GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VIII

MECHANICAL ENGINEERING

Subject Name: **REFRIGERATION AND AIRCONDITIONING**

Sr. No.	Course Contents	Total Hrs
1.	Refrigeration an introduction, heat load, development of refrigeration, aircraft refrigeration, Bell-Coleman cycle, Bootstrap air refrigeration system, types of air cycles, advantages and disadvantages,	**03**
2.	**Vapour Compression system:** Simple system on P-h diagram, analysis of the simple cycle, factors affecting the performance of the system, actual cycle considering different losses. **Compound Compression System:** Need, flash tank, Compound compression with flash and inter cooler, all evaporators working at the same temperature, evaporators with back pressure valves and with multiple expansion valves without flash inter cooling, analysis of two evaporators with flash inter cooler and individual and multiple expansion valve, estimation of power requirement and COP.	**07**
3.	**Absorption refrigeration system:** Characteristics of refrigerant, selection of pair, practical water -NH_3 cycle Li – Br system and its working.	**03**
4.	**Refrigeration system components:** Compressors, condensers, expansion devises, evaporators its types construction and working, comparison and selection, refrigeration piping accessories and controls, thermal insulation properties and classification, thickness of insulation.	**05**
5.	**Steam jet refrigeration system:** Basic concepts, system analysis, performance of steam jet refrigeration equipments, application, advantages and disadvantages.	**02**
6.	**Refrigerants:** development, classification, designation of refrigerants, secondary refrigerants, future industrial refrigerants	**01**
7.	**Psychrometry and psychrometric terms:** properties of air, Daltons law of partial pressure, humidity, temperature, enthalpy of moist air, temperature and humidity measuring instruments, plotting psychrometric chart, psychrometric processes such as sensible heating, cooling, heating and humidification cooling and dehumidification, chemical dehumidification, adiabatic saturation.	**05**
8.	**Human comfort:** air temperature and human body, body thermoregulation, effective temperature, comfort chart and factors governing effective temperature.	**01**
9.	**Load analysis:** Site survey, outdoor design conditions. Indoor design conditions, classification of loads, Flywheel effect of building material and its use in design, effect of wall construction on cooling load, instantaneous heat gain (IHG) and instantaneous cooling load (ICL) heat transmission through sunlit and shaded glass using tables, method of reduction of solar heat gain thorough glass, total equivalent temperature difference, calculations of cooling load TETD due to sunlit and shaded walls using tables, air infiltration and load due to outside air, ventilation, heat gain from occupants, electric lights, product, electric motor and appliances, use of load estimation sheet.	**06**
10.	**Duct Design and air distribution:** Function, classification economic factors influencing duct layout, duct design methods, velocity reduction, equal friction and static regain method, use of friction chart equivalent diameter, dynamic losses and its determination, Requirements of air distribution system, terms in air distribution, grills, outlets, application, location	**04**
11.	**Air-conditioning systems:** classification, system components, all air, all water, air-water systems, room air conditioners, packaged air conditioning plant, central air-conditioning systems, split air conditioning systems	**03**

12.	**Air conditioning system components:** fans types laws, classification and selection, air cleaning devices classification, types, construction and working, humidifiers and dehumidifiers	**03**
13.	**Refrigeration and air-conditioning application:** food preservation, ice manufacturing, cold stores, air-conditioning of residential, commercial buildings	**02**

Term Work: The term work shall be based on the topics mentioned above.
Practical / Oral: The candidate shall be examined on the basis of term-work.

Text Books:

1. Desai P.S, Modern Refrigeration and Air-conditioning Khanna Publishers, 2004
2. Manohar Prasad, "Refrigeration and Air Conditioning", Wiley Eastern Ltd., 1983
3. Arora. C.P., Refrigeration and Air Conditioning, Tata McGraw-Hill New Delhi, 1988
4. S C Arora & S Domkundwar, 'Refrigeration and Air-Conditioning' Dhanpat Rai Publication, 2009

Reference Books:

1. Roy.J Dossat, "Principles of Refrigeration", Pearson Education 2009.
2. Jordon and Prister, "Refrigeration and Air Conditioning", Prentice Hall of India PVT Ltd., New Delhi, 2009
3. Sapali S.N., "Refrigeration and Air Conditioning", PHI Learning Private Ltd, 2009.
4. W.F.Stocker and J.W.Jones, "Refrigeration and Air Conditioning", McGraw-Hill, 2009.
5. Ahmadul Ameen "Refrigeration and Air Conditioning", Prentice Hall of India Pvt. Ltd. 2010
6. S.S Thispee Refrigeration and air-conditioning , Jaico Publications, 2009
7. Ramesh Arora ," Refrigeration and Air-conditioning", Prentice Hall of India, 2010