



Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	P	OJT		Theory		Tutorial/ Practical		
			University exams (ESE)	Progressive Assessment (PA)	External Practical /viva Exam(ESE)	Internal evaluation Practical /viva Exam(PA)		
3	0	0	3	50	0	0	0	50

L- Lectures; P- Practical; OJT- On Job Training; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

Program Objectives:

- Demonstrate basic understanding of soldering and de-soldering concepts, their importance, and applications in Refrigeration & Air Conditioning (RAC) systems.
- Differentiate between soft soldering, hard soldering (brazing), and welding, and select appropriate joining techniques for RAC components.
- Identify and correctly use soldering tools, equipment, soldering materials, and safety gear while following standard workshop safety practices.
- Identify common faults related to soldered joints and perform basic troubleshooting during RAC servicing and maintenance.

Course Content: Theory

Unit No.	Content	No. of Hours
1.	Basics of Soldering Introduction to soldering and de-soldering Importance of soldering in Refrigeration & Air Conditioning systems Types of soldering: Soft soldering Hard soldering (Brazing) Difference between soldering, brazing, and welding Applications of soldering in RAC components	7
2	Tools, Equipment and Materials Soldering tools: Soldering iron, Gas torch, Blow lamp Soldering materials: Solder wire (lead and lead-free) Fluxes (acidic, non-acidic) De-soldering tools: De-soldering pump Wick (braid) Safety equipment: gloves, goggles, fire extinguisher	10
3	Soldering Techniques and Procedures Preparation of surfaces for soldering, Proper use of flux Heating techniques and temperature control Step-by-step soldering procedure, Common soldering defects: Cold joints, Dry joints, Excess solder, Quality checking of soldered joints	7



4	<p>De-Soldering Techniques Need for de-soldering in servicing and maintenance Methods of de-soldering: Manual de-soldering, Pump-based de-soldering, Wick-based de-soldering. Precautions during de-soldering Removal and replacement of faulty components Cleaning after de-soldering</p>	8
5	<p>Safety Practices and Applications in RAC Systems Safety precautions during soldering and de-soldering Handling refrigerant copper tubes and fittings Soldering of: Copper pipes Joints in refrigeration circuits Electrical terminals in RAC systems Environmental and health hazards Basic troubleshooting related to soldered joints Suggested Practical Work Soldering copper pipes De-soldering and replacing a damaged joint Identification of soldering tools and materials</p>	10
Total		42

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
10	20	10	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Bloom’s Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Refrigeration and Air Conditioning – C.P. Arora
2. Basic Workshop Practice – Raghuwanshi
3. RAC Service Manuals and Skill Council (NSDC) Modules

(b) Open source software and website:

1. <https://nptel.ac.in/>

Course Outcomes:

At the end of this course students will be able to:

- Understand basic concepts of soldering and de-soldering used in RAC systems.
- Identify and use appropriate soldering tools, materials, and safety equipment.
- Perform proper soldering techniques for RAC components and copper joints
- Apply de-soldering methods to remove and replace faulty components safely.
- Follow safety practices and troubleshoot soldered joints in RAC applications.

