

Ch. Ranbir Singh State Institute of Engineering & Technology, Jhajjar
DEPARTMENT OF MECHANICAL ENGINEERING
 IV Yr. VII Semester (Mechanical Engineering)

LESSON PLAN

Program : **B. Tech**
 Year & Sem. : **IV / VII**
 Course No : **ME-403-F**
 Course Title : **REFRIGERATION & AIR CONDITIONING**
 Max Marks : **100**
 No. of Total Lecture : **51**
 Schedule : **3L+1T=4**
 Lecturer : **Satyapal Yadav**

Recommended Books:

1. Refrigeration & Air conditioning –R.C. Jordan and G.B. Priester, Prentice Hall of india.
2. Refrigeration & Air conditioning –C.P. Arora, TMH, New Delhi. **Lesson Plan:**

Lect. No(s)	Ref. No.	Topics to be covered
Unit I:		
1-2	1.1	Definition of refrigeration & air conditioning; Necessity, Methods of refrigeration
3	1.2	Unit of refrigeration; Coefficient of performance (COP), Fundamentals of air-conditioning system
4-5	1.3	Refrigerants-Definition, Classification, Nomenclature, Desirable properties, Comparative study,
6	1.4	secondary refrigerants, Introduction to eco-friendly Refrigerants, Introduction to Cryogenics
7-8	1.5	Air Refrigeration System: Carnot refrigeration cycle. Temperature. Limitations.
9	1.6	Brayton refrigeration or the Bell Coleman air refrigeration cycle;
10	1.7	Necessity of cooling the aero plane; Air craft refrigeration systems
11	1.8	Simple cooling and Simple evaporative types, Boot strap and Boot strap evaporative types,
12	1.9	Regenerative type and Reduced Ambient type system, Comparison of different systems, problems.
Unit II:		
13	2.1	Vapour Compression (VC) Refrigeration Systems: (A) Simple Vapour Compression (VC) Refrigeration systems-Limitations of Reversed Carnot cycle with vapour as the refrigerant
14	2.2	Analysis of VC cycle considering degrees of sub cooling and superheating;

15	2.3	VC cycle on p-v, t-s and p-h diagrams; Effects of operating conditions on COP
16	2.4	Comparison of VC cycle with Air Refrigeration cycle.
17	2.5	Multistage Ref. Systems- Necessity of compound compression, Compound VC cycle
18	2.6	Inter-cooling with liquid sub-cooling and / or water inter cooler: Multistage compression with flash inter-cooling and / or water inter-cooling
19	2.7	systems with individual or multiple expansion valves; Individual compression system with individual or multiple expansion valves
20	2.8	Individual compression systems with individual or multiple expansion valves but with and without intercoolers.
21	2.9	Other Refrigeration Systems: (A) Vapour Absorption Refrigeration Systems – Basic Systems, Actual COP of the System, Performance
22	2.10	Relative merits and demerits; Properties of aqua ammonia; Electrolux Refrigeration; Problems
23	2.11	Steam Jet Refrigerating System- Introduction, Analysis, Relative merits and demerits
24	2.12	Performance Applications, Problems
		Unit III:
25	3.1	Psychrometry of Air & Air Conditioning Processes
26	3.2	Properties of moist Air-Gibbs Dalton law, Specific humidity, Dew point temperature
27	3.3	Degree of saturation, Relative humidity, Enthalpy
28-29	3.4	Humid specific heat, Wet bulb temp., Thermodynamics wet bulb temp.
30	3.5	Psychrometric chart; Psychrometry of air-conditioning processes, Mixing Process
31-32	3.6	Basic processes in conditioning of air; Psychrometric processes in air washer
33	3.7	Problems.
34	3.8	Air- Conditioning Load Calculations: Outside and inside design conditions; Sources of heating load
35	3.9	Sources of cooling load; Heat transfer through structure,
36	3.10	Solar radiation, Electrical applications, Infiltration and ventilation,
37	3.11	Heat generation inside conditioned space; Apparatus selection; Comfort chart,.
38	3.12	Problems
		Unit IV:
39	4.1	Air Conditioning Systems with Controls & Accessories
40	4.2	Classifications, Layout of plants; Equipment selection;
41	4.3	Air distribution system; Duct systems Design;
42-43	4.4	Filters; Refrigerant piping; Design of summer air conditioning and Winter air conditioning systems
44	4.5	Temperature sensors, Pressure sensors, Humidity sensors
45	4.6	Actuators, Safety controls; Accessories
46	4.7	Problems

47	4.8	Refrigeration and Air Conditioning Equipments
48	4.9	Type of compressors and their performance curves; Types of Condensers
49	4.10	Heat transfer in condensers; Types of expansion devices
50	4.11	types of evaporators, Cooling and Dehumidifying coils
51	4.12	Problems

(Satyapal Yadav)
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