

# Dr. Babasaheb Ambedkar Technological University, Lonere.

## **B.Tech (Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering)**

### **A. Program Educational Objectives (PEOs)**

Graduates will be able to–

- 1.To equip graduates with a strong foundation in engineering sciences and Electrical Engineering fundamentals to become effective collaborators, researchers and real-time problem solver with technical competencies.
- 2.Perceive the limitation and impact of engineering solutions in social, legal, environmental, economical and multidisciplinary contexts.
- 3.Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

### **B. Program Outcomes (POs)**

Engineering Graduate will be able to –

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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**Curriculum of Second Year**

**Semester III**

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
BSC	BTBS301	Engineering Mathematics-III	3	1	-	20	20	60	100	4
PCC1	BTEEC302	<b>Electrical Machines-I</b>	3	1	-	20	20	60	100	4
PCC2	BTEEC303	Electrical and Electronics Measurement	3	1	-	20	20	60	100	4
HSSMC	BTHM304	Basic Human Rights	2	-	-					<b>Audit</b>
ESC	BTES305	<b>Engineering Material Science</b>	3	-	-	20	20	60	100	3
LC	BTEEL306	Electrical Machines-I Lab			2	60		40	100	1
LC	BTEEL307	Electrical and Electronics Measurement Lab			2	60		40	100	1
Project	BTEEP308	Mini Project-I			4	60		40	100	2
Internship	BTES211P	Internship-I Evaluation						50	50	1
			14	3	8	260	80	410	750	20

**Semester IV**

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC3	BTEEC401	<b>Network Theory</b>	3	1	-	20	20	60	100	4
PCC4	BTEEC402	<b>Power System</b>	3	1	-	20	20	60	100	4
PCC5	BTEEC403	Electrical Machine-II	3	1	-	20	20	60	100	4
BSC	BTBS404	Analog and Digital Electronics	3	-	-	20	20	60	100	3
PEC1	BTEEPE405	Group A	3	-	--	20	20	60	100	3
LC	BTEEL406	Network Theory Lab	-	-	2	30		20	50	1
LC	BTEEL407	Power System Lab	-	-	2	30		20	50	1
LC	BTEEL408	Electrical Machine-II Lab	-	-	2	30		20	50	1
LC	BTEEL409	Analog and Digital Electronics lab	-	-	2	30		20	50	1
Internship	BTEEP410	Internship-II (minimum of 4 weeks which can be completed partially in third or fourth semester or in at one time)	-	-	-	-	-	-	-	-
						220	100	380	700	22

**Group-A**

- (A) Electromagnetic Field Theory
- (B) **Signals and System**
- (C) Advance Renewable Energy Sources
- (D) **Electronic Devices and Circuits**

**Unit 1: Philosophy of Measurement****4 Hours**

Introduction to Measurement, Methods of Measurements, Measurement System, Instruments, Classification of Instruments, Characteristics of Instruments & Measurement System, Errors in Measurement, Types of Errors, Calibration, Standards and their classifications.

**Unit 2: Analog Measurement of Electrical Quantities****8 Hours**

Classification of Analog Instruments, Principle of Operation, Operating Torques, Different types of Damping and Control Systems, Types of Instrument: PMMC, Extension of Range of PMMC Instruments, Moving Iron, Electro-dynamometer, Hot wire, Thermocouple, Induction, Electrostatic, Rectifier.

Power Measurement: Power measurement in AC and DC circuits, Power and Power Factor, Electrodynamometer-type Wattmeter, Induction-type Wattmeter, Power measurement in Poly-phase systems, Power measurement in Three-Phase systems, Reactive Power measurements, Power measurement with Instrument Transformers - Potentiometer and Current Transformer.

Measurement of Energy: Induction-type Energy Meter, Errors in Induction-type Energy Meters and their compensation, Testing of Energy Meters.

**Unit 3: A.C. and D.C. Bridges****8 Hours**

Measurement Resistance: Wheatstone Bridge, Kelvin Bridge Method, Kelvin Double Bridge Method, Ammeter-Voltmeter Method, Direct deflection method, Loss of charge method, Megohm Bridge, Megger.

Measurement of Inductance and Capacitance: Maxwell Bridge, Hays Bridge, Anderson Bridge, De-Sauty Bridge, Schering Bridge, Wien Bridge.

Localisation of Cable Faults: Murray Loop Test, Varley Loop Test.

Magnetic Measurements: Ballistic Galvanometer, Flux Meter, Maxwell's Bridge Method, AC Potentiometer Method.

**Unit 4: Digital Measurement of Electrical Quantities****7 Hours**

Concept of Digital Measurement, Block diagram of Digital Instrumentation System, Digital versus Analog Instrument, Digital Voltmeter, Types of Digital Voltmeter, Digital Multi-meter Digital Counter, Digital Frequency Meter, **Power Analyzer & Harmonic Analyzer**, Spectrum & Wave analyzer, Oscilloscopes, Cathode Ray Oscilloscope (CRO), Digital Storage Oscilloscopes (DSO), Signal Generator, Q-Meter.

**Unit 5: Transducers****8 Hours**

**Definition**, Classification & selection of transducers, **Characteristics**, **Transducers for measurement of Displacement (RVDT & LVDT), Speed, Angular Rotation, Altitude, Force, Torque, Humidity and Moisture, Pressure, Strain and Temperature (Thermocouple and RTD method), Position, Hall Effect transducer and applications. Instrumentation amplifiers, Signal Conditioning, Data Transmission and Telemetry, Data Acquisition Systems.**

**Displays and Recorders: Different types of Display – Different types of Recorder:** Graphic Recorder, Strip Chart Recorder, **Galvanometric and** Potentiometer type **Recorders**, X-Y Recorder, Circular Chart Recorder, Magnetic Tape Recorder, **Digital Recorders**, Printer and Plotter (**Block Diagram, theory and applications only**)

**Reference Books/ Text Books:**

1. E.W. Golding & F.C. Widdis, “Electrical Measurement & Measuring Instrument”, A.H. Wheeler & Co. India.
2. A.K. Sawhney, “Electrical & Electronic Measurement & Instrument”, Dhanpat Rai & Sons.
3. Forest K. Harries, “Electrical Measurement”, Willey Eastern Pvt. Ltd. India.
4. M.B. Stout, “Basic Electrical Measurement” Prentice hall of India.
5. W.D. Cooper, “Electronic Instrument & Measurement Technique”, Prentice Hall International.
6. J.B. Gupta, “Electrical Measurements and Measuring Instruments”, S.K. Kataria & Sons.
7. Prithwiraj Purkait, Budhaditya Biswas, Santanu Das and Chiranjib Koley, “Electrical and Electronics Measurements and Instrumentation”, McGraw Hill.