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

INTRODUCTION OF NEW COURSE

Course Title	Design of Refrigeration and Air-Conditioning Systems	Course No *(by Academic Cell)*				
Specialization	Mechanical Engineering	Structure (LTPC)	3	0	0	3
To be offered for	UG, DD, M.Tech. and Ph.D. students	Status	Core ☐		Elective ▬	
Faculty Proposing the course	Raja.B	Type	New ▬		Modification ☐	
Pre-requisite	Basics of Thermal Engineering	Submitted for approval	_____ Senate			
Learning Objectives	• To understand the working principles and applications of different types of Conventional and non-conventional R&A/C systems and application • To understand the design parameters and performance characteristics • To bring product design aspect in to the a RAC system					
Learning Outcomes	• Illustrate the principles conventional and non-conventional refrigeration systems • Performance characteristics of the practical systems • Use of psychrometric and the performance of air-conditioning systems • 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; (3 Hrs) 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; CO_2 Supercritical Cycle Linde liquefaction process; Design application in chemical and process industries, Dairy plants, Food processing (12 Hrs) 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 (10 Hrs) 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 (10 Hrs) Non-conventional systems: Steam-Jet, pulse tube, thermo-acoustic, vortex tubes and Evaporative cooling refrigeration systems (5 Hrs) Product Design aspect: Aesthetics in consumer RAC systems and Ergonomic on large scale systems (2 hrs)					
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					