

I-Year, I-Semester

L T P Credits: 4
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CH563 FOOD REFRIGERATION AND COLD STORAGE CONSTRUCTION

UNIT-I

Principles of Refrigeration: Refrigeration cycles, Vapour Compression and Vapour Absorption cycles, Refrigerants, characteristics of different refrigerants, Ozone Depletion Potentials, Green house Potential Refrigerants, use of non polluting refrigerants, net refrigerating effect, ton of refrigeration - Components of a Refrigeration system: Compressor, condenser, Evaporator, Expansion valves piping and different controls. Atmospheric air and its properties, Psychometrics, Energy considerations

UNIT-II

Cold Storage Design and Construction: Small and large commercial storages, Cold Room temperatures, Insulation, properties of insulating materials, air diffusion equipment, Doors and other openings. Cold load estimation; prefabricated systems, walk-in-coolers, and Refrigerated container trucks: Freezer Storages, Freezer room Temperatures, insulation of freezer rooms: Pre-cooling and pre freezing. Cold Storage practice, Stacking and handling of material in and around cold rooms, Optimum temperatures of storage for different food materials-meat and poultry products, marine products, fruits and vegetables, spices and food grains

UNIT-III

Operation and maintenance - Controlled atmosphere and modified atmosphere storages: Operation and maintenance, Cleanliness, defrosting practices, preventive maintenance, safety measures Controlled atmosphere and Modified atmosphere storages Principles and basics of their construction

UNIT-IV

Chilling of Foods: Chilling equipment for liquid foods. Secondary refrigerants and direct expansion techniques in chilling. Chilled foods transport and display cabinets - Basics of Chilled foods microbiology, Packaging of Chilled foods - Hygienic design considerations for chillers and chilled Storages. Cool storages and their applications. Evaporative cooling and its applications

UNIT-V

Freezing of foods: Freezing equipment, Freezing rates, growth rate of ice crystals, crystal size and its effect of texture and quality of foods, Freezer types, Blast freezers, Contact Plate Freezers, conveyORIZED quick freezers, Individual quick freezing. Cryogenic Freezing, Freezing practice as applied to marine foods, meat and poultry, fruits and vegetables.

Text Books:

1. Raymond R.Gunther: Refrigeration, Air conditioning and Cold Storage Chiltan Company, Philadelphia, USA 1957
2. Clive D.J.Dellino: Cold and Chilled Storage Technology Publisher: Kluwer Academic Publishers (1997)

3. S. Domkundwar and Subhash Arora: A Course in refrigeration and Air Conditioning: Dhanpat Rai and sons, Publishers, New Delhi (1994)
4. Andrew D Althouse and others: Refrigeration and air Conditioning Goodheart – Willcox Company Inc. 1982
5. E.R.Hollowell: Cold Storage and Freezer Storage Manual AVI Publishing Co. (1980)
6. Ed. C.P.Mallet: Frozen Food Technology Balckie Academic and Professional, (1993)
7. Aurel Gobaneu and Gabriela Laseha and others (1976) Cooling Technology in the Food Industry: Abacus Press, Tunbridge Wells, U.K.
8. Colin Dennis and Michael Stringer: Chilled Foods – A Comprehensive Guide Ellis Horwood Publishing, New york (1992)
9. D.K.Tressler and C.F.Evers: The Freezing Preservation of Foods (Vol.1&2) AVI Publishing Company Inc. USA (1965)
10. J.S.Pruthi: Quick Freezing Preservation of Foods (2 Volumes) Allied Publishers, Mumbai (1999)