

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 <i>(by Academic Cell)</i>				
Specialization	Mechanical Engineering	Structure (LTPC)	3	0	0	3
To be offered for	UG, DD, M.Tech. and Ph.D. students	Status	Core <input type="checkbox"/>		Elective <input checked="" type="checkbox"/>	
Faculty Proposing the course	Raja.B	Type	New <input checked="" type="checkbox"/>		Modification <input type="checkbox"/>	
Pre-requisite	Basics of Thermal Engineering	Submitted for approval	_____ Senate			
Learning Objectives	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 <i>(With approximate break up of hours)</i>	<p>Introduction –Industrial Refrigeration; Refrigerants – Pure and Mixed refrigerants, Secondary coolants, ASHRAE Nomenclature, Oils, Properties; GWP and OPD; (3 Hrs)</p> <p>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; Design application in chemical and process industries, Dairy plants, Food processing (12 Hrs)</p> <p>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)</p> <p>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)</p> <p>Non-conventional systems: Steam-Jet, pulse tube, thermo-acoustic, vortex tubes and Evaporative cooling refrigeration systems (5 Hrs)</p> <p>Product Design aspect: Aesthetics in consumer RAC systems and Ergonomic on large scale systems (2 hrs)</p>					
Text Books	<ol style="list-style-type: none"> 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 Arora C.P., Refri. and Air-conditioning, Tata Mc Graw –Hill, New Delhi, 3rd Ed, 2008. 					
Reference Books	<ol style="list-style-type: none"> Roy J. Dossat, Principles of Refrigeration, 5th Edition, 2001, Wiley Ltd ASHRAE Handbook - Fundamental, 2017 					