

<b>GANPAT UNIVERSITY</b>									
<b>FACULTY OF ENGINEERING &amp; TECHNOLOGY</b>									
Programme		Bachelor of Technology			Branch/Spec.		Mechanical Engineering		
Semester		VIII			Version		2.0.0.0		
Effective from Academic Year			20121-22		Effective from the batch Admitted in			July 2018	
Subject code		<b>2ME81PE3</b>		Subject Name		<b>Air Conditioning System Design</b>			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50
<b>Pre-requisites:</b>									
Basic Thermodynamics Heat and Mass Transfer									
<b>Course Objective:</b>									
<ul style="list-style-type: none"> <li>• Appreciate and understand the concepts and components of air conditioning systems and applications.</li> <li>• Applied the general knowledge of indoor thermal comfort and environmental health and will get the knowledge of moist air properties and conditioning processes.</li> <li>• Know about the heating and cooling load required for a building.</li> <li>• Understand design of duct, selection of fan and measuring instruments used In air conditioning system.</li> </ul>									
<b>Theory syllabus</b>									
Unit	Content								Hrs
1	<b>PSYCHOMETRICS:</b> Concept of Psychometric and Psychometrics, Psychometric relations, Adiabatic Saturation process, Psychometric charts and Processes, Psychrometers.								6
2	<b>HUMAN COMFORT:</b> Thermodynamics of human body, factors affecting comfort, effective temperature, factors governing optimum effective temperature.								4
3	<b>AIR CONDITIONING SYSTEMS:</b> Air conditioning cycle, Classification of Air conditioning systems, control system, Zoned system, Unitary system, Unitary central system, VAV and VRF system , Ice system of air conditioning , Room sensible heat factor, grand sensible heat factor, Application of air conditioning.								6
4	<b>AIR CONDITIONING EQUIPMENT, COMPONENTS AND CONTROLS:</b> Package units, Central units , Filters, Fans, Air washer, Radiator and Connector, Manually controlled system, Automatic system, Semi-automatic system, Automatic humidity control, Air movement control, Automatic temperature control, Limit switches and Noise control								7
5	<b>DUCT AND AIR DISTRIBUTION SYSTEMS:</b> Duct size, shape, material and construction, continuity and Bernoulli's equations for ducts, pressure losses in circular and rectangular duct, Dynamics losses in duct and Duct design. Principles of air distribution system, Air handling system, Room air distribution, Types of air distribution system with application.								8

6	<b>FAN:</b> Types of Fans, Fan air power, Fan efficiencies, Velocity triangle for moving blades of centrifugal fan, Fan similarity laws, Fan performance.	8
7	<b>LOAD ESTIMATION AND MEASURING INSTRUMENTS:</b> Cooling load estimate, Heating load estimate, Solar heat gain through glass, Thermal barrier, Infiltration, Internal heat gains, System heat gain , Design of cold storage, Measurement of Humidity, infiltration, Pressure , Air flow and Temperature.	6
<b>Practical content</b>		
The term work shall be based on experimental and analytical work on topics mentioned above Field work.		
<b>Text Books</b>		
1	P.S.Desai, “Modern Refrigeration and Air conditioning”, Khanna Publication, Delhi. 2 <sup>nd</sup> Edition.	
2	Domkundwar, “Refrigeration & Air Conditioning”, Dhanpatrai& Co., Delhi. 2012.	
<b>Reference Books</b>		
1	Roy J. Dossat, “Principles of Refrigeration”, Publisher Prentice Hall, USA, 5 <sup>th</sup> Edition.	
2	C.P.Arora, “Refrigeration and Air conditioning”, Tata McGraw Hill, New Delhi. 3 <sup>rd</sup> Edition.	
3	Bellany, “Refrigeration & Air Conditioning”, Khanna Publication, Delhi. 3 <sup>rd</sup> Edition.	
4	Shan K. Wang, “Handbook of Air Conditioning and Refrigeration” McGraw-Hill, New York, 2 <sup>nd</sup> Edition.	
<b>Mooc Links:</b>		
<a href="https://nptel.ac.in/courses/112/107/112107208/">https://nptel.ac.in/courses/112/107/112107208/</a> <a href="https://nptel.ac.in/courses/112/105/112105129/">https://nptel.ac.in/courses/112/105/112105129/</a> <a href="http://www.digimat.in/nptel/courses/video/112107208/">http://www.digimat.in/nptel/courses/video/112107208/</a>		
<b>Course Outcomes:</b>		
<b>After learning this course, student should be able to</b>		
<ol style="list-style-type: none"> <li>1. Illustrate the fundamental principles and applications of refrigeration and air conditioning system</li> <li>2. Understand the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air conditioning.</li> <li>3. Study of the various equipment-operating principles, operating and safety controls employed in refrigeration air conditioning systems</li> <li>4. Compute cooling/heating loads for designing air conditioning systems for residential and commercial building.</li> <li>5. Design the air duct systems for large commercial buildings.</li> </ol>		