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| **Subject:** | **Applied Thermodynamics and Fluid Mechanics** |
| **Academic Year:** | 2020-21 |
| **Name of the Teacher:** | Dr. V. S.Jorapur |

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| **Weekly Plan** | **Topic** | **Module** | **Hours** |
| **Week 1**  (10/07/20) | Introduction to Thermodynamics, Discussion on syllabus content and scope of studying different chapters. | 1 | 1 |
| **Week 2**  (13/07/20  – 17/07/20) | Thermodynamics system and types, Macroscopic and Microscopic approach, Thermodynamic properties of the system, state, path, process and cycle, Point and Path functions, Quasi-static process & Equilibrium, Zeroth law of thermodynamics, Characteristic gas equation, Concept of Internal energy, Enthalpy, Heat and Work. Concept of P-dv work.  First Law of Thermodynamics- Statement & Equation, First law for Cyclic process (Joule’s experiment), Perpetual Motion Machine of the First Kind, Application of first law to non flow systems (Ideal gas processes with numerical) First law applied to flow system: Concept of flow process and flow energy, Concept of the steady flow process, Energy balance in a steady flow, | 1 | 4 |

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| **Week 3**  (20/07/20  – 24/07/20) | First Law contd….  Application of steady flow energy equation to nozzle, turbine, compressor, pump, boiler, condenser, heat exchanger, throttling device. Steady flow work, Significance of – V-dp work, Relation between flow and non-flow work.  Problems solved  Limitation of the first law of thermodynamics, Thermal reservoir, Concept of heat engine, Heat pump and Refrigerator | 1  2 | 3  1 |
| **Week 4**  (27/07/20  – 31/07/20) | Statement of the second law of thermodynamics, Reversible and irreversible Process, Causes of irreversibility, Perpetual Motion Machine of the second kind, Carnot cycle, Carnot theorem. Entropy-Clausius theorem, Entropy is property of a system, Temperature-Entropy diagram, Clausius inequality, Increase of entropy principle | 2 | 4 |
| **Week 5**  (03/08/20  – 07/08/20) | T-ds relations, Entropy change During a process. Problems and solutions from text books and university papers.  Availability-High grade and low- grade energy, Available and Unavailable energy, | 2  3 | 3  1 |
| **Week 6**  (10/08/20  – 14/08/20) | Dead State, Useful work, Irreversibility, Availability of closed system& steady flow process, Helmholtz & Gibbs function  ThermodynamicRelations**-** Maxwell relations, Clausis- Clapeyron Equation, Mayer relation, Joule- Thomson coefficient.  Solutions to the problems. | 3 | 4 |
| **Week 7**  (17/08/20  – 21/08/20) | **Properties of Pure Substance:** Advantages and applications of steam, Phase change process of water, Saturation pressure and temperature, Terminology associated with steam,  Different types of steam. Property diagram: T-v diagram, p-v diagram, p-T diagram, Critical and triple point, T-s and an h-s diagram for water, Calculation of various properties of wet, dry and superheated steam using the steam table and Mollier chart**.**  **Vapor Power cycle:**  Principal components of a simple steam power plant, Carnot cycle and its limitations as a vapour cycle, Rankine cycle with different turbine inlet conditions, Mean temperature of heat addition, Reheat Rankine Cycle  Solutions to the problems. | 4 | 4 |
|  | **MIDTERM BREAK** |  |  |
| **Week 8**  (31/08/20  – 09/09/20) | **Gas Power cycles:**  Nomenclature of a reciprocating engine, Mean effective pressure, Assumptions of air Standard Cycle, Otto cycle, Diesel Cycle and Dual cycle, Comparison of Otto and Diesel cycle for same compression ratio, Brayton Cycle. Sterling Cycle, Ericsson Cycle, Lenoir cycle, and Atkinson cycle  Solutions to the problems. | 5 | **4** |
| **Week 9**  (07/09/20  – 11/09/20) | **Compressible Fluid flow:**  Propagation of sound waves through compressible fluids, Sonic velocity and Mach number; Stagnation properties, Application of continuity, momentum and energy equations for steady-state conditions; Steady flow through the nozzle, Isentropic flow through ducts of varying cross-sectional area, Effect of varying back pressure on nozzle performance, Critical pressure ratio.  Solutions to the problems. | 6 | **4** |