

TAMIL NADU PUBLIC SERVICE COMMISSION
SYLLABUS

TRADE - INSTRUMENT MECHANIC
(ITI STANDARD)

CODE: 439

UNIT-I : SAFETY & BASIC FITTING BASIC ELECTRICITY :

Elementary First Aid- Basic hand tools- Precision Measuring Instruments - types & uses screw threads - Electrical components - Conductor- Semi conductor & insulators - Electrical related terms - Resistor - Types of resistor - Ohm's law, kirchoff's law, series & parallel circuit - Types of switches - Magnetism - E.M.relay Cells and Batteries - AC terms & definition - Inductors & Capacitors - RLC circuit-motors - Types of motor - DC motors - AC motors - stepper motor - Transformer - Instrument transformers.

UNIT-II : ELECTRICAL MEASURING INSTRUMENTS :

Absolute & secondary instruments - Essentials of electrical measuring instruments - DC instruments - PMMC - Extension of range - Shunt & series resistance - Ohm meter, megger / insulation tester - AC instruments - Types - MI, Electro dynamometer - Watt meter - Energy meter - Frequency meter.

UNIT-III : DIGITAL ELECTRONICS :

Semi conductor - PN junction diode - Types- Its characteristics - Special diodes - Transistor - Types & Characteristics of CB, CE, CC configuration - FET & MOSFET, Rectifier - Half wave, Full wave & Bridge Rectifier - Filter - Types - Voltage regulator - Types - Power supply - UPS - SMPS - Inverter - Convertor - Thyristor devices - SCR, TRIAC, DIAC. Oscillators - Types - Operational amplifier - Application of Op-AMP - IC 555 Application - Numbering system - Logic gates & Flip flops.

UNIT-IV : MEASUREMENT OF MOTION AND PRESSURE :

Basic fundamentals of measurement system – Static characteristics and Dynamic characteristics – Types of errors – Arithmetic mean and standard deviation. Stress & strain measuring instruments – Tachometer & speedometers used in instrumentation - Pressure relation with volume, temperature & flow. Units of pressure - Types of pressure - Manometer – Types of pressure sensors – Pressure switches - Transducer – Electrical transducers – Types - Low pressure gauges. And its types – Calibration – Installation & Service of pressure instruments.

UNIT-V : MEASUREMENT OF FLOW :

Basic properties of fluids in flow measurement – Unit of flow rate - factors affecting flow rate – Types of flow meter – Head type flow meters - variable area flow meters - quantity flow meters – mass flow meters - open channel flow meters – Positive displacement meter – Advanced flow meters – Solid flow measurement – Solid flow meters types – Calibration – Installation & service of various types of flow meters - DPT.

UNIT-VI : MEASUREMENT OF LEVEL :

Level measurement – Direct and indirect method of level gauges – Types of level instrument in open channels & closed channels - Level switches – Electrical type level measuring instruments – Conductivity & Capacitance level instrument solid level measurement – Sonic level detector.

UNIT-VII : MEASUREMENT OF TEMPERATURE :

Heat & temperature – properties – Units – types – Conversion – Primary & secondary standards – Expansion thermometers in solids, liquids and gases – temperature transmitter – Thermocouple – RTD – Thermistor – Types – Pyrometers – Radiation & optical pyrometer - Recorders - Strip chart Recorder – Circular chart recorder – Paperless recorder.

UNIT-VIII : FINAL CONTROL ELEMENT :

Actuators – types – Pneumatic, Hydraulic & Electrical Actuators – Control valve – Types – Flow Characteristics – Valve – Body & shapes – Control switches – Types – Capacitive inductive, proximity, Limit switches, micro & IR Switches. Controller – ON / OFF controller – Analog & Digital controller – PI, PD, PID controller – Modes of controllers – Its types PLC – I/O Device – Simple programming – PLC symbols – Basic PLC operation Digital control system HART transmitter – HART communicator - Calibration of HART devices.

UNIT-IX : NETWORKING :

Types of networks Used in digital instrument system – Connection - Types of cables – various networking tools – Fundamentals of SCADA and DCS – Types of communication & field instruments – Field bus – HMI, Interfacing modules, I/O modules, field bus devices basics of RTP, Ethernet, EDDL.

UNIT-X : BASIC HYDRAULICS, PNEUMATICS & ANALYTICAL INSTRUMENTS :

Principles of Hydraulic – Hydrostatic pressure – Pascal's law – Bernoulli's principle – Physical properties of Hydraulic fluid – Types of directional control valve – Classification – Symbols – Accessories – Principles of Pneumatics – Air Treatment – Components of Pneumatic power system - Basic analytical instruments – pH meter – conductivity meter – dissolved oxygen meter – Types of electrodes used in above meters.