INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

Course Title	**Principles and Design of Refrigeration and Air-Conditioning Systems**	Course No *(to be assigned by Academic Cell)*	MEXXXX			
Specialization	Mechanical Engineering	Structure (LTPC)	3	1	0	4
Faculty Proposing the course	Dr.B.Raja	Status	Core		Elective ■	
To be offered for	UG / PG	Type	New		Modificatio■	
To take effect from	Dec 2021	Submitted for approval	46th Senate			
Pre-requisite	Engineering Thermodynamics					
External Experts	Prof. S.P. Venkateshan and Prof Shaligram Tiwari (IITM)					
Recommendation from the DAC : Recommended Date of DAC : 01-06-2021						
Learning Objectives	1. To understand the working principles and applications of different types of Conventional and non-conventional R&A/C systems and application 2. To understand the design parameters and performance characteristics 3. To bring product design aspect in to the a RAC system					
Learning Outcomes	1. Illustrate the principles conventional and non-conventional refrigeration systems 2. Performance characteristics of the practical systems 3. Use of psychrometric and the performance of air-conditioning systems 4. Compute and Interpret cooling and heating loads in an air-conditioning system in various application					
Contents of the course *(With approximate break up of hours)*	Introduction –Industrial Refrigeration; Refrigerants – Pure and Mixed refrigerants, Secondary coolants, ASHRAE Nomenclature, Oils, Properties; GWP and OPD; (L3) Vapor Compression Refrigeration System (VCRS): Working, Analysis- superheat, sub-cooling, throttling, pressure drops and performance; MultiPressure and Multi-evaporator systems, use of flash vessel, inter cooling , liquid-suction heat exchangers; Grindlay cycle and Lorenz cycle, Optimum COP; Ewing's construction; CO2 Supercritical Cycle Linde liquefaction process; Basics of Compressors – Types, Inverter; Design application in chemical and process industries, Dairy plants, Food processing (L12 + T4) Vapour Absorption Systems: Absorbent – Refrigerant, Working and analysis of Water-Ammonia Systems and Lithium- Bromide System, Practical problems; Modified cycles of vapor absorption systems; Design application in hotels industry (L10 + T3) Air-Conditioning: Psychrometric chart, ADP, Sensible heat factor, Bypass factor, Air washer; Occupant comfort zone and ventilation, Load calculation, Transport air conditioning Systems – Automobile, Trains and Ships; Duct sizing and air distribution; Artificial snow; Cold storages; Energy conservation; Design application in Restaurants, malls, cold storage, IT Industries and Electronic ware houses, Cooling towers (L10 + T4) Non-conventional systems: Steam-Jet, pulse tube, thermo-acoustic, vortex tubes and Evaporative cooling refrigeration systems, Product Design aspect: Aesthetics in consumer RAC systems and Ergonomic on large scale systems (L7 + T3)					

Text Books	1. A.D.Althouse, C.H. Turnquist, A.F. Bracciano, D.C. Bracciano, G.M.Bracciano, Modern Refrig. and Air-conditioning, Goodheart-Willcox Publication; 19th Ed, 2013 2. Arora C.P., Refri. and Air-conditioning, Tata Mc Graw –Hill, New Delhi, 3rd Ed, 2008.
Reference Books	1. Roy J. Dossat, Principles of Refrigeration, 5th Edition, 2001, Wiley Ltd 2. ASHRAE Handbook - Fundamental, 2017