Course: A Practical Course in Air Conditioning and Maintenance

Guided Learning Hours: 18

Pre-requisite: Basic Science

Abstract

This unit provides learners with the necessary training for entry level positions as service and maintenance technicians in the field of air conditioning and refrigeration. Upon successful completion of the course learners should have the necessary skills to enter the field of refrigeration and air conditioning. This training course is intended for persons wishing to improve their knowledge and skills in refrigeration engineering. Learning will take place through a combination of lectures and laboratory sessions.

Target Audience

The course is intended for students, end users, consultants, engineers, technicians, architects, contractors and HVAC designers

Learning outcomes

On completion of this course, learners will be able to:

1. Understand the fundamentals of refrigeration and thermodynamics
2. Understand how to read P-H diagrams and to size and select air condition units for various applications.
3. Identify and understand the functions of the air conditioning components
4. Understand the safety requirements during installation and servicing of air conditioning systems and be able to troubleshoot and carryout maintenance of the air condition system.
Course Content

1. Understand the fundamentals of refrigeration and thermodynamics

   *Basic Concepts*: Vapor compression, absorption and other refrigeration cycles

   *Methods of mechanical cooling*: Natural and Artificial Methods /Vapor Compression and Absorption


2. Understand how to read P-H diagrams and to size and select air condition units for various applications.

   *Design of air conditioning systems*: Choice of air conditioning systems relative to needs; Control systems for the various air conditioning systems; Sizing and selection of plant, ductwork and pipework; design implications on space, maintenance and commissioning requirements, capital and operating costs.

   *Psychometric Charts*: How to read P-H diagrams; Heating and cooling loads

3. Identify and understand the functions of air conditioning components

   *Components*: Evaporators, condensers, compressors, Fans and control components.

   *Refrigerants*: Properties; characteristics; thermodynamic performance; health, safety and welfare implications; environmental implications

4. Understand the safety requirements during installation and servicing of air conditioning systems and be able to troubleshoot and carryout maintenance of the air conditioning system.

   Safety during service and installation; Servicing and troubleshooting small hermetic split units, commercial chillers and automotive air conditioning systems.
**Assessment Criteria**

<table>
<thead>
<tr>
<th>In order to achieve Learning Outcome...</th>
<th>The Learner must...</th>
</tr>
</thead>
</table>
| 1. Understand the fundamentals of refrigeration and thermodynamics | 1.1 Explain the basic concepts of refrigeration cycles  
1.2 Describe the various methods of mechanical cooling  
1.3 State and describe the eight Foundation blocks of refrigeration and thermodynamics |
| 2. Understand how to read P-H diagrams and to size and select air condition units for various applications. | 2.1 Describe the control system used for an air condition system  
2.2 Determine by calculation heating and cooling loads given specific data  
2.3 Select and size an air condition system for a particular application. |
| 3. Identify and understand the functions of air conditioning components | 3.1 Explain the function and operation of Evaporators, Condensers, Compressors, Fans and control components.  
3.2 Compare the differences between them.  
3.3 Identify each component within an air condition system. |
| 4. Understand the safety requirements during installation and servicing of air conditioning systems and be able to troubleshoot and carry out maintenance of the air condition system. | 4.1 Develop a Maintenance Schedule for Air Conditioning Systems.  
4.2 Be able to properly troubleshoot air condition systems to identify possible causes of failure before they occur. |
**Essential Learning Resources:**

Learners will need access to a wide range of publications relating to Air Conditioning systems and a suitably equipped laboratory for practical training. Various manufacturer products specifications and reference data would also be beneficial to learners.

**Textbooks and Manuals**

1. Air Conditioning student manual

**Websites**

Ashrae.org