CBSE | DEPARTMENT OF SKILL EDUCATION

CURRICULUM FOR SESSION 2021-2022

AIR CONDITIONING & REFRIGERATION (SUB. CODE – 827)

JOB ROLE: SERVICE TECHNICIAN

CLASS – XII

OBJECTIVES OF THE COURSE

After successfully completing these two years of Senior Secondary skill course, the student would have acquired relevant appropriate and adequate technical knowledge together with the professional skills and competencies in the field of Air conditioning and Refrigeration Technology so that they will be able to properly equipped to take up gainful employment in this sector.

Thus he should have acquired:

A. Understanding of

a) The relevant basic concepts and principles in basic science subjects (Physics, Chemistry and Mathematics) so that he/she is able to understand the different vocational subjects.
b) The basic concepts in engineering drawing.
c) The concepts and principles of working of refrigeration and air-conditioning equipment.
d) The knowledge of testing, faults, identification and repair procedures in respect of refrigeration and air conditioning equipment.
e) The knowledge to prepare estimates for cost of repair/ installation/ maintenance/ overhauling jobs.

B. Adequate Professional Skills and Competencies in

a) Testing, fault location and repairing of refrigeration and air-conditioning equipment.
b) Installing and commissioning of refrigeration and air-conditioning equipment.

c) Carrying out preventive maintenance of refrigeration and air-conditioning equipment.
d) Dismantling, overhauling and reassembling of refrigeration and air-conditioning equipment.

C. A Healthy and Professional Attitudes of that. He/ She has

a) An analytical approach while working on a refrigeration or air-conditioning equipment.
b) An open mind while locating/ rectifying faults in refrigeration or air-conditioning equipment.
c) Respect for working with his/her own hands.
d) Respect for honesty, punctuality and truthfulness.

SCHEME OF UNITS

This course is a planned sequence of instructions consisting of units meant for developing employability and vocational competencies of students of Class XII opting for skill subject along with other education subjects.

The unit-wise distribution of hours and marks for class XII is as given on the next page:

AIR CONDITIONING & REFRIGERATION (SUBJECT CODE - 827)

Class XII (Session 2021-2022)

Total Marks: 100 (Theory – 60+ Practical – 40)

	TERM	UNITS	NO. OF HOURS for Theory and Practical		MAX. MARKS for Theory and Practical
Part A	**Employability Skills**				
	TERM I	Unit 1 : Communication Skills-IV	10		5
		Unit 2 : Self-Management Skills-IV	10		
		Unit 3 : ICT Skills-IV	10		
	TERM II	Unit 4 : Entrepreneurial Skills-IV	15		5
		Unit 5 : Green Skills-IV	05		
		Total	**50**		**10**
Part B	**Subject Specific Skills**		**Theory (In Hours**	**Practical (In Hours)**	**Marks**
	TERM I	Unit 1: Psychrometry	22	08	06
		Unit 2: Heat transfer and Air Distribution	25	10	07
		Unit 3: Components of Refrigeration Systems	30	13	12
	TERM II	Unit 3: Components of Refrigeration Systems	05	02	02
		Unit 4: Electric controls	25	10	07
		Unit 5: Commercial Applications	24	06	08
		Unit 6: Air-Conditioning Systems & Maintenance	24	06	08
		Total	**155**	**55**	**50**
Part C	**Practical Work**				
		Practical Examination			15
		Written Test			10
		Viva Voce			05
		Total			**30**
Part D		**Project Work/Field Visit**			
		Practical File/Student Portfolio			10
		Total			**10**
		GRAND TOTAL	**260**		**100**

DETAILED CURRICULUM/TOPICS FOR CLASS XII

PART-A: EMPLOYABILITY SKILLS

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills-IV	10
2.	Unit 2: Self-management Skills-IV	10
3.	Unit 3: Information and Communication Technology Skills-IV	10
4.	Unit 4: Entrepreneurial Skills-IV	15
5.	Unit 5: Green Skills-IV	05
	TOTAL DURATION	**50**

NOTE: Detailed Curriculum/ Topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

PART-B – SUBJECT SPECIFIC SKILLS

- Unit 1: Psychrometry
- Unit 2: Heat transfer and Air Distribution
- Unit 3: Components of Refrigeration Systems
- Unit 4: Electric controls
- Unit 5: Commercial Applications
- Unit 6: Air-Conditioning Systems & Maintenance

UNIT 1 - PSYCHROMETRY

Psychrometric Processes – Sensible Cooling, Sensible Heating, Cooling with de-humidification, Cooling with adiabatic Humidification, Chemical-dehumidification, heating and humidification, Mixing of air- streams, Air Washers.

UNIT 2 – HEAT TRANSFER AND AIR-DISTRIBUTION

1. Principles of heat transfer, Conduction, Convection and Radiation. Properties of insulating materials.

2. Air Distribution, Systems of air distribution, Duct systems, cooling load and air-quantities pressure inducts, duct layout & construction.

UNIT 3 - COMPONENTS OF REFRIGERATION SYSTEMS

1. Condensers, Air cooled and water cooled, Evaporative Condensers, Heat Rejected in condensers, construction of condensers, Driers, receivers, Purging, Cleaning of Condensers.

2. Refrigerant Controls, Types of expansion devices and sensible heat factor, construction and operation of Automatic expansion valve, thermostatic expansion valve, and capillary tube, low side float valve, High Side float valve. Solenoid valves, testing and adjusting thermostatic expansion valves.

3. Evaporators, types of evaporators- Dry and flooded, Heat absorbed in evaporators, water chillers, brine coolers, Methods of defrosting.

4. Refrigerants, their properties and nomenclature- R11, R12, R22, R502, R113, R114, R134A, ammonia, and carbon dioxide.

UNIT 4 – ELECTRIC CONTROLS

1. Refrigeration Controls, H.P. and L.P. cutouts, Oil Pressure failure safety switch.

2. Motor Starters, capacitors, Relays, over load protectors and servicing of motors.

UNIT 5 – COMMERCIAL APPLICATIONS

Ice-Manufacture, cold-storage, Ice-Cream manufacture, Dairy refrigeration etc.

UNIT 6 – AIR-CONDITIONING SYSTEMS AND MAINTENANCE

1. Air-Conditioning systems and equipments, classification of air-conditioning systems-all air systems, all water system types, Fans, Blowers, grills, resistors, filters, compressors, cooling coils, condensers Air-Handling Units, Fan coil Units, Central Air Conditioning plants. Ventilation Systems.

2. Leak Detection, Pressure testing and charging.

PRACTICAL

Time: 3 Hours **Marks: 40**

1. Testing of Thermostats.
2. Experiment on an Evaporative Cooler.
3. Experiment on a Cooling Tower.
4. Study of expansion-valves, testing and adjusting.