

**Bangladesh University of Engineering and Technology**  
**Department of Electrical and Electronic Engineering**

**PART A: General Information**

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|----|-------------------------|---|
|    | Course Number:          | EEE 263   |
| 1. | Course Title:           | Electronic Circuits   |
|    | Credit (Contact) Hours: | <b>3.0</b>  |
| 2. | Level and Term:         | Level-2, Term-1 (July 2025 academic term)   |
| 3. | Course Type:            | Non-departmental course   |
| 4. | Pre-requisite Courses:  | EEE 163   |
| 5. | Course Website:         | Designated Microsoft Teams for each section   |
| 6. | Lecture Schedule:       | <b>Section A:</b> Sun 8 am, Mon 10 am, Wed 11 am<br><b>Section B:</b> Sun 9 pm, Mon 11 am, Wed 9 am<br><b>Section C:</b> Sun 10 am, Mon 9 am, Wed 10 am |
| 7. | Important Dates:        | For important dates and examination schedules please follow the classes and corresponding teams.  |

**Section A: Tanushri Medha Kundu**

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8. Course Teachers:

**Section C: Md. Tanvir Hossain**

Lecturer

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**PART B: Course Details**

**1. Course Content:**

Ideal device characteristics of Diode, Bipolar Junction Transistor (BJT), Metal-Oxide-Semiconductor Field Effect Transistor (MOSFET); Wave shaping circuits: Diode wave shaping techniques, clipping and clamping circuits, comparator circuits, switching circuits; Amplifiers: BJT and MOSFET amplifiers; Linear Integrated Circuits: Op-amps, linear applications of Op-Amps; Oscillators: Timers (555), function generators.

**2. Course Objectives:**

- The main objective of this course is to learn about characteristics and operation of basic electronic circuit elements like diode, BJT, MOSFET and understand the application of these elements in various electronic circuits like rectifier and amplifier.
- The course talks about the characteristics, operation, and application of Op-amps in linear Circuits.
- The course also aims to teach the students the design principles and/or applications of Oscillators, Timers (555) and Function generators.

- Thus, the course teaches students how to design amplifiers, oscillators, switches and other electronic circuits using electronic circuit elements like diode, BJT, MOSFET, Op-amps and other linear ICs.
- The course also generates ability in the student so that he can understand any electronic circuit and discuss electronic circuits with specialists as necessary in his academic and professional life.

**3. Background Knowledge required:** Basics of electrical circuits, equation solver, calculus and differential equation solver.

**4. Course Outcomes (COs):**

Upon completion of this course, the successful student will be able to-

| COs | CO Statements   | Corresponding PO(s)* | Domains and Taxonomy level(s)** | Delivery Method(s) and Activity(-ies) | Assessment Tool(s)                 |
|-----|---|----------------------|---------------------------------|---------------------------------------|------------------------------------|
| CO1 | <b>Explain</b> the operation, characteristics, and application of diode, BJT, MOSFET, Op-amps. Learn about various wave shaping circuits using diodes                 | PO1                  | C2                              | Lectures, Tutorials, Homeworks        | Assignment, Class test, Final exam |
| CO2 | <b>Analyse</b> electronic circuits using DC and AC equivalent circuit models of BJTs and MOSFETs  | PO2                  | C4                              | Lectures, Tutorials, Homeworks        | Assignment, Class test, Final exam |
| CO3 | <b>Explain</b> operation and application of Oscillators, Timers (555), Function generators  | PO1                  | C2                              | Lectures, Tutorials, Homeworks        | Assignment, Class test, Final exam |
| CO4 | <b>Design</b> amplifiers, oscillators, switches and other electronic circuits using electronic circuit elements like diode, BJT, MOSFET, Op-amps and other linear ICs | PO3                  | C5                              | Lectures, Tutorials, Homeworks        | Assignment, Class test, Final exam |

**\*Program Outcomes (PO):** PO1 Engineering Knowledge, PO2 Problem Analysis, PO3 Design/development Solution, PO4 Investigation, PO5 Modern tool usage, PO6 The Engineer and Society, PO7 Environment and sustainability, PO8 Ethics, PO9 Individual work and team work, PO10. Communication, PO11 Project management and finance, PO12 Life-long Learning

