REFRIGERATION AND AIRCONDITIONING

(Elective – I)

Course Code: 15ME2305

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Pre- requisites: Thermodynamics and Heat transfer

Course Outcomes: At the end of the course, the student will be able to

CO1: explain different refrigeration systems, design steam jet and non-conventional refrigeration systems.

CO2: analyze simple vapor compression refrigeration systems, select refrigerants, design multi- evaporator systems.

CO3: discuss low temperature systems and design and vapor absorption refrigeration systems discuss different, defrosting methods.

CO4: outline psychrometric properties and analyze different air conditioning systems.

CO5: calculate capacities at different loads and design air conditioning systems.

UNIT – I (10-Lectures)

AIR REFRIGERATION: Bell-Coleman cycle and Brayton Cycle, air craft refrigeration, simple, bootstrap, regenerative, and reduced ambient systems , problems based on different systems.

STEAM JET REFRIGERATION SYSTEM: analysis, components of plant, advantages, limitations, and applications, performance.

NON-CONVENTIONAL REFRIGERATION SYSTEMS: thermoelectric refrigerator, Vortex tube or Hirsch tube

UNIT-II (10-Lectures)

VAPOR COMPRESSION REFRIGERATION: Performance of VCR, properties and selection of pure and mixed refrigerants.

MULTI-EVAPORATOR AND COMPRESSORS: methods of improving COP, sub-cooler heat exchanger, optimum inter stage

pressure for two stage refrigeration system**,** single load systems, multi load systems with single compressor, multiple evaporator and compressor system, dry ice system, cascade systems.

UNIT-III (10-Lectures)

VAPOR ABSORPTION SYSTEM: simple absorption system, practical ammonia absorption system, Electrolux Refrigerator, Domestic Electrolux Refrigerator-Lithium–Bromide system-actual analysis of ammonia absorption system.

METHODS OF DEFROSTING: automatic periodic defrosting, solid absorbent system, water defrosting, defrosting by reversing cycle, automatic hot gas defrosting, thermo bank defrosting, electric defrosting, electric air switch defrosting system, two outdoor unit system, multiple evaporators defrosting system.

UNIT-IV (10-Lectures)

AIR-CONDITIONING: psychometric properties & processes- summer air-conditioning systems-winter air conditioning systems-year around air –conditioning, requirements of comfort air-conditioning, thermodynamics of human body, comfort chart-design considerations, need for ventilation.

AIR-CONDITIONING SYSTEMS: central station air-conditioning system, unitary air-conditioning system, self-contained air-conditioning units.

UNIT-V (10-Lectures)

DESIGN OF AIR CONDITIONING SYSTEMS: cooling load calculations, different heat sources, bypass factor (BF), effective sensible heat factor (ESHF), cooling coils and dehumidifying air washers.

TEXT BOOK:

1. S.C. Arora and S. Domkundwar, "*A Course in Refrigeration and Air Conditioning"*, 8th Edition, Dhanpat Rai & Co., 2012.

REFERENCES:

1. C.P.Arora, "*Refrigeration and Air Conditioning"*, 2nd Edition, Tata McGraw-Hill, 2008.
2. W.P. Stoeker, "*Refrigeration and Air Conditioning"*, Tata McGraw-Hill, 1989.
3. R.J. Dossat, "*Principles of Refrigeration"*, John Willey and sons, John Wiley (SI Version), 1989.