



National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	Bachelor of Technology in Mechanical Engineering	Year of Regulation	2018
Department	Mechanical Engineering	Semester	VII

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total

ME 411	REFRIGERATION AND AIR-CONDITIONING	3	0	0	3	50	50	100	200
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Course Objectives	To develop the student's ability to understand vapor compression and absorption system along with analyzing the refrigeration cycles and techniques for performance improvement	Course Outcomes	CO1	Able to explain the concepts of refrigeration and air conditioning systems using various refrigerants. (Understanding)
	To familiarize the students with the components of refrigeration systems		CO2	Able to explain vapor compression refrigeration systems with different refrigerants and infer the effect of different input parameters on the system performance and solve related problems. (Applying)
	To enable the students to solve problems on psychrometric process using psychrometric chart and design air-conditioning systems using cooling/heating load calculations.		CO3	Able to describe the operating principle of different components of vapour compression, vapor absorption refrigeration systems, aircraft refrigeration. (Understanding)
			CO4	Able to explain and solve combined psychrometric process problem using analytical method and psychrometric chart. (Applying)
			CO5	Able to explain the air-conditioning process utilizing the inside and outside environment condition. (Applying)

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	2	0	0	0	0	0	0	0	0	0	0	0	2	1	0
2	CO2	3	0	0	0	0	0	0	0	0	0	0	0	3	2	0
3	CO3	3	0	0	0	0	0	0	0	0	0	0	0	3	1	0
4	CO4	3	0	0	0	0	0	0	0	0	0	0	0	2	1	0
5	CO5	0	3	0	0	0	0	0	0	0	0	0	0	2	2	0

SYLLABUS

No.	Content	Hours	COs
I	Introduction Definition of Refrigeration and Air Conditioning, Refrigerating Machine - the Second Law Interpretation, Reversed Carnot Cycle and its Limitations, Energy Conservation.	03	CO1
II	Vapour Compression Refrigeration Systems Modifications in Reversed Carnot Cycle, Superheat Horn and Throttling Loss for Various Refrigerants, Standard Vapour Compression Refrigeration Cycle.	06	CO1 CO2 CO3
III	Refrigerants Designation and Trade Name, Physical, Chemical & Thermodynamic Properties of Principal Refrigerants, ODP and GWP of Refrigerants like CFC, HCFC, HFC, HC, HFO	04	CO1 CO2
IV	Multipressure Systems Multistage Compression, Multi-Evaporator Systems, Cascade Systems	04	CO1 CO2 CO3
V	Refrigeration System Components Types of Compressors, Expansion Devices, Condensers & Evaporators.	05	CO2 CO3
VI	Absorption System of Refrigeration Simple Vapor Absorption System, Maximum COP of a Heat Operated Refrigerating Machine, Common Refrigerant-Absorbent Systems, Modifications to Simple Vapor Absorption System, Electrolux Refrigerator.	04	CO3
VII	Psychrometry Air properties and Psychrometric Chart, Sensible Heating / Cooling, Humidification / Dehumidification and their combinations, By-Pass Factor, Sensible Heat Ratio, Comfort, Psychrometric calculations for cooling, Evaporative Cooling.	04	CO4
VIII	Summer and Winter AC Simple summer AC process, Room sensible heat factor, Coil sensible heat factor, ADP, Winter AC, Comfort Zone, Clothing.	02	CO4 CO5
IX	Load Calculations Internal heat Gain, System Heat Gain, Break-up of Ventilation Load And Effective Sensible Heat Factor, Cooling / Heating Load Estimate.	04	CO5
Total Hours		36	

Essential Readings

1. C.P. Arora, "Refrigeration and Air Conditioning", Tata McGraw-Hill, 2000.
2. R.J. Dossat, "Principles of refrigeration", Pearson, 2001.

Supplementary Readings

1. W.F. Stoecker, "Refrigeration and Air conditioning", Tata McGraw-Hill, 2014.
2. P.N. Ananthanarayanan, "Basic Refrigeration and Air Conditioning", Tata McGraw-Hill, 2013.
3. M. Prasad, "Refrigeration and Air Conditioning", New Age International Pvt Ltd Publishers, 2015.