



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch: ALL

Course / Subject Code : BE01000111

Course / Subject Name : Basic Electronics Engineering

| | |
|-------------------------|----------------------|
| w. e. f. Academic Year: | 2024-25 |
| Semester: | I st Year |
| Category of the Course: | ESC |

| | |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prerequisite: | High School Physics and Mathematics |
| Rationale: | Electronics is playing a key role in all engineering applications. All engineers should have the basic knowledge of electronics. Purpose of this course is to make students familiar with basic electronic devices, circuits and their applications. Students will be able to operate electronic test and measurement equipment like digital multi-meter, CRO, DC power supply and function generator. |

Course Outcome:

After Completion of the Course, Student will able to:

| No | Course Outcomes | RBT Level |
|----|--------------------------------------------------------|-----------|
| 01 | Analyze the general and special purpose diode circuits | N |
| 02 | Design biasing circuits for BJT and FET | C |
| 03 | Analyze BJT circuits in small-signal domain | N |
| 04 | Analyze FET circuits for DC voltages and currents | N |
| 05 | Understand usage of Special Purpose Diodes | U |

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

| Teaching Scheme (in Hours) | | | Total Credits L+T+ (PR/2) | Assessment Pattern and Marks | | | | Total Marks |
|-------------------------------|---|----|---------------------------------|------------------------------|-------------|-----------|----------------------|-------------|
| L | T | PR | | C | Theory | | Tutorial / Practical | |
| | | | ESE (E) | | PA / CA (M) | PA/CA (I) | ESE (V) | |
| 3 | 0 | 2 | 4 | 70 | 30 | 20 | 30 | 150 |



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Course Content:

| Unit No. | Content | No. of Hours | % of Weightage |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------|
| 1. | Semiconductor Diodes: p-n junction diode, Characteristics and parameters, Diode approximations, DC load line analysis, Temperature effects, Diode AC models, Diode specifications, Diode testing, Zener diodes. | 6 | 15 |
| 2. | Diode Applications: Half-wave and Full-wave rectifiers, Power supply, RC and LC power supply filters, Zener diode voltage regulators, Series and shunt clipping circuits, Clamping circuits, DC voltage multipliers. | 6 | 15 |
| 3. | Bipolar Junction Transistors : BJT operation, BJT voltages and currents, BJT amplification, BJT switching, CB, CE and CC characteristics, Transistor testing. | 6 | 15 |
| 4. | BJT biasing : DC load line and bias point, Base bias, Collector-to-base bias, Voltage- divider bias ,Comparison of basic bias circuits, Bias circuit design. | 6 | 15 |
| 5. | AC analysis of BJT circuits : Coupling and bypass capacitors, AC load lines, transistor models and parameters, CE circuit analysis, CE circuit with unbypassed emitter resistor, CC circuit analysis, CB circuit analysis, Comparison of CE, CB and CC circuits | 6 | 15 |
| 6. | Field Effect Transistors: Junction Field Effect Transistors, JFET characteristics, JFET data sheets and parameters, FET amplification and switching, MOSFETs | 5 | 10 |
| 7. | FET biasing : DC load line and bias point, Gate bias, Self bias, Voltage divider bias, Comparison of basic JFET bias circuits | 4 | 5 |
| 8. | Special Purpose Diodes: Light Emitting Diode(LED), Photo diode, Solar cell, PIN diode, Varactor diode, Schottky diode, Tunnel diode, Seven segment display | 6 | 10 |
| Total | | 45 | 100 |

Suggested Specification Table with Marks (Theory):

| Distribution of Theory Marks (in %) | | | | | |
|-------------------------------------|---------|---------|---------|---------|---------|
| R Level | U Level | A Level | N Level | E Level | C Level |
| 15 | 20 | 25 | 30 | 0 | 10 |

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



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References/Suggested Learning Resources:

(a) Books:

1. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, Fifth Edition
2. Jacob Millman, Christos Halkias, Chetan D. Parikh, "Integrated Electronics", Tata McGraw Hill, Second Edition

Open source software and website:

1. <http://nptel.ac.in/courses/122106025> (Basic Electronics and lab by Prof. T.S.Natarajan)

Suggested Course Practical List:

1. VI characteristics of p-n junction diode, LED and photo diode
2. Half wave and full wave rectifier circuits
3. Clipper and clamper circuits
4. Zener diode regulator circuit
5. CE amplifier characteristics
6. CB amplifier characteristics
7. CC amplifier characteristics
8. Transistor as a switch
9. Voltage gain and current gain of a CE amplifier
10. FET characteristics
11. Varactor diode and tunnel diode characteristics
12. Seven segment LED operation

List of Laboratory/Learning Resources Required: CRO, Function Generators, DC power supply, bread board and discrete electronic components

Suggested Project List: Project based on design of a small circuit with input and output signal observations on CRO.

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