

J.C. Bose University of Science and Technology, YMCA, Faridabad

Department of Mechanical Engineering

B.Tech 5th Sem Mechanical Engg. M51

Lesson Plan of Refrigeration and Air Conditioning (PCC-ME-504/21)

Lecture No	Content to be Covered	Remarks
Unit 1: Basic of Refrigeration and Air refrigeration		
1	Introduction Overview of the subject – Course Outcomes	
2	Refrigerants mixtures - Definition, Classification, Nomenclature, Desirable properties, Comparative study, secondary refrigerants, Introduction to eco-friendly new Refrigerants and their analysis Refrigerants properties and characteristics	
3	Air Refrigeration Systems: Brayton refrigeration or the Bell Coleman air refrigeration cycle	
4	Air-craft refrigeration systems, Simple cooling and Simple evaporative types.	Numerical Problems
5	Boot strap and Boot strap evaporative types	Numerical Problems
6	Regenerative type and Reduced Ambient type system,	Numerical Problems
7	Comparison of different air refrigeration systems, advantages and disadvantages of air refrigeration cycle, Actual air conditioning system with controls	Numerical Problems. Assignment
Unit 2: Vapour Compression Refrigeration		
8	Basic vapour compression cycle , VC cycle on P-V, T-S and PH diagrams	
9	Effects of operating conditions on COP; Cooling and superheating;	
10	Comparison of VC cycle with Air Refrigeration cycle. Super critical vapour compression cycle	
11	Multistage Vapour Compression (VC) Refrigeration Systems	Numerical Problems
12	Necessity of compound compression, Compound VC cycle	Numerical Problems
13	Multistage compression with flash inter-cooling and / or water inter- cooling	Numerical Problems
14	Systems with individual or multiple expansion valves	
15	Cascade refrigeration and problems discussion	Assignment
Unit 3: Other Refrigeration Systems		
16	Basic of vapour absorption refrigeration system	
17	Water and ammonia based VARS	
18	Lithium Bromide-Water Absorption Refrigeration Systems	
19	Electrolux Refrigeration system	
20	Solar energy (Solar Concentrator) based absorption refrigeration systems	Numerical Problems
21	Vapour jet, thermoelectric and Vortex tube refrigeration, Relative merits and demerits, Applications	Assignment

Unit 4 Psychometric & Air Conditioning Processes		
22	Basic of Air Conditioning, Properties of moist Air, Gibbs Dalton law	
23	Specific humidity, Degree of saturation, Relative humidity, Enthalpy, Humid specific heat.	Numerical Problems
24	Wet bulb temp., Thermodynamics wet bulb temperature	Numerical Problems
25	Psychometric chart; Psychometric of air-conditioning processes,	Numerical Problems
26	Psychometric processes in air washer	Numerical Problems. Assignment
Unit 5 : Heating and cooling load calculation for HVAC system design		
27	Outside and inside design conditions; Sources of heating load; Sources of cooling load	
28	Heat transfer through structure, Solar radiation	
29	Electrical applications, Infiltration and ventilation,	
30	Heat generation inside conditioned space;	Numerical Problems
31	Apparatus selection; Problems	Numerical Problems
32	Comfort chart, Problems	Numerical Problems. Assignment
Unit 6 : Equipment selection for HVAC system		
33	Air distribution system; Basic of Duct systems design;	
34	Filters; Refrigerant piping;	
35	Design of summer air-conditioning and Winter air conditioning systems	
36	Temperature sensors, Pressure sensors,	
37	Humidity sensors, Actuators,	
38	Safety controls; Accessories.	
39	Different types of compressor used in refrigeration.	Assignments
40	Energy Conservation opportunity in Refrigeration and air conditioning.	