------------------|-------------------|
| 1    | Elementary Concepts of DC and AC Circuits                         | Book 1, Ch.1      |
| 2    | Recent advancements in Electrical Engineering                     | Book 1, Ch.1      |
| 3    | DC Circuit Elements (R, L, C)                                     | Book 1, Ch.1      |
| 4    | Voltage and Current sources, Kirchhoff's current and Voltage Laws | Book 1, Ch.1      |
| 5    | Mesh and Nodal analysis                                           | Book 1, Ch.1      |
| 6    | Superposition Theorem                                             | Book 1, Ch.2      |
| 7    | Maximum Power transfer Theorem                                    | Book 1, Ch.2      |
| 8    | Thevenin & Norton Theorems                                        | Book 1, Ch.2      |

### Unit-II Representation of Sinusoidal Waveforms

|    |                                                                             |              |
|----|-----------------------------------------------------------------------------|--------------|
| 9  | Representation of Sinusoidal Waveforms                                      | Book 1, Ch.4 |
| 10 | Peak and RMS values                                                         | Book 1, Ch.4 |
| 11 | Phasor representation                                                       | Book 1, Ch.4 |
| 12 | Real power                                                                  | Book 1, Ch.4 |
| 13 | Reactive power, apparent power                                              | Book 1, Ch.4 |
| 14 | Power factor                                                                | Book 1, Ch.4 |
| 15 | Analysis of single-phase AC circuits.                                       | Book 1, Ch.4 |
| 16 | Classification of Instruments: Operating principle of Measuring Instruments | Book 1, Ch.4 |

### Unit-III Single Phase Transformer and Machines

|    |                                                         |              |
|----|---------------------------------------------------------|--------------|
| 17 | Single phase Transformers and Machines                  | Book 1, Ch.8 |
| 18 | Principle of operation, ideal and practical transformer | Book 1, Ch.8 |
| 19 | Equivalent circuit                                      | Book 1, Ch.8 |
| 20 | Losses in transformers                                  | Book 1, Ch.8 |
| 21 | Transformer testing, regulation, and efficiency         | Book 1, Ch.8 |
| 22 | Principle of operation of DC and AC machines            | Book 1, Ch.8 |

### Unit-IV Semiconductor Devices and Application

|    |                                                                            |              |
|----|----------------------------------------------------------------------------|--------------|
| 23 | Evolution in Electronics (vacuum tubes to nano-electronics)                | Book 2, Ch.1 |
| 24 | Types and specifications of Resistor, Inductor, Capacitor and Color coding | Book 2, Ch.1 |
| 25 | PN junction                                                                | Book 2, Ch.3 |
| 26 | Zener diode and its characteristics                                        | Book 2, Ch.3 |



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|                                                |                                                                                                    |                   |
|------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------|
| 27                                             | Types of diodes (Tunnel diode, Schottky diode)                                                     | Book 2, Ch.3      |
| 28                                             | Types of diodes (LED, photodiode, Varactor diode)                                                  | Book 2, Ch.3      |
| 29                                             | Voltage Regulators                                                                                 | Book 2, Ch.3      |
| 30                                             | Wave Shaping Circuits (rectifiers, filters, clippers and clampers).                                | Book 2, Ch.4      |
| <b>Unit-V Transistors and Biasing Circuits</b> |                                                                                                    |                   |
| 31                                             | Transistors and Biasing Circuits: BJT: Principle and operation of NPN transistor                   | Book 2, Ch.5      |
| 32                                             | Configuration and characteristics (CB)                                                             | Book 2, Ch.5      |
| 33                                             | Configuration and characteristics (CE, and CC)                                                     | Book 2, Ch.5      |
| 34                                             | Types of biasing circuit.                                                                          | Book 2, Ch.9      |
| 35                                             | Hybrid Parameters Introduction                                                                     | Book 2, Ch.8      |
| 36                                             | Two port networks, hybrid model for CE, CC, CB configuration and their analysis using h-parameters | Book 2, Ch.8      |
| 37                                             | Miller theorem                                                                                     | Book 2, Ch.8      |
| 38                                             | FET: Principle of Operation and Characteristics                                                    | Book2, Ch. 10     |
| 39                                             | Biasing of JFET                                                                                    | Book2, Ch. 10     |
| 40                                             | MOSFET and CMOS                                                                                    | Book2, Ch. 9 & 10 |

#### ADDITIONAL WEB RESOURCES

|    |                                                                                                                                                                                                       |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | <b>MOOC:</b> Linear Circuits 1: DC Analysis<br><a href="https://www.coursera.org/learn/linear-circuits-dcanalysis">https://www.coursera.org/learn/linear-circuits-dcanalysis</a>                      |
| 2. | <b>NPTEL:</b> Video lectures on Fundamentals of Electronic Engineering<br><a href="https://onlinecourses.swayam2.ac.in/nou24_ec04/preview">https://onlinecourses.swayam2.ac.in/nou24_ec04/preview</a> |

#### GRADING AND ASSESSMENT

- **Sessional Test:** 20 marks
- **Assignment:** 20 marks
- **Attendance:** 10 marks
- **Final Examination:** 100 marks

#### COURSE POLICIES

- **Attendance:** Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity:** MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions:** Assignments and projects must be submitted by the specified timelines.

#### FACULTY INFORMATION

- **Office Hours**  
Tuesday (12:55 PM - 1:45 PM)  
Friday (12:55 PM - 1:45 PM)
- **Contact Information**  
[suhaib.ece@mietjammu.in](mailto:suhaib.ece@mietjammu.in)