BME G 0001: BASIC MECHANICAL ENGINEERING

Objective: *Precise thermodynamics education is a requirement to discuss issues that one faces in thermodynamics and resulting studies in global warming, energy conversion and other energy related topics that affect sustainability of the environment in the global sense. Also introduce the students to various basic manufacturing processes carried out in various industries very commonly.*

Credits: 04 **Semester I/II** **L–T–P: 3–1–0**

Module No.	Content	Teaching Hours
I	**Fundamentals of Thermal Engineering:** Thermodynamic systems, State & properties, Thermodynamic equilibrium & processes, Heat & work, Work done for different polytrophic processes, Zeroth law of thermodynamics and its applications, First law of thermodynamics, Steady flow energy equation, Application of first law to various thermodynamic systems and its limitations.	13
II	**Second Law of Thermodynamics:** Concept of heat engine, heat pump & refrigerator, Second Law of Thermodynamics, Carnot Cycle, Carnot theorem. Clausius Inequality, Concept of entropy, Entropy change during various processes. **Steam & its Properties** Definition of pure substance, Phase change, p-T diagram and pV-T surfaces, Formation of Steam, Concept and determination of dryness fraction of steam, Thermodynamic properties of steam, Steam table and Mollier diagram.	13
III	**Introduction to Manufacturing Processes**: Mechanical properties of materials, Engineering Materials: Plain carbon steel and its applications **Casting Process:** Patterns and types of patterns and their allowances, Moulding sand and its properties, Elements of gating system**.** **Fabrication processes:** Introduction and classification of welding, principle and applications of Shielded Metal Arc Welding and Gas Welding.	14

Reference Books:

- Nag P. K.: "*Engineering Thermodynamics*", TMH, and India.
- Yadav R.: "*Thermodynamics and Heat Engines*", Vol I & II (Sl Edition) Central Publishing House Allahabad.
- HajraChowdhary SK and HajraChowdhary AK "*Workshop Technology*" Media Promotors& Publishers.
- Raghuwanshi RS, "*Workshop Technology*" DhanpatRai and Sons, New Delhi.
- VaWylen G.J. &Sonnlog R.E.: "*Fundamentals of classical thermodynamics*", John Wiley & Sons, Inc. NY.
- WarkWenneth: "*Thermodynamics*", McGraw Hill book Co. NY.
- Joel R.: Basic Engineering "*Thermodynamic*"s, Addison Wesley.
- Chapman WAJ, "*Workshop Technology*" Part 1-3, Viva Books Pvt. Ltd. New Delhi.

Outcome: *At the end of the course the student will be able to:*

- *Understand the basic laws of thermodynamics and their applications in engineering.*
- *Understand the processes and operations of metal joining, fabrication & casting with applications.*
- *Develop basic know how and awareness of various manufacturing processes.*