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Electronic Instrumentation and Measurement — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 4th Semester • Session 2026-27
Subject 4.3 (Practicum) • Total 100 Marks • 3 Credits • L 2 - P 2

Note: The scheme table spells this subject “Electronic Instrumentation & Measurement” (sic); the subject heading spells it “Electronic Instrumentation & Measurement”.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.3	Electronic Instrumentation & Measurement	Practicum	2 - 2	3	Theory 40	Theory 60 (3 hrs)	100
Electronic Instrumentation and Measurement Total				3	40	60	100

What This Subject Aims To Do

To build on basic measuring tools with the principles, concepts and techniques of analog and digital electronic measurement methods — for accurate determination of process parameters in industrial applications, with data detection, acquisition, analysis and control.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Basics of Measurements	4	15%
2	AC and DC and Bridges	4	15%
3	Measuring Instruments	7	25%
4	Oscilloscopes	7	25%
5	Transducers	6	20%

Unit 1 — Basics of Measurements (4 Periods, 15%)

Topics: Measurement, Method of measurements, Types of instruments, Accuracy & Precision, Sensitivity, Resolution, Types of Errors, Sources of errors, Loading effect

In simple words: What makes a measurement good: accuracy, precision, sensitivity, resolution, and the errors that creep in.

Unit 2 — AC and DC and Bridges (4 Periods, 15%)

Topics: DC Bridges -Wheatstone and Kelvin Double Bridge (Only comparative study). AC Bridges - Maxwell's Bridge, Hay's Bridge, Anderson Bridge, De-Sauty's Bridge (Only comparative study)

In simple words: Bridge circuits for measuring resistance and inductance precisely — Wheatstone, Kelvin, Maxwell, Hay, Anderson and De-Sauty.

Unit 3 — Measuring Instruments (7 Periods, 25%)

Topics: Permanent Magnet Moving Coil Instruments (PMMC), Moving Iron Type Instruments (MI), Electro Dynamo Type Instruments, Single Phase Energy Meter, Applications of DC Potentiometer and AC Potentiometers, Various types of Electronic Instruments.

In simple words: The classic indicating instruments — PMMC, moving-iron and dynamometer types — plus energy meters and potentiometers.

Unit 4 — Oscilloscopes (7 Periods, 25%)

Topics: Cathode ray tube: probe structure (1:1,10:1), construction, operation, screens, Graticules vertical deflection system, Horizontal deflection system, Delay line, Measurement of frequency, time delay, phase angle and modulation index (trapezoidal method), Oscilloscope probe: Structure of 1:1 and 10:1 probe, Multiple Trace CRO, Digital storage oscilloscope (DSO).

In simple words: The oscilloscope: how a CRO works, its probes, and how to measure frequency, phase and modulation index — plus the modern digital storage oscilloscope.

Unit 5 — Transducers (6 Periods, 20%)

Topics: Classification, Selection Criteria, Characteristics, Construction, Working Principles and Application of following Transducers: RTD, Thermocouple, Thermistor, LVDT, Strain Gauge Load Cell, Piezoelectric Transducers.

In simple words: Sensors that convert physical quantities into electrical signals: temperature (RTD, thermocouple, thermistor), displacement (LVDT), strain gauges and piezoelectric devices.

Practical Work

- Determine the value of unknown resistance using Wheatstone bridge.
- Measure Low resistance by Kelvin's Double Bridge.
- Measure unknown inductance using following bridges (a) Anderson's Bridge (b) Maxwell's Bridge.
- List various standard sources & measuring UNITS. Measure DC & AC voltages, current using ammeter and voltmeter.
- Test diodes and transistors using analog and digital Multimeter.
- Study the working of Q-meter and measure Q of coils.
- Operate front panel controls of DSO/CRO to observe various waveforms.
- Measure time, voltage, frequency, phase difference of input signals using DSO/CRO.
- Demonstrate features of digital storage oscilloscope.
- Experiment with front panel controls of various signal generators and observe output Waveform.
- Measure strain/stress using strain gauge measurement.
- Measure displacement using LVDT.
- Measure temperature using thermistor and thermocouple.
- Using a piezo resistive sensor to measure pressure variations/Using a piezoelectric sensor to measure sound vibrations.

Reference Books (as listed in the syllabus)

- Electrical & Electronic Measurement & Instruments A.K. Sawhney, Dhanpat Rai & Sons, India
- Electronic Instrument and Measurement Technique W.D. Cooper Prentice Hall International, India.
- Electronic Measurement & Instrumentation J.G. Joshi Khanna Publishing House, Delhi
- Measurement systems application and design E.O. Doebelin and D. N. Manik, Tata Mcgraw-Hill
- Electronic Measurements and Instrumentation Oliver and Cage, Tata Mcgraw-Hill
- Rahul Wadhwa, Electronic Instruments&Measurement, Asian Publishers, Muzaffarnagar. ISBN: 978-93-5502-137-3
- Basic Electrical Measurement M.B. Stout Prentice hall of India, India
- Electronic Instrumentation H. S. Kalsi ,Tata Mcgraw-Hill

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Source: BTEUP 2nd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.

Please confirm with your own polytechnic for any local changes.

