### INVERTIS
UNIVERSITY BAREILLY

**CBCS Course Curriculum (Effective from Session 2022-23)**
**[Bachelor of Technology (B.Tech. Biotechnology)]**

**B.Tech Biotechnology: Semester-I**
**BBT 103 - Basic Electrical Engineering**

| Teaching Scheme | Examination Scheme |
|---|---|
| Lectures: 3 hrs/Week | Class Test -12 Marks |
| Tutorials: 1 hr/Week | Teachers Assessment – 6 Marks |
| Credits: 4 | Attendance – 12 Marks |
| | End Semester Exam – 70 marks |

**Course Objective:**

The course aims at imparting basic knowledge of electrical engineering and its applications in living world.

**Course Learning Outcomes:**
After completing the course, the student shall be able to:

CO1: To define the Circuit and Network, active and passive elements, Concept of linearity and linear network, unilateral and bilateral elements.

CO2: To summarize the Working principle of DC motor & single phase induction motor, working principles of PMMC and moving iron type voltmeters and ammeters, breakdown mechanism, breakdown characteristics, zener diode application as shunt regulator.

CO3: To determine the values of current and voltages using loop and nodal methods of analysis, Kirchhoff's law, Superposition Theorem, Thevenin's Theorem, Norton's Theorem.

CO4: To compare the Extrinsic & Intrinsic type semiconductors, ideal and practical diodes, non-inverting and unity gain configurations, Logic Gates.

CO5: To judge the significance of K-maps, canonical forms, applications of Op-Amp as adders, applications of Op-Amp as adders.

CO6: To create a Conversion of numbers into Binary to Hexadecimal, Decimal to Binary, Octal to Binary, Basic construction, transistor amplification action, input/output characteristics of CB and CE configurations.

**UNIT 1: D C Circuit Analysis and Network Theorems**

**D C Circuit Analysis and Network Theorems**
Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear element transformation. Kirchhoff's laws; loop and nodal methods of analysis.
**Network Theorems:** Superposition Theorem, Thevenin's Theorem, Norton's Theorem, and Maximum Power Transfer Theorem.
**Electrical machines:** Principles of electro mechanical energy conversion, DC machines: types, e. m. f. equation of generator and torque equation of motor, characteristics and applications of dc motors
Single phase induction motor: Principle of operation and introduction to methods of starting applications.

**UNIT 2: Semiconductor Diodes and Applications**

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## Semiconductor Diodes and Applications

p-n junction, depletion layer, diode ratings (average current, repetitive peak current, peak inverse voltage) p-n junction as rectifiers (half wave and full wave) filter (Shunt capacitor filter), clippling circuits, clamping circuits, Zener Diode.

## Bipolar Junction Transistor (BJT)

Basic construction, transistor action, CB, CE and CC configurations, input/ output characteristics, Different types of transistor biasing

**JFET:** Basic construction, principle of working, concept of pinch-off maximum drain saturation current, input and transfer characteristics characteristic equation, CG, CS and CD configurations, fixed and self-biasing of JFET amplifier

## UNIT 3: Switching Theory and logic design

## Switching Theory and logic design

Number system, conversion of bases (decimal, binary, octal and hexadecimal numbers) addition and subtraction, BCD numbers, Boolean algebra, logic gates, concept of universal gates canonical forms, minimization using K-map.

## Electrical Instruments
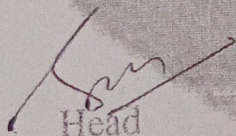
Types of instruments, construction and working principles of PMMC and moving iron type Voltmeters& ammeters, single phase dynamometer wattmeter and induction type energy meter.

## Electronics Instruments

working principle of digital voltmeter, digital multimeter (block diagram approach) CRO (its Working with block diagram) measurement of voltage, current, phase and frequency using CRO.
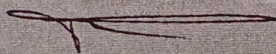
### Suggested Readings

- Robert L. Boylestad/ Louis Nashelsky "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education.
- Devid A. Bell "Electronic Devices and Circuits", 5th Edition, OXFORD University Press 2008.
- Morris Mano "Digital Computer Design", PHI 2003.
- H.S. Kalsi "Electronic Instrumentation", 2nd Edition, TMH 2007.
- D.E. Fitzgerald & A. Grabel Higginbotham, "Basic Electrical Engineering ".
- I.J. Nagarath, "Basic Electrical Engineering" Tata McGraw Hill.

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