Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

Syllabus

B.Sc. (Instrumentation Practice)

First Year

(First and Second Semester)

(Effective from June 2009)

B.Sc. First Year (Instrumentation Practice)

Semester I

Paper I :- Instrumentation - I

Periods (45) Credits (3.00)

1. Electrons and Electricity : Periods(9) Credits(0.6)

Introduction, Atoms and their structure, electrical charge, Atomic number, Atomic weight, conductors and Insulators, electric Current, electric voltage, Batteries, wet cells, dry cells.

2. Resistance and Ohm's law: Periods(9) Credits(0.6)

Introduction, Ohm's law, resistors, colour coding of resistors, types of fixed resistors, variable resistors, combination of resistors, series resistances, parallel resistances.

3. Kirchhoff's Laws: Periods(9) Credits(0.6)

Introduction, Kirchhoff's voltage laws, Loops, Loop current's Sign conventions, Kirchhoff's voltage law in action, Kirchhoff's current law, Nodes, Kirchhoff'f current law in action.

4. Magnetism and Electricity: Periods(9) Credits(0.6)

What is a magnet?, Producing magnetism with electricity, producing electricity with magnetism.

5. Transformers: Periods(9) Credits(0.6)

Introduction, Coefficient of coupling, Transformer action, centre taps.

Text Book : Basic Electricity and Electronics : Delton T. Horn, McGraw Hill

B.Sc. First Year (Instrumentation Practice)

Semester I

Paper II :- Instrumentation - II

Periods (45) Credits (3.00)

1. Introduction to Electronic Instrumentation and Measurement: Periods(9) Credits(0.6)

Introduction, Scientific notations, Physical Units, Physical Constants, Average, Integrated Root Mean Square, Integrated Root Sum Squares.

2. Logarithmic Representations: Periods(9) Credits(0.6)

Decibels, Adding it all up, converting between dB notation and gain notation, special dB scales, converting dBm to voltage.

3. Basic Measurement Theory : Periods(9) Credits(0.6)

Introduction, Categories of measurements, Factors in making measurements, Errors, Validity, Reliability and Repeatability, Accuracy and Precision, Categories of Errors.

4. DC Deflection Meter Movements: Periods(9) Credits(0.6)

The basic Analog dc meter, d-Arsonval meter movement, types of analog meters, Voltage measurement from dc current meters, The voltage sensitivity, Analog Multimeters.

5. Analog ac deflection type meters: Periods(9) Credits(0.6)

Thermocouple ac current meters, Rectifier based ac meters, Rectification, Rectifier circuits for ac meters, effects of waveform on meter readings, true rms reading, Rectifier Instruments.

Text Book : Elements of Electronic Instrumentation and Measurements - Joseph J. Carr Pearson Education III edition.

B.Sc. First Year (Instrumentation Practice)
Semester I

Every candidate appearing for examination must produce journal showing that he/she has completed at least 75% experiments during the semester. The journal must be certified at the end of the semester by head of the department.

Paper III :-Practical Paper - I

1. Study of resistance using colour code and finding their values when they are in series and in parallel.
2. Study of Kirchhoff's voltage law.
3. Study of Kirchhoff's current law.
4. Study of capacitors in series and in parallel.
5. Study of Transformers.
6. Study of Relays and circuit breakers.
7. Study of errors in measurements.
8. Study of DC and AC meters.

Paper IV :-Practical Paper - II

1. Study of meter sensitivity.
2. Study of Phase detector..
3. Characteristics of Rectifier Diode.
4. Characteristics of Zener Diode.
5. Characteristics of Varactor Diode.
6. Characteristics of Displays.
7. Study of thermocouple type current meter.
8. Study of analog and digital multimeters.

B.Sc. First Year (Instrumentation Practice)

Semester II

Paper V :- Instrumentation - III

Periods (45) Credits (3.00)

1. Semiconductors: **Periods(9) Credits(0.6)**

Semiconductor properties, n-type semiconductor, p-type semiconductor, semiconductor diode, Zener diode.

2. Light Emitting Diodes: **Periods(9) Credits(0.6)**

Introduction, Three State LED, Multiple segment Displays, Bar Graphs, 7-Segment displays, flasher LEDs, LCDs.

3. Transistors: **Periods(9) Credits(0.6)**

NPN transistor, working of NPN transistor, PNP transistor, working of PNP transistor, Basic transistor amplifier configurations, Common Base Amplifier, Common Emitter Amplifier, Common Collector Amplifier, Alpha and Beta, relation between Alpha and Beta.

4. Linear Integrated Circuits and OP-AMP's: **Periods(9) Credits(0.6)**

Integrated circuits, Operational Amplifiers, Inverting Amplifier, Non-inverting Amplifier, Integrator, Differentiator.

5. Timers: **Periods(9) Credits(0.6)**

555 Basics, Monostable multivibrator using 555, Astable multivibrator using 555.

Text Book : Basic Electricity and Electronics : Delton T. Horn, McGraw Hill

B.Sc. First Year (Instrumentation Practice)

Semester II

Paper VI :- Instrumentation - IV

Periods (45) Credits (3.00)

1. Bridge Circuits: **Periods(9) Credits(0.6)**

Introduction, DC-Wheatstone Bridge, Bridges in the Null condition, DC bridge applications, DC Null Indicators.

2. AC Bridges: **Periods(9) Credits(0.6)**

Types of AC Bridges, Maxwell's Bridge, The Hay's Bridge, The Schering Bridge.

3. Electronic Multimeters: **Periods(9) Credits(0.6)**

Basic Electronic multimeter, AC multimeters, Electronic Ohm-meters, Digital Voltmeters.

4. The Oscilloscope: **Periods(9) Credits(0.6)**

The Cathode Ray Oscilloscope, Cathode ray tubes, Deflection systems, The XY Oscilloscope, The YT Oscilloscope.

5. Oscilloscope specifications: **Periods(9) Credits(0.6)**

Sensitivity, Bandwidth, Rise time, Horizontal sweep time, Dual Beam models.

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Paper VII :-Practical Paper - III

1. Study of DC Wheatstone bridge.
2. Study of Maxwell's bridge.
3. Study of Potentiometers.
4. Study of CRT.
5. Characteristics of NPN transistor.
6. Study of photovoltaic cell.
7. Study of Inverting amplifier using IC 741.
8. Measurement of AC and DC voltages using C.R.O.

Paper VIII :-Practical Paper - IV

1. Study of Hay's bridge.
2. Study of Lissajous Figures.
3. Characteristics of PNP transistor.
4. Study of Frequency Response of Transistor Amplifier.
5. Study of Phototransistor.
6. Measurement of frequencies using C.R.O.
7. Study of Schering bridge .
8. Study of IC 555 as an astable multivrator.