	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Master of Technology in Mechanical Engineering**	Year of Regulation	**2018**
Department	**Mechanical Engineering**	Semester	**I**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
ME 517	**Advanced Thermodynamics**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives	1. The fundamental of thermodynamics.	Course Outcomes	CO1	Students will to understand the details of first and second law along with the entropy and availability
	2. The thermodynamics related to Gibbs phase rule.		CO2	Students will able to understand the basics of Helmholtz and Gibbs Function
	3. The mechanisms of combustion and reaction.		CO3	Students will able to understand the Heterogeneous System, Thermodynamic Postulates for Simple Systems, Fundamental Equations for Energy and Entropy
	4. The introduction in statistical thermodynamics.		CO4	Students will able to understand the various Thermodynamic State Relations
			CO5	Students will able to understand the Reaction and Combustion and Statistical Thermodynamics

SYLLABUS

No.	Content	Hours	COs
I	**Introduction** First Law, Second Law and Entropy, Availability, Pinch Point Analysis	**03**	**CO1**
II	**Helmholtz and Gibbs Function** Introduction, Basics of Helmholtz and Gibbs Function, Significance of Helmholtz and Gibbs Energy	**08**	**CO2**
III	**Gibbsian Thermodynamics** Introduction, First and Second Order Phase Conversion, Stability of Heterogeneous System, Thermodynamic Postulates for Simple Systems, Fundamental Equations for Energy and Entropy	**08**	**CO3**
IV	**Thermodynamic State Relations** Introduction, Equations of State, Virial Equation of State, Van der Waals Equation of State, Redlich-Kwong Equation of State, Compressibility Charts, Boyle Temperature and Boyle Curves, Deviation Function, Three Parameter Equations of State, Generalized Equation of State, Empirical Equations of State, State Equations for Liquids/Solids	**05**	**CO4**
V	**Reaction and Combustion** Chemical Reactions and Combustion, Thermochemistry, First and Second Law Analyses for Chemically Reacting Systems, Adiabatic Flame Temperature, Direction of Reaction, Chemical Equilibrium, Gibbs Minimization Method, Availability of Reacting Systems	**07**	**CO5**
VI	**Statistical Thermodynamics** Introduction, Mechanics of Wave, Statistical Thermodynamic Models, Fermi-Dirac Statistics, Partition Function, Principle of Equipartition of Energy, Application of Partition Function	**05**	**CO5**
	Total Hours	**36**	

Text Books and References

1. Bejan, “Advanced Engineering Thermodynamics”, John Wiley and Sons.
2. T. Engel and P. Reid, “Thermodynamics, Statistical Thermodynamics and Kinetics”, Pearson Education.

Supplementary Readings

1. K. Annamalai and I. K. Puri, “Advanced Thermodynamics Engineering”, CRC Press.
2. R. Balmer, “Thermodynamics “, Jaico Publishing House.