



**K. S. INSTITUTE OF TECHNOLOGY**  
An Autonomous Institution under VTU, Approved by AICTE  
Department of Electronics & Communication Engineering  
**FIRST SEMESTER SYLLABUS**

Name of the Course: <b>Fundamentals of Electronics &amp; Communication Engineering</b>		Semester	I/II
Course Code	<b>25BPSC105D/205D</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	CORE		

**Course objectives:**

Students will be taught

- Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications.
- Biasing circuits for transistor (BJT) as an amplifier.
- Study of linear Op-amps and its applications.
- Logic circuits and their optimization.
- Principles of Analog Communication and Transducers

**Teaching-Learning Process (Innovative Delivery Methods)**

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching learning process and facilitate the achievement of course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the functioning of various analog and digital circuits.
3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
5. Arrange visits to nearby industries to give brief information about the electronics manufacturing industry. 6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

**Module-1**

**Semiconductor Diodes:** Introduction, PN Junction diode, Characteristics and Parameters, Diode Approximations, DC Load Line analysis (Text 1: 2.1,2.2,2.3,2.4)

**Diode Applications:** Introduction, Half Wave Rectification, Full Wave Rectification, Full Wave Rectifier Power Supply: Capacitor Filter Circuit, (only qualitative approach), **Diode as Clipper, (Text 1: 3.1,3.2,3.4,3.8)**

**Zener Diodes:** Zener Diode and its use in Voltage Regulation (Text1:2.9, 3.7)

**Number of Hours:8**

<b>Module-2</b>	
<p><b>Bipolar Junction Transistors:</b> Introduction Voltages &amp; Currents, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics, BJT Biasing: Introduction, Fixed Biasing and Voltage Divider, DC Load line and Bias point. (Text 1: 4.1,4.2, 4.3, 4.5,4.6, 4.7,5.1)</p> <p><b>Field Effect Transistor:</b> Junction Field Effect Transistor, JFET Characteristics, MOSFETs: Enhancement MOSFETs, (Text 1: 9.1,9.2,9.5)</p> <p><b>Case Study:</b> MOSFET as a Switch.</p>	<b>Number of Hours:8</b>
<b>Module-3</b>	
<p><b>Operational Amplifiers:</b> Introduction The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, Slew rate, Bandwidth, input offset voltage, Input bias Current and Input offset Current, The Ideal Op-Amp , Equivalent Circuit of Op-Amp, Open Loop Op-Amp configurations, Differential Amplifier, Inverting &amp; Non Inverting Amplifier</p> <p><b>Op-Amp Applications:</b> Inverting Configuration, Non-Inverting Configuration, Differential Configuration, Voltage Follower, Integrator, Differentiator.</p> <p>(Text 2: 1.1, 1.2, 1.3, 1.5, 2.3, 2.4, 2.6, 6.5.1, 6.5.2, 6.5.3, 6.12, 6.13).</p>	<b>Number of Hours:8</b>
<b>Module-4</b>	
<p><b>Oscillators: Positive Barkhausen criterion, Sinusoidal and Non-Sinusoidal oscillators, Wein bridge oscillator. (Text 5: 9.1,9.3)</b></p> <p><b>Communications:</b> Elements of a Communication System, Communication Channels and their Characteristics; Wireline, Fiber Optic, Wireless Electromagnetic Channels, Modulation, Need for Modulation, Types of Modulation, waveforms. (Textbook 3: 1.2, 1.3, 3.1)</p> <p><b>Applications:</b> AM Radio Broadcasting, Superhetrodyne FM Receiver, Mobile Wireless Telephone Systems. (Textbook 4: 3.5 ,4.4.1,4.5,18.3.1,18.3.2)</p>	<b>Number of Hours:8</b>
<b>Module-5</b>	
<p><b>Boolean Algebra and Logic Circuits:</b> Binary numbers, Number Base Conversion, octal &amp; Hexa Decimal Numbers, Complements, Signed Binary Numbers - Arithmetic Addition and Subtraction Binary Logic, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates (Text 5 : 1.2, 1.3, 1.4, 1.5, 1.6,1.9, 2.2, 2.3, 2.4, 2.5,2.6, 2.8,3.6),</p> <p><b>Combinational logic:</b> Introduction, Design procedure, Adders- Half adder, Full adder. (Text 5 :4.1, 4.2, 4.3,4.5), <b>Case Study with 4- Bit Adder Simulation</b></p>	<b>Number of Hours:8</b>
<p><b>Course outcome (Course Skill Set)</b></p> <p>At the end of the course, the student will be able to:</p> <p>CO1: Understand and analyze construction, operation, and characteristics of semiconductor devices.</p> <p>CO2: Demonstrate understanding by applying acquired knowledge to design and construct small-scale circuits using semiconductors.</p> <p>CO3: Develop competence by applying knowledge to construct basic digital circuits using logic gates and understanding their functions.</p> <p>CO4: Understand and construct the conceptual blocks for basic communication system.</p> <p>CO5: Develop and demonstrate basic knowledge of transducers and oscillators.</p>	

**Assessment Structure:** The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. • To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. • To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks. Note: The Case Studies provided in Modules 2, 4 and 5 are only meant to motivate the application of concepts to students and will not appear in the SEE.

**Continuous Comprehensive Evaluation (CCE):**

CCE will be conducted for a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

**Learning Activity:** (Marks 25): Two assignments (for 10marks) and 15marks for Mini project using discrete components, demonstration and report submission.

**Suggested Learning Resources: (Textbooks)**

1. David A Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press, 30th Impression, 2025.
2. Ramakanth A Gayakwad, Op-amps and Linear Integrated Circuits, 4th Edition, Pearson Education, 2015.
3. John G. Proakis, Masoud Saleh, Fundamentals of Communication Systems, Second Edition, Pearson Educations, Inc., 2014.
4. D.P Kothari and I J Nagrath, Basic electronics, Second Edition, McGraw Hill Education Pvt Ltd, 2018.
5. M.Morris Mano and Michael D.Ciletti, Digital Design - With an Introduction to the Verilog HDL, VHDL and System Verilog 6th Edition, Pearson Education Inc, 2024.

**Reference Book**

1. Mike Tooley, Electronic Circuits, Fundamentals & Applications, 5th Edition, Elsevier, 2020.
2. Albert Malvino, Electronic Principles, 9th Edition, McGraw Hill Publications, 2021.
3. Electronic Devices and Circuit Theory, R Nashelsky and L Nashelsky, 11th Edition, Pearson, 2012

**Web links and Video Lectures (e-Resources):**

- Introduction to Basic Electronics: <https://nptel.ac.in/courses/122106025>
- Digital Electronic Circuits <https://nptel.ac.in/courses/108105132>

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

- Quizzes
- Assignments
- Seminar
- Presentations
- Mini Projects