**\*\*Cognitive Domain Taxonomy Levels:** C1 – Remember, C2 – Explain, C3 – Apply, C4 – Analysis, C5 – Synthesis/Design, C6 – Evaluation

**5. Assessment Strategy:**

- Class Attendance and Participation**  
Class participation and attendance will be recorded in every class. Participation and attendance for the students may be considered in case the student could not attend the class due to a valid reason (power failure, internet problem, device problem, health problem, etc.). The student has to inform the teacher over email in case of such occurrences. A maximum of three (03) such missed classes can be considered for this course
- Quiz, Assignment, Viva and Presentation**  
Four nos. of tests (Quiz, Assignment, Viva and Presentation) will be taken and best 3 nos. will be counted.

- c. Final Examination  
A comprehensive term final examination will be held at the end of the Term following the guideline of academic Council.

#### 6. Distribution of Marks:

Individual student will be evaluated based on the following criteria as approved by the University:

|                                    |             |
|------------------------------------|-------------|
| a. Class Participation             | 10%         |
| b. Homework Assignment and Quizzes | 20%         |
| c. Final Examination (3 hours)     | 70%         |
| <b>Total</b>                       | <b>100%</b> |

#### 7. Learning Resources:

- a) Text Books
- **Microelectronic circuits ~ Adel Sedra, Kenneth C. Smith**
- b) Reference Books:
- Electronic Devices and Circuits ~ Louis Nashelsky, Robert Boylestad
  - Operational Amplifiers and Linear Integrated Circuits ~ Frederick F. Driscoll and Robert F. Coughlin
  - Digital Fundamentals ~ Thomas L. Floyd
- c) Other Resources: Online resources or supplementary materials will be shared with the class on a need basis

N.B. Besides going through relevant topics of the textbook, it is strongly advised that the students follow the class lectures and discussions regularly for a thorough understanding of the topics.

#### 8. Course Contents and Lecture Plan:

| Topic  | Lectures (Week) |
|--|-----------------|
| <b>Diode:</b> Ideal and non-ideal device characteristics and operation. Rectifier circuits, ripple factor, RC time constants. Wave shaping circuits, diode wave shaping techniques, clipping and clamping circuits.  | 10 (1-4)        |
| <b>Bipolar junction transistor (BJT):</b> Operation and characteristics. Transistor Configuration: CB, CE and CC-operation and characteristics. Early effect. Transistor biasing. Amplifiers: BJT amplifiers. DC and AC equivalent circuits. Amplifier and other circuit analysis using equivalent circuits, | 7 (4-6)         |
| <b>Metal oxide semiconductor field effect transistor (MOSFET):</b> Operation and characteristics. Current saturation in MOSFET. Depletion and Enhancement type MOSFET. DC and AC equivalent circuits. Amplifier and other circuit analysis using equivalent circuits   | 7 (6-8)         |
| <b>Operational Amplifiers (Op-amps):</b> Operation and characteristics, inverting and non-inverting amplifiers, summer, integrator, differentiator, Electronic Analog Computation.   | 3 (9)           |
| <b>Linear Integrated Circuits:</b> <ul style="list-style-type: none"> <li>• Oscillators: Barkhausen criteria, Wein bridge oscillator, Crystal oscillator, LC tuned oscillator</li> <li>• Timers (555)</li> <li>• Monostable, astable, bistable multivibrator</li> <li>• Function generators</li> </ul>       | 12 (10-13)      |
| <b>Review</b>  | 3 (14)          |

9. Important University Policies

- Please check the following link for Rules and regulations for the undergraduate programs:  
<https://www.buet.ac.bd/info/Academicinformation/RulesUndergradprogram>

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|----------------------------|----------------------------|------------|
| Course Outline Prepared by | Dr. Mahbub Alam            | 28/07/2022 |
| Course Outline Reviewed by | Dr. Quazi Deen Mohd Khosru | 29/07/2022 |
|                            | Dr. Ahmed Zubair           | 29/07/2022 |
|                            | Nafis Sadik                | 20/11/2023 |
|                            | Md. Jawad Ul Islam         | 20/11/2023 |