GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. MARINE ENGINEERING
SEMESTER: V

Subject Name: **Thermodynamics – I**
Subject Code: **151802**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (I)**
4	1	0	5	70	30	50

Sr. No.	**Course Content**
1.	**The second Law of Thermodynamics:** Different statements of the second Law of Thermodynamics. Carnots cycle, Thermodynamic Reversibility. Carnots Principle, Carnot's cycle for a gas, Deductions from carnot's cycle. Thermodynamic Temperature scale. Steam and Gas Processes on T-S and H-S charts Entropy and Irreversibility. Applied problems.
2.	**Steam and two phase system:** Phase Equation of Steam, Temperature Pressure Diagrams, Triple Point, Specific Enthalpy and Entropy, Use of Steam Tales and Steam Charts, Pressure volume and Enthalpy- entropy Diagrams.
3.	**Boilers and Evaporators:** Boiler Calculations; Boiler thermal efficiency and Equivalent of a boiler; Basic Calculations on the effect of Condenser Leakage and impure Feed, dissolved solids in Boilers. Density of water and its control in Boilers; Density of water and its control I Boilers & Evaporators. Basic Calculations on performance of singleeffect, multi-effect and Flash-type Evaporators. Basic Calculations on performance of single-effect, multi effect and flash-type Evaporators'; Applied Problems.
4.	**Ideal Gas Cycles:** Constant Volume Cycle Constant Pressure Cycle, Diesel Cycle, Dual combustion Cycle, 4 Stroke Cucle, Criteria of Performance, compression Ratio and Thermal Efficiency, Indicator Diagrams; Indicated Power, Brake Power, Friction Power, Mechanical Efficiency, Specific Fuel consumption, Energy Balance, Applied Problems.

5.	**Steam cycle:** Carnot cycle for steam and Ideal Efficiency. Rankine cycle with dry saturated steam and superheated steam. Feed Pump work. Rankine Efficiency, work Ratio, Reheating and Regenerative Feed Heating and their effect on Thermal Efficiency. Applied Problems.
6.	**Steam Engines:** Modified Rankine cycle for steam Engines, Hypothetical Indicator Diagram. Mean Effective pressure and work transfer, diagram Factor. Indicated Thermal Efficiency. Efficiency Ratio, Engine Efficiency, Energy Balance, compound steam Engines, Missing quantity. Applied Problems.
7.	**Reciprocating Compressors:** Ideal cycle for compressors, work Transfer in single stage Compressor, Mass and volume flow. Free Air Delivery, Effect of clearance and volumetric Efficiency in Single stage compressors, Multi-stage compression neglecting clearance and with clearance. Condition for Minimum work Input and Perfect Intercooling, Tandem and In-line arrangement in compressors. Rotary positive Displacement Types of compresses air Motors Applied Problems.
8.	**Properties of Mixtures of Gases and Gas & Vapours:** Dalton's Law of partial pressure, Amagat's Law of partial volume, Volumetric and Gravimetric Analysis of Gas Mixtures, Gibb's – Dalton Law, Mean value of a Gas constant. Equivalent Molecular weight, Density, specific volume, Specific Heat and Molar Heat capacity of gas mixture. Advanced problem of Adiabatic Mixing. Air and Water vapour mixture, Specific Humidity, Relative Humidity, Dew point, unsaturated and saturated Air, Principle of cooling Tower and Air Leakage Problem in surface condenser.

Reference Books:

1. A Textbook of Thermal Engineering by J.K. Gupta S Chand
2. Thermal Engineering By R.K. Rajput by Laxmi Publications
3. Engineering thermodynamics by Omkar Singh New age Publisher
4. Thermal Engineering By Ajoy Kumar by Gardners Books
5. "Engineering Thermodynamics", 1st Edition by Nag, P.K, Tata McGraw-Hill Publishing Company Limited New Delhi, 1993.
6. "Engineering Thermodynamics", 1st Edition by Russel, Oxford University Press, 2007
7. "Thermodynamics", 4th Edition by Russel, McGraw-Hill Book Company,New York,1888.
8. "Thermodynamics", 4th Edition by Rao, Y.V.C., Wiley Eastern Ltd.,New Delhi,1993.