

**DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, UTTAR PRADESH,  
LUCKNOW**



## **EVALUATION SCHEME AND SYLLABI**

*For*

**B. Tech. 1<sup>ST</sup> Year**  
**Common to All Branches**  
**EXCEPT Agriculture Engineering and Biotechnology**

**Effective from the Session: 2023-24**

**DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY UTTAR PRADESH.**  
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## IEC101 / IEC201 : FUNDAMENTALS OF ELECTRONICS ENGINEERING

Topics	Contact Hours
<b>Unit-1</b>	<b>8</b>
<p><b>Semiconductor Diode:</b> Depletion layer, V-I characteristics, ideal and practical Diodes, Diode Equivalent Circuits, Zener Diodes breakdown mechanism (Zener and avalanche)</p> <p><b>Diode Application:</b> Diode Configuration, Half and Full Wave rectification, Clippers, Clampers, Zener diode as shunt regulator, Voltage-Multiplier Circuits</p> <p><b>Special Purpose two terminal Devices:</b> Light-Emitting Diodes, Photo Diodes, Varactor Diodes, Tunnel Diodes.</p>	
<b>Unit-2</b>	<b>8</b>
<p><b>Bipolar Junction Transistor:</b> Transistor Construction, Operation, Amplification action. Common Base, Common Emitter, Common Collector Configuration</p> <p><b>Field Effect Transistor:</b> Construction and Characteristic of JFETs. Transfer Characteristic. MOSFET (MOS) (Depletion and Enhancement) Type, Transfer Characteristic.</p>	
<b>Unit-3</b>	<b>8</b>
<p><b>Operational Amplifiers:</b> Introduction, Op-Amp basic, Practical Op-Amp Circuits (Inverting Amplifier, Non-inverting Amplifier, Unit Follower, Summing Amplifier, Integrator, Differentiator). Differential and Common-Mode Operation, Comparators.</p>	
<b>Unit-4</b>	<b>8</b>
<p><b>Digital Electronics:</b> Number system &amp; representation, Binary arithmetic, Introduction of Basic and Universal Gates, using Boolean algebra simplification of Boolean function. K Map Minimization upto 6 Variables.</p>	
<b>Unit-5</b>	<b>8</b>
<p><b>Fundamentals of Communication Engineering:</b> Basics of signal representation and analysis, Electromagnetic spectrum Elements of a Communication System, Need of modulation and typical applications, Fundamentals of amplitude modulation and demodulation techniques.</p> <p><b>Introduction to Wireless Communication:</b> Overview of wireless communication, cellular communication, different generations and standards in cellular communication systems, Fundamentals of Satellite &amp; Radar Communication.</p>	

### Course Outcomes:

At the end of this course students will demonstrate the ability to:

1. Describe the concept of PN Junction and devices.
2. Explain the concept of BJT, FET and MOFET.
3. Apply the concept of Operational amplifier to design linear and non-linear applications.
4. Perform number systems conversions, binary arithmetic and minimize logic functions.
5. Describe the fundamentals of communication technologies.

**Text Books:**

1. Robert L. Boylestand / Louis Nashelsky "Electronic Devices and Circuit Theory", Pearson Education.
2. George Kennedy, "Electronic Communication Systems", McGrawPublication
3. David A. Bell, "Electronic Devices and Circuits", Oxford UniversityPress.
4. Jacob Millman, C.C. Halkias, StayabrataJit, "Electronic Devices and Circuits", McGrawHill.
5. A. Anand Kumar, "Fundamental of Digital Circuits," PHI 4th edition, 2018.

# IEC151 / IEC251: BASIC ELECTRONICS ENGINEERING LAB

## Suggestive List of Experiments

### Part A:

1. Study of various types of Active & Passive Components based on the ir ratings.
2. Identification of various types of Printed Circuit Boards (PCB) and soldering Techniques.
3. PCB Lab: a. Artwork & printing of a simple PCB. b. Etching & drilling of PCB
4. Winding shop: Step down transformer winding of less than 5VA.
5. Soldering shop: Soldering and disordering of Resistor in PCB. Soldering and disordering of IC in PCB. Soldering and disordering of Capacitor in PCB

### Part B:

1. Study of Lab Equipment and Components: CRO, Multimeter, and Function Generator, Power supply-Active, Passive Components and Bread Board.
2. P-N Junction diode: Characteristics of PN Junction diode - Static and dynamic resistance measurement from graph.
3. Applications of PN Junction diode: Half & Full wave rectifier- Measurement of  $V_{rms}$ ,  $V_{dc}$ , and ripple factor.
4. Characteristics of Zener diode: V-I characteristics of zener diode, Graphical measurement of forward and reverse resistance.
5. Characteristic of BJT: BJT in CE configuration.
6. To study Operational Amplifier as Adder and Subtractor
7. Verification of Truth Table of Various Logic Gate.
8. Implementation of the given Boolean function using logic gates in both SOP and POS forms.

### Part (C):

<b>Part A</b>	<b>PCB Lab:</b> a. Artwork & printing of a simple PCB. b. Etching & drilling of PCB	This practical is not possible by virtual lab. It will be conducted only in physical mode
<b>Part B</b>	Study of Lab Equipment's and Components: CRO, Multi meter, Function Generator, Power supply-Active, Passive Components and Bread Board.	NA, These test equipment can be Demonstrated online from any lab of ECE department or physical mode is only option.

**(D) Experiments available on virtual lab**

PN Junction on diode: Characteristics of PN Junction diode-Static and dynamic resistance measurement from graph.	<a href="http://vlabs.iitkgp.ernet.in/be/exp5/index.html">http://vlabs.iitkgp.ernet.in/be/exp5/index.html</a>
Applications of PN Junction diode: Half & Full wave rectifier- Measurement of $V_{rms}$ , $V_{dc}$ , and ripple factor.	<a href="http://vlabs.iitkgp.ernet.in/be/exp6/index.html">http://vlabs.iitkgp.ernet.in/be/exp6/index.html</a> <a href="http://vlabs.iitkgp.ernet.in/be/exp7/index.html">http://vlabs.iitkgp.ernet.in/be/exp7/index.html</a>
Characteristics of Zener diode: V-I characteristics of Zener diode, Graphical measurement of forward and reverse resistance.	<a href="http://vlabs.iitkgp.ernet.in/be/exp10/index.html">http://vlabs.iitkgp.ernet.in/be/exp10/index.html</a>
Characteristic of BJT: BJT in CE configuration.	<a href="http://vlabs.iitkgp.ernet.in/be/exp11/index.html">http://vlabs.iitkgp.ernet.in/be/exp11/index.html</a>
To study Operational Amplifier as Adder and Subtractor	<a href="http://vlabs.iitkgp.ernet.in/be/exp17/index.html">http://vlabs.iitkgp.ernet.in/be/exp17/index.html</a> <a href="http://vlabs.iitkgp.ernet.in/be/exp18/index.html">http://vlabs.iitkgp.ernet.in/be/exp18/index.html</a>
Verification of Truth Table of Various Logic Gate	<a href="https://de-iitr.vlabs.ac.in/digital-electronics-iitr/exp/truth-table-gates/">https://de-iitr.vlabs.ac.in/digital-electronics-iitr/exp/truth-table-gates/</a>
Implementation of the given Boolean function using logic gates in both SOP and POS forms.	<a href="https://de-iitr.vlabs.ac.in/digital-electronics-iitr/exp/realization-of-logic-functions/">https://de-iitr.vlabs.ac.in/digital-electronics-iitr/exp/realization-of-logic-functions/</a>