5034 - REFRIGERATION AND AIR-CONDITIONING ✓

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
					Theory		Practical Ex.	Total
Lectures	Practical	Credit						
3	2	5	25	25	3 hrs	100	25	175

Pre-requisite	Source
	MEC

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	25	50	175

Rationale: Refrigeration & air-conditioning is one of the most important and specialised branch of mechanical Engg. A teacher in Mechanical Engineering if wants to take up a career in refrigeration and air-conditioning should have a basic conceptual knowledge of this vast field so that he can group further knowledge in the subject as per the requirement in the field. This course provides acquaintance with various information methods, construction. Principles of operation their applications. The course also deals with one of the main area of refrigeration and air-conditioning to a great detail. The course is designed to facilitate acquaintance with principle of estimation for various application of air-conditioning.

COURSE CONTENTS	Hrs	Mks
1. FUNDAMENTALS OF REFRIGERATION 1. Second law of Thermodynamics Clausius statement, Kelvin-Planck statement. 2. Definition of Refrigeration. 3. Coefficient of performance. 4. Standard rating of a refrigeration machine.	2	4
2. REFRIGERANTS 1. Classification of refrigerants. 2. Designation of refrigerants. 3. Desirable properties of an ideal refrigerant. 4. Properties and uses of commonly used refrigerants like R-12, R-22, R134-A, Ammonia. 5 Comparison of refrigerants, 6. Applications of refrigerants, 7. Green House effect.	4	8
3. SIMPLE VAPOUR COMPRESSION SYSTEM 1. Vapour compression cycle. 2 Functions of parts of vapour compression system. 3 Representation of vapour compression cycle on (T-S) and (P-h) diagram. 4 Factors affecting the performance of vapour compression system. 5 Mathematical analysis of vapour compression refrigeration.	6	12
4. VAPOUR ABSORPTION SYSTEM 1 Simple vapour absorption cycle. 2 Functions of parts of vapour absorption system 3 Electrolux refrigerator construction and working. 4 Temperature concentration diagram and enthalpy concentration diagram for ammonia and lithium bromide absorption system. 5. Cascade system of refrigeration: introduction, working.	10	16
5. REFRIGERATION COMPONENTS AND CONTROLS 1 Compressor: Hermetic sealed compressor, open type compressor, screw compressor, centrifugal compressor. 2 Condensers: Air cooled, water-cooled, evaporative, cooling tower, and spray pond. 3 Evaporators: flooded type, dry expansion, bare tube, plate surface, finned tube. 4 Refrigeration controls: Thermostatic expansion valve, Capillary tube, Solenoid valves, Low – side & high side floats.	4	08
6. PSYCHROMETRICS 1 Definition of psychrometry, psychrometrics.		

2 Various properties of air: i) Dry air, ii) saturated air, iii) DBT, iv) WBT, v) DPT, vi) Specific humidity, vii) relative humidity, viii) wet bulb depression, ix) Dew point depression, x) sensible heat, xi) Enthalpy.
3. Psychrometers, 4. Psychrometric charts

7. PSYCHROMETRIC PROCESS	10	16
1 Description and representation of various processes on psychrometric charts: Mixing of air streams, Sensible heating, Sensible cooling, Cooling and dehumidi-fication, Cooling and humidification, Heating and humidification, Heating and dehumidification.		
2. Definition of sensible heat factors such as RSHF & GSHF.		
3. Simple numericals to be solved by using psychrometric charts.		
8. AIR CONDITIONING COMPONENTS AND CONTROLS	6	12
1 Air conditioning components: 1.filters, 2.Fans, 3.Air washer, 4.Radiator & convector		
2. Air conditioning control: Manually controlled system, Automatic system, Semiautomatic control system, Automatic humidity control, Air movement system, Automatic temperature control, Limit switches, Time switches.		
9. AIR DISTRIBUTION	5	12
1 Air handling unit		
2 Room air distribution: Requirements of good room air distribution, Draft, Types of supply air outlet		
3 Duct system		
4 Air distribution systems.		
5 Duct design method (no mathematical treatment)		
10. REFRIGERATION AND AIR CONDITIONING	-	10
Construction, working and practical applications of following units: Domestic refrigerator, Water cooler, Ice plant, Window air conditioner, Central air conditioning plant, Cold storage		
(Chapter 10 to be included in the practicals)		
Total	48	100

PRACTICALS

1. Study of refrigeration and Air conditioning tools.
2. Dismantling and assembly hermetically sealed compressor.
3. Locating various parts of domestic refrigerator and studying their importance in the circuit.
4. Study of charging and purging of domestic refrigerator.
5. Locating various parts of window air conditioner and studying their importance in the circuit.
6. Study of desert cooler.
7. Study of automobile air conditioning system.

FIELD VISITS

1 Visit to cold storage, 2. Visit to 5 star hotel, 3. Visit to Goa dairy. 4. Visit to Telephone Exchange.

REFERENCE BOOKS

1. Refrigeration and Air conditioning (S.I. units) by R.K. Rajput, S.K. Kataria & sons, Delhi – 11006.