

TAMIL NADU PUBLIC SERVICE COMMISSION

SYLLABUS

TRADE - MECHANIC REFRIGERATION & AIR CONDITIONER (MR & AC)

(ITI STANDARD)

Code: 435

UNIT-I: BASIC SAFETY AND REFRIGERATION SYSTEM

General Safety precautions and first aids, Fire fighting Equipment and Electrical Safety - Different types of Fitting Hand Tools - Their use - Electrical Terms such as AC and DC supply, Voltage, Current, Resistance, Power, Energy, Frequency, Safety Precautions to be observed while working on Electricity, Conductors, Insulator Materials - Measuring Instruments such as Voltmeter, Ammeter, Ohm Meter, Watt Meter, Energy Meter and Frequency Meter - Earthing and its importance, Basic Principle of Semi-Conductors, Application of Diodes - Transistors - IC's, Soldering, Brazing, Oxy-Acetylene Welding, Basic Principles of Welding Processes commonly used, Basic Principles of Refrigeration, Working, use specification, Refrigeration Tools, Instruments and Equipment - Fundamentals Refrigeration and it's units - Thermodynamic Laws.

Science Related to Refrigeration, work, power, energy, force, heat and Temperature, Different Temperature Scales, Thermometers, Units of Heat, Sensible Heat Latent Heat, Super Heating and Sub-Cooling, Saturation Temperature, Pressure Types, Units -Type of Refrigeration System - Study the Construction and working of Vapour Compression Cycle - Low side & High Side of Vapour Compression System, COP (Coefficient of Performance), Ton of Refrigeration.

UNIT-II: REFRIGERATORS AND ITS TYPES

Refrigerator (Direct cool of frost free), Function, Construction working of Single Door Direct Cool Refrigerator, Frost Free Refrigerator, Specifications, Trouble Shooting, Heat Insulation Materials, Care and

Maintenance of Refrigerators, Mechanical and Electrical Components of Refrigerator's.

Importance of Flushing in Evaporator, and condenser, Use of Dry Nitrogen for Flushing – Evacuation, Leak Testing, Gas Charging Method in Refrigerator.

Frost Free Refrigerator Two or Three Door Parts – Function – Electrical Accessories and its Function (Timer, Heater, Bimetal, Relay, OLP), Refrigerator Cabinet Volume Calculation).

Refrigerator Inverter Technology – Two and Three Door Construction – Working – Care and Maintenance.

UNIT-III: COMPRESSOR, MOTOR AND REFRIGERANTS

Types of Compressors used in Refrigeration and Air-Conditioning, Function, Construction – Wet Compression – Oil Properties – Lubrication Methods – Applications.

AC Motors – Types – Advantages of AC Motor Over DC Motor – Starting and Running Winding – Starting Current, RSIR, CSIR, CSR and PSC Motor, Functions of Starting Relay, Capacitors, OLP.

Classification of Refrigerants – Properties of Refrigerants – Pressure and Temperature of Different Refrigerants – GWP, ODP of various Refrigerants – Properties of Insulating Materials used in Refrigeration and Air-Conditioning.

UNIT-IV: CONDENSER, EXPANSION VALVE AND EVAPORATOR

Function of Condenser, Type, Liquid Receiver, Pump Down, Drier Function, Types – Expansion Value used in Domestic Refrigeration and Air-Conditioning – Capillaries, Automatic and Thermostatic Expansion Value and Electronic Expansion Value, Evaporator – types, construction, working and its uses.

UNIT-V: AIR-CONDITIONER AND ITS TYPES

Window Air-Conditioner, Split Air-Conditioner, Construction, Multi split AC, Inverter Split AC Working, Mechanical, Electrical Components – Types of Split Air-Conditioners – Study of Wiring Circuits – Installation and Servicing – Fault Finding – Testing Components.

UNIT-VI: COMMERCIAL COMPRESSOR AND ITS TYPES

Commercial Compressor: Function, types Construction & Working Applications. Compressor Lubricant Oil, Properties types of Lubricant Methods.

UNIT-VII: WATER COOLED CONDENSER, COOLING TOWER, EVAPORATOR/CHILLER AND WATER TREATMENT

Water Cooled Condenser: Types and Capacity, Construction, Working and De-Scaling Application, Evaporative Condenser – Function, Construction and Application.

Cooling Tower: Types, Construction, Capacity, Efficiency, Approach and Cooling Tower Range.

Water Treatment: Causes for Water Contamination and Water Treatment.

Evaporator and Chillers: Construction Function and Types of DX Chiller, Types of Defrost System, Water / Brine Chiller, Types of Brine used as secondary Refrigerant.

UNIT-VIII: HEAT EXCHANGER, ACCUMULATOR, WATER COOLER AND DEEP FREEZER

Heat Exchanger and Accumulator: Function and Construction, Applications, Oil Separator – Function and Construction.

Water Cooler: Types, Construction and Working Principle and its Applications.

Deep Freezer: Description, Construction, Working Specifications, Care and Maintenance, Fault and Remedies.

UNIT-IX: ICE CANDY PLANT, ICE PLANT AND COLD STORAGE/WALK IN COOLER

Ice Candy Plant: Function, Construction Working Principle, Capacity, Types of Compressor used.

Ice Plant: Details about Components of Ice Plant their Functioning.

Cold Storage/Walk in Cooler: Details about Components, their Functioning, Working Principle, Circuit Diagram, Capacity and types, Care and Maintenance, Food Preservation Spoiling agents, Preservation by Refrigeration System, Types of Cold Storage and its Details.

UNIT-X: DIRECT AND INDIRECT AIR CONDITIONING SYSTEM, DUCT, AIR FILTER AND CONTROL SYSTEM OF AC PLANT

DUCT and Air Filters: Function, Types, Materials, and Designing DUCT, Function of Air Filter Types, Construction, Maintenance, Effect of Chocked Air Filter.

Direct Central Air Conditioning Plant: Construction and Working Principle, Types, Maintenance of Direct Air conditioning plant.

Humidification and Dehumidification method Description of AHU and FCU.

Temperature and Pressure control used in AC Plant, its Construction, Working, Safety Device and Pipe Line.

Indirect/Chiller System: Construction and Working Principles, Maintenance of Indirect/Chiller System, Air-Washers used in chilled water system.

Control System of AC Plant: Controls used in AC System, Electromechanical, Pneumatic and Electronic, Details study of Heat Load Calculation for Commercial and Industrial Buildings.