

GOVT POLYTECHNIC BOLANGIR
Department of Mechanical Engineering

| LESSON PLAN: 2025-26 | | | | |
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| Name of the Faculty: Manabhanjan Bhoi (Lecturer Stage-II) | | | | |
| Subject: Refrigeration and Air Conditioning (TH4 (a)) (MEPE202(a)) | | | | |
| Program: Diploma in Mechanical Engineering Semester: 4th | | | | |
| Total Contact Hours: 45 Total Marks: 100 | | | | |
| Assessment: Progressive –30, End Term – 70 | | | | |
| Credits: 3 | | | | |

COURSE OBJECTIVES:

After completion of the course, the students will be able to

1. Define refrigeration and types of Refrigeration cycles
2. Explain Vapor Compression and Vapor Absorption System working principles
3. Identify the components required for refrigeration system.
4. Identify the controlling components for a refrigeration system.
5. Explain the working principles of Air-conditioning.

| UNIT-I: Introduction to Refrigeration (Total Classes: 10) | | | | |
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| Class No. | Topic | Subtopics Covered | Teaching Aids / Activities | Course Objective |
| 1 | Introduction to Refrigeration | Definition of refrigeration; need and applications | Chalk & board, PPT, real-life examples | CO1 |
| 2 | Refrigerating Effect | Refrigerating effect; unit of refrigeration | PPT, numerical examples | CO1 |
| 3 | COP | Coefficient of Performance; significance | Board work, problem solving | CO1 |
| 4 | Types of Refrigeration | Ice and dry ice refrigeration | PPT, images | CO1 |
| 5 | Types of Refrigeration | Steam jet and throttling refrigeration | PPT, discussion | CO1 |
| 6 | Advanced Refrigeration | Liquid nitrogen refrigeration | Video/visual aids | CO1 |
| 7 | Ideal Cycle | Carnot refrigeration cycle | PPT, T-S diagram | CO1 |
| 8 | Air Refrigeration | Bell-Coleman cycle; working principle | PPT, schematic diagram | CO1 |
| 9 | Air Refrigeration Diagrams | PV and TS diagrams | Board work | CO1 |
| 10 | Air Refrigeration | Advantages, disadvantages; simple problems | Numerical problems | CO1 |

UNIT-II: Refrigeration systems (Total Classes: 10)

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| 11 | Vapour Compression System | Basic components; layout | Model/PPT | CO2 |
| 12 | Vapour Compression Cycle | Working principle; flow diagram | PPT, animation | CO2 |
| 13 | VCR Cycle Representation | P-H, T-S, P-V diagrams | Board & charts | CO2 |
| 14 | Performance of VCR System | Refrigerating effect; work done | Numerical problems | CO2 |
| 15 | Types of VCR Systems | Simple and modified cycles | PPT | CO2 |
| 16 | Superheating & Subcooling | Effects, advantages, disadvantages | Charts, discussion | CO2 |
| 17 | Vapour Absorption System | Principle and simple cycle | PPT | CO2 |
| 18 | Electrolux System | Construction and working | Diagram, video | CO2 |
| 19 | VCR vs VAR | Comparison between systems | Tabular discussion | CO2 |
| 20 | Numerical Problems | Simple problems on VCR cycle | Problem solving | CO2 |

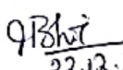
UNIT-III: Refrigeration equipment (Total Classes: 08)

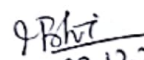
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| 21 | Compressors | Types of compressors | PPT, cut-section images | CO3 |
| 22 | Compressors | Hermetically and semi-hermetic compressors | Visual aids | CO3 |
| 23 | Condensers | Air-cooled and water-cooled condensers | Charts, models | CO3 |
| 24 | Condensers | Natural & forced draught cooling; comparison | PPT, discussion | CO3 |
| 25 | Evaporators | Natural and forced convection evaporators | PPT | CO3 |
| 26 | Flow Control Devices | Capillary tube; working | Real component / PPT | CO3 |
| 27 | Expansion Valves | Automatic expansion valve | PPT, diagram | CO3 |
| 28 | Expansion Valves | Thermostatic expansion valve | PPT | CO3 |

UNIT-IV: Refrigerant flow controls (Total Classes: 08)

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| 29 | Valves | Float valves; solenoid valve | Visual aids | CO4 |
| 30 | Regulators | Evaporator pressure regulator | Diagram, discussion | CO4 |
| 31 | Applications of Refrigeration | Slow and quick freezing | PPT, case studies | CO4 |
| 32 | Storage Systems | Cold storage and frozen storage | Video, PPT | CO4 |

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| 33 | Industrial Applications | Dairy refrigeration; ice plants | PPT | CO4 |
| 34 | Commercial Applications | Water coolers and domestic units | Real-life examples | CO4 |
| 35 | Introduction to Air Conditioning | Definition; objectives | PPT | CO4 |
| 36 | Factors Affecting AC | Temperature, humidity, comfort | PPT, discussion | CO4 |
| UNIT-V: Air conditioning (Total Classes: 09) | | | | |
| 37 | Psychrometry | Psychrometric chart and properties | Chart demonstration | CO5 |
| 38 | Psychrometric Processes | Sensible heating and cooling | Board work | CO5 |
| 39 | Humidification Processes | Humidifying and dehumidifying | Chart problems | CO5 |
| 40 | Adiabatic Saturation | Concept and process | PPT | CO5 |
| 41 | AC Equipment | Components of AC system | PPT, models | CO5 |
| 42 | AC Units & Plants | Window, split, central AC | Video/PPT | CO5 |
| 43 | Tools & Installation | Tools used; installation procedure | Tool demonstration | CO5 |
| 44 | Faults & Servicing | Common faults; servicing methods | Case discussion | CO5 |
| 45 | Revision & Evaluation | Overall revision; Q&A | Interactive session | All objectives |


 22.12.25
 Signature of Faculty


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 Signature of
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