

Kerala Technological university KTU First year B.tech Syllabus  
for **BE101-02 INTRODUCTION TO MECHANICAL  
ENGINEERING SCIENCES**

**Course No. : BE101-02**

**Course Name: INTRODUCTION TO MECHANICAL ENGINEERING  
SCIENCES**

**L-T-P-Credits: 2-1-0-3**

**Year of Introduction: 2015**

**Course Objectives:**

1. To introduce different disciplines of Mechanical Engineering
2. To kindle interest in Mechanical Engineering
3. To impart basic mechanical engineering principles

**Syllabus:**

Thermodynamics & Power sources, Thermal Engineering, Refrigeration and Air Conditioning, Automobile & Aeronautical Engineering, Mechanisms & Machines, Materials and manufacturing.

**Expected outcome:**

At the end of the course, the students will have exposed to the different areas of Mechanical Engineering; gained idea about nature, scope and applications of Mechanical Engineering principles.

**References:**

1. [Landmarks in Mechanical Engineering- Rachel Maines, ASME](#)
2. Engineering Thermodynamics – Spalding & Cole, ELBS & Edward Arnold (Pub) Ltd.
3. [Thermodynamics- J P Holman, McGraw Hill Co.](#)

4. Principles of Turbomachinery- William W Peng, John Wiley & Sons
5. Internal Combustion Engine Fundamentals- John Heywood, McGraw Hill Publishers
6. Principles of Refrigeration- Roy J Dossat, PHI
7. Air Conditioning Principles & Systems- Edward G Pita, PHI
8. Automobile Engg- K K Jain & R B Asthana, TTTI Bhopal
9. Automotive Engg Fundamentals- Richard Stone and Teffrey K Ball, SAE International
10. Aerodynamics, Theodore Von Karman
11. Theory of Machines & Mechanisms- J E Shigley & John Joseph Uicker, McGraw Hill Publishers
12. Mechanical Engg Design- J E Shigley, McGraw Hill Publishers
13. Manufacturing Processes for Engineering Materials- Serope Kalpakjian & Steven R Schmid, Pearson education
14. Rocket Propulsion Elements- G P Sutton & D M Ross, John Wiley & Sons
15. The Development of Science & Technology; Notes by R V G Menon
16. Online course on Refrigeration & Air conditioning, IIT Kharagpur  
[www.nptel.ac.in](http://www.nptel.ac.in)

## **Module 1 Contents**

Thermodynamics: Nature and scope of thermodynamics; Basic concepts ;  
Laws of thermodynamics- Discovery, Significance & Applications; Qualitative ideas on Entropy, Available energy, Irreversibility, Clausius Inequality, Principle of increase of entropy & Carnot engine; Limitations of Thermodynamics;  
Sources of power; history of power production; power production in the future.

## **Module 2 Contents**

Thermal Engineering: Historical development of steam engine, steam turbines, gas turbines and hydraulic turbines; Principle of turbomachinery; History of IC engines; two stroke and four stroke engines-working, applications; Air compressors- types and uses; Principles of Rocket propulsion, chemical rockets, Indian space programme

## **Module 3 Contents**

Refrigeration & Air Conditioning: History & scope of refrigeration; applications of refrigeration; Food preservation, refrigerated storage; applications in chemical and process industries; special applications; Air conditioning- Principles & systems; scope of air conditioning; Components of A/c systems, all-air and all-water A/c systems;, Psychrometric properties of air; Human comfort; comfort standards.

## **Module 4 Contents**

Automobile & Aeronautical Engineering: Introduction to an Automobile; history of the automobile; Indian Automobiles; Types of automobiles; Layout of an automobile; Major components and their functions; Manufacturers of motor vehicles in India; Fundamentals of aerodynamics; theory of lift and drag; aircraft engines-types and applications.

## **Module 5 Contents**

Mechanisms & Machines: Introduction; Analysis and synthesis; terminology; definitions & assumptions; planