	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	**V**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
ME 319	**Design of Thermal systems**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives	To develop the student's ability to understand the engineering system and devices associated with fluid flow, heat transfer, thermodynamics Law.	Course Outcomes	CO1	Able to acquire knowledgeof thermal devices with the consideration law of fluid flow, heat transfer and thermal device project management.
			CO2	Abe to acquire knowledge pipe network in series and parallel.
	To develop the student's ability to understand the design and analysis of devices associated with fluid flow, heat transfer.		CO3	Able to designand analyze pipe network with various losses.
			CO4	Able to design shell and tube heat exchanger, plate nd frame heat exchanger, parallel flow heat exchanger, cross flow heat exchanger.
	To develop the student's ability to understand the design of thermal devices with the consideration of energy efficiency.		CO5	Able to acquire knowledge on quality control and design inspection.

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	**3**	**3**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**3**	**3**	**0**
2	CO2	**3**	**3**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**3**	**3**	**0**
3	CO3	**3**	**3**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**3**	**3**	**0**
4	CO4	**3**	**3**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**3**	**3**	**0**
5	CO5	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**0**
6	CO6	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SYLLABUS

No.	Content	Hours	Cos
I	**Fundamental:** The design process, bid process, engineering design approaches, project management, fluid properties and basic equations in fluid flow and heat transfer.	**5**	**CO1**
II	**Piping System:** Pipe and tubing standards, equivalent diameter of noncircular ducts, equation of motion for flow in duct, friction factor and pipe roughness, minor losses, series piping system, flow through non circular cross section, optimization process for economic pipe diameter, equivalent length of fittings, symbol of pipe system, support system for pipe, piping system design practices, pressure drop in two phase flow, support system design for low temperature application.	**15**	**CO2** **CO3** **CO4**
III	**Design and analysis of heat exchanger:** Shell and tube heat exchanger, plate and frame heat exchanger, cross flow heat exchanger, analysis of shell and tube heat exchanger, heat recovery, design of heat exchanger, extended or finned system heat exchanger	**10**	**CO3** **CO4**
IV	**Quality control of the design:** Quality assurance, quality control, inspection and testing.	**10**	**CO5**
	Total Hours	**40**	

Essential Readings

1. W. S. Janna, "Design of Fluid Thermal System", PWS Publishing, 3rd Edition, 2011.

2. A. G. McDonald, H. Magande,"**Introduction to Thermo-Fluids Systems Design**" Wiley, 1st Edition, 2012.

Supplementary Readings

1. Y. A. Cengel, "Heat Transfer: A Practical Approach", McGraw-Hill, 2nd Edition, 2002.

2. B.K. Taylor and R.P. Taylor, "Analysis and design of Energy Systems, Hodge", Prentice Hall, 3rd Edition, 1999.

3. L. C. Burmeister, "Elements of Thermal-Fluid System Design", 1st Edition, Prentice Hall, 1998,

4. Y, Jaluria, "Design Optimisation of Thermal Systems",McGraw-Hill, 3rd Edition, 1998.

5. F. Owen, D. Maidment, "Quality assurance : a guide to the application of ISO 9001 to process plant projects}, Rugby : Institution of Chemical Engineers, 1st Edition 1996.