Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Master of Technology (M. Tech)
Course Code	:	2MTE07
Course Title	:	Advanced Air conditioning Engineering
Type of Course	:	PE
Year of Introduction	:	2023-24

Prerequisite	:	Basic about Air conditioning system
Course Objective	:	To understand the principles of air refrigeration
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	To make calculation of various Psychrometric processes 12
	CO2	To estimate the cooling load requirements of residential and commercial building and design the system components accordingly
	CO3	To develop the skills to analyze the domestic and industrial requirement of air conditioning systems and evaporative cooling equipment
	CO4	To select fan for particular air conditioning system and discuss recent developments in air conditioning
	CO5	To make use of tables and nomographs to design air distribution systems

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**SEE**	**CIA**	**SEE**	**CIA**	
03	00	00	03	70	30	00	00	100

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage
1	Applied psychometric: Different psychrometric charts, combinations of different processes and their representation on psychrometric charts, psychrometric calculations for cooling and dehumidification, high latent heat load,	4	5%

	dehumidified air quantities based on total and effective room loads, GSHF and RSHF, effective surface temperature, effect of bypass factor on GSHF, analysis for using all outside air, psychrometric of partial load control		
2	Design conditions and Heat load calculation: Selection of inside design conditions for different applications, Thermal comfort, Different equations governing thermal exchanges, environmental indices, AQ and its importance, Basic terminology for heat load calculation, heat transfer through walls and roofs, heat gain through glass, solar heat gain factor, shading of glass, shading devices and its selection, load due to other sources, stack effect, brief idea about other ASHRAE methods of calculating cooling load.	10	20%
3	Distribution of Air: Terminology, outlet performance, types of outlets, location of outlets, factors affecting grill performance, selection of outlets using nomographs and tables, room air diffusions performance index (ADPI) and its use in outlet selection, types of ducts, duct materials and their accessories, duct construction, factors affecting duct construction, friction charts and other correction factors, losses, design velocity and its selection, duct heat gain or loss, duct insulation, duct layouts, duct sizing methods, noise and their isolation.	10	25%
4	Air conditioning systems: Factors affecting the selection of the systems, classification, design procedure, system features, controls of all air, air water, all water, DX, VAV and dual duct systems, basic idea of cold air distributions systems	7	20%
5	Evaporative cooling equipment: Cooling tower: Types, construction, working and performance; Evaporative air cooler: Types, construction, working and performance, testing of evaporative air coolers as per IS standards, indirect evaporative cooling; Air washer: Types, construction.	7	15%
6	Air handling systems: Types, construction and performance characteristics of fans, fan laws, testing as per IS and AMCA standards, fan selection with the help of tables, charts and curves, fan drive arrangements and discharge from fans, Chilled beam, clean room concept, filtration of suspended particles, PPM control and methods, types of filters	4	15%

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Air conditioning test rig
2	Air cooler apparatus
3	Apparatus to perform various psychrometric processes

Suggested Learning Websites

Sr. No.	Name of Website
1	https://nptel.ac.in

Reference Books

Sr. No.	Name of Reference Books
1	Air Conditioning Engineering by W P Jones, Butterworth-Heinemann, Boston, Oxford
2	Refrigeration and Air conditioning by C P Arora, McGraw-Hill Publication
3	Hand book of Air conditioning Systems Design by Carrier Corporation
4	Air conditioning Principles and Systems by Edward G. Pita, John Wiley& Sons Australia Limited