



Syllabus & Scheme of Examination for the post of **JUNIOR ENGINEER**

Stream: HVAC

Level – 1 MCQ Test

Introduction of HVAC

- Scope of HVAC Industry with overview of Consulting & Construction industry
- What is Heating Ventilation and Air Conditionings
- Types of Air Conditioning

Fundamentals of Heat Transfer

- Heat, Sensible Heat, Latent Heat
- Conduction, Convection & Radiation
- British Thermal unit, Ton of Refrigeration
- Units used in HVAC System

Air-Conditioning System and Equipment

- Vapor Compression Cycle
- Components of AC System - Details and Types of Compressor, Condenser, Expansion Valve and Evaporator Coil.
- Types of AC System - Air cooled / Water Cooled/ DX / Chilled Water
- Types of Air Conditioning Equipment -Unitary, Split System, Package AC, Chilled Water (AHU,FCU & FAHU) and VRV System

Refrigerants

- Refrigerants, Types, Classification and Nomenclature
- Properties, Application and Environmental effects

Cooling Load Calculation

- Design Condition for comfort zone
- Concepts of Cooling Load
- Time of Peak Cooling Load
- Outdoor Design Conditions
- U Values and R Values Calculation
- Heat Gain through Windows / Skylight
- Heat Gain Through exposed (exterior) walls and Roof
- Heat Gain Through Partition walls
- Heat Gain Through Floors Located Above Unconditioned Spaces
- Heat gain Through Slab Floors
- Heat gain from ceiling voids, and other unconditioned spaces

- Heat Gain Through cracks, openings, and deficiencies in structure
- Heat Gain Through Ventilation (Fresh Air)
- Heat Gain Through Lights, Equipment's and People
- Heat Gain from System
- Cooling Load Calculation by using E-20, HAP and Elite

ESHF, ADP & Air Flow Rate(CFM) Calculation Air Distribution System- Ducting and Air Terminals

- Ducting
- Duct Design - Equal friction, Velocity Reduction Method
- Ducting - Classification, Material and Shapes
- Duct Insulation-Types, Material and Properties
- Duct Acoustics - Types, Material and Properties
- Plenum Box Sizing
- Duct gauge selection, Comparison between different shapes of duct
- Air Distribution Terminals
- Types of Air Terminals
- Application
- Selection methods - Manual and by Software
- Sound Attenuators Selection

Fans

- Types of Fans
- an Laws, ESP Calculation, Fan Selection

Water Distribution System- Pipes and Valves

- Pipe Sizing - Using Manual Methods and by Software (Pipe Sizer)
- Piping Insulation
- Pipe Hangars and Anchors
- Distribution of Chilled Water System - Constant Volume Network & Variable
- Pump Head Calculation

Cooling Tower

- Types of Cooling Tower
- Fill Material
- Selection of Cooling Tower Capacity
- Cooling Tower Performance
- Calculation of Drift loss, Bleed off and Evaporation losses
- Make up Water Tank Sizing
- Range, Approach and Effectiveness
- Selection of Cooling Tower

Level – 2 Trade Test

(i) Engineering Drafting

- Standards and Practices
- Introduction to AutoCAD
- Basic Commands, Creating Block formation of AC Equipment
- Drafting of Ducting & Piping Layout

(ii) Identification of different Refrigeration and Air conditioning components

Reference Books:

1. REFRIGERATION AND AIR CONDITIONING | W. F. STOECKER, J. W. JONES 2nd Edition, McGraw Hill, 1982
2. W. P. Jones, Air Conditioning Engineering, Elsevier, 2001
3. C. P. Arora, Refrigeration and Air conditioning, Tata McGraw Hill, 2008
4. R. C. Arora, Refrigeration and Air conditioning, Printice Hall India, 2010

Scheme of Examination:

Level	Type of Test	Weightage for final result
Level-1	MCQ Test	50%
Level-2	Trade Test	50%

- The shortlisted candidates should appear for Level -1 MCQ Test and Level -2 Trade Test.
- A minimum of 5X candidates shall be shortlisted (for X number of posts advertised) for the Level-2 Trade Test, based on their performance in the Level-1 MCQ Test.
- The questions shall generally be on the minimum qualification level.

Date: 05.02.2026

**Sd/-
Registrar**