	J.S. University, Shikohabad Faculty of Mechanical engineering	Value Added Course AY: 2020-21

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Value Added Courses

Faculty of Mechanical Engineering

	J.S. University, Shikohabad Faculty of Mechanical engineering	Value Added Course AY: 2020-2021

HEATING, VENTILATION, AIR CONDITIONING AND REFRIGERATION ENGINEERING

Learning Objective:

This Course will provide knowledge of Heating, ventilation, air conditioning and Refrigeration engineering

Duration: 40 Hours. (Theory and Practical)

Course Outcomes: -

After completion of the course the student shall be able to:-

1. Determine the performance parameters of trans-critical & ejector refrigeration systems
2. Estimate thermal performance of compressor, evaporator, condenser and cooling tower.
3. Describe refrigerant piping design, capacity & safety controls and balancing of vapour compressor system.
4. Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system.
5. Estimate heat transmission through building walls using CLTD and decrement factor &timelag methods with energy-efficient and cost-effective measures for building envelope.
6. Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.

Syllabus

Module I: Advanced Vapour Compression Cycles

Review of vapour compression cycle, Trans-critical cycle and their types retical treatment) Ejector refrigeration cycle and their types. Presentation of cycle on P-h and T-s chart

Module 2: Thermal Design of Refrigeration System Components

Compressor: Characteristic curves of reciprocating & Centrifugal compressors, sizing of reciprocating compressor

Evaporator: Standards & Codes, Performance analysis of Dx evaporator,

Condenser: Standards & Codes, air-cooled condenser, shell & tube condenser and evaporative condenser.

Expansion Devices: Standards & Codes, Operating Characteristics, Liquid Charge in the Sensing Bulb, Hunting of Thermostatic Expansion Valve.

Module 3: Practical Aspects of Vapour Compression System

Refrigerant Piping : Copper Tubing, Piping Design for Reciprocating Refrigeration Systems, Size of Copper Tube, Refrigeration Load, and Pressure Drop, Sizing Procedure, Suction Line.

Module 4: Ventilation and Infiltration

Indoor Design Criteria and Thermal Comfort : Basic parameters, factors affecting thermal comforts,Comfort-Discomfort Diagrams, Indoor Temperature, Relative Humidity, and Air Velocity Indoor Air Quality: Indoor Air Contaminants, Basic Strategies to Improve Indoor Air Quality. Outdoor Design Conditions: Outdoor Air Requirements for Occupants, the Use of Ventilation for cooling: Natural ventilation, mechanical ventilation

Module 5: Heat Load Estimation in Building Structures

Solar radiation, Heat gain through fenestrations, Space load characteristics, cooling load and coil loadcalculations, Overall heat transmission coefficient, air spaces, sol-air temperature.

References

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2. ASHRAE Handbook (HVAC Equipments)
3. Stocker W.F. and Jones J.W., Refrigeration and Air-conditioning, McGraw Hill Internationaleditions 1982.
4. Roger Legg, Air conditioning systems: Design, Commissioning and maintenance
5. Shan Wang, Handbook of Refrigeration and Air Conditioning, McGrawHill Publications
6. Wilbert Stocker, Industrial Refrigeration, McGrawHill Publications
7. Keith Harold, Absorption chillers and Heat Pumps, McGrawHill publications
8. ASHRAE, Air Conditioning System Design Manual, II[nd] edition, ASHRAE.
9. Arora R.C., Refrigeration and Air Conditioning, PHI, India
10. Dossat Ray J., Principal of Refrigeration, Pearson, India
11. Arora C P, Refrigeration and Air Conditioning, Tata McGraw Hill

Sanjeev
Course Coordinator
Er. Sanjeev
Kr. Verma

Dean
Academic
Dr. AK Sachan

Dean
Dr. Gaurav
Yadav