

PET4I103 ELECTRICAL AND ELECTRONICS MEASUREMENTS

Module-I (6 Hrs)

1. Introduction: (a) Measurement and Error: Definition, Accuracy and Precision; Significant Figures, Types of Errors. (b) Standards of Measurement: Classification of Standards, Electrical Standards, IEEE Standards.

Module-II (8 Hrs)

2. Measurement of Resistance, Inductance and Capacitance: (a) Resistance: Measurement of Low Resistance by Kelvin's Double Bridge, Measurement of Medium Resistance, Measurement of High Resistance, Measurement of Resistance of Insulating Materials, Portable Resistance Testing set (Mega ohm meter), Measurement of Insulation Resistance when Power is ON, Measurement of Resistance of Earth Connections. (b) Inductance: Measurement of Self Inductance by Ammeter and Voltmeter, and AC Bridges (Maxwell's, Hay's, and Anderson Bridges), Measurement of Mutual Inductance by Felici's Method. (c) Capacitance: Measurement of Capacitance by Ammeter and Voltmeter, and AC Bridges (Owen's, Schering & Wien's Bridge), Screening of Bridge Components and Wagner Earthing Device.

Module- III (10 Hrs)

3. Galvanometer: Construction, Theory and Principle of operation of D' Arsonval, Vibration (Moving Magnet & Moving Coil types), and Ballistic Galvanometer, Influence of Resistance on Damping, Logarithmic decrement, Calibration of Galvanometers.

4. Ammeter and Voltmeter: Derivation for Deflecting Torque of; PMMC, MI (attraction and repulsion types), Electro Dynamometer and Induction Type Ammeters and Voltmeters.

5. Potentiometer: Principle of operation of DC Potentiometers (Crompton, Vernier, Constant Resistance and Deflectional Potentiometer); AC Potentiometers (Drysdale-Tinsley and Gall-Tinsley Potentiometer).

Module- IV (12 Hrs)

6. Measurement of Power, Energy, Frequency and Power factor: Measurement of single phase and three phase power by wattmeter, Construction, Theory and Principle of operation of (a) Electro-Dynamometer and Induction type Watt meters, (b) Single Phase and Poly Phase Induction Type Watt-hour meters, (c) Frequency Meters, and (d) Power Factor Meters.

7. Current Transformer and Potential Transformer: Construction, Theory, Characteristics and Testing of CTs and PTs.

8. Electronic Instruments for Measuring Basic Parameters: Amplified DC Meters, AC Voltmeters using Rectifiers, True RMS Voltmeter, Considerations for choosing an Analog Voltmeter, Digital Voltmeters (Block Diagrams only), Q-meter.

Additional Module (Terminal Examination- Internal) (8 Hrs.)

9. Oscilloscope: Digital Storage Oscilloscopes, Measurement of Frequency, Phase Angle, and Time Delay using Oscilloscope.

10. Counters and Analyzers: Introduction to Wave, Harmonic Distortion and Spectrum Analyzers, Frequency Counters, Computer Controlled Test Systems: Testing an Audio Amplifier.

Text Book(s)

1. Electrical Measurements and Measuring Instruments, E.W Golding & F.C Widdis, Reem Publication, 5th Edition, (For sections 2 to 6: Selected Portions from Ch.-VI, VII, IX, XIX, XX, XXI & XXII).

2. Modern Electronic Instrumentation and Measurement Techniques, Albert D Helfrick & W. D Cooper, 2nd Edition Phi Learning (For sections 1, 7 to 9: Selected Portions from Ch.-1, 3, 6, 7, 9, 10, and 13).

3. Electronic Instrumentation and Measurements, David A. Bell, Oxford university press, 3rd edition.

Reference Book(s)

1. A Course in Electrical and Electronic Measurements and Instrumentation, A K Sawhney, Puneet Swahney, Dhanpat Rai & Co, 2013

2. Electronic Instrumentation, H C Kalsi, Tata McGraw Hill, 2nd Edition

3. Elements of Electronic Instrumentation and Measurement, Joseph J. Carr, Pearson Education. 3rd Edition,

4. Electronic Measurement and Instrumentation, B. M. Oliver & J. M. Cage, Tata McGraw Hill.

5. Electrical Measurements, Krishna Reddy, Scitech Publication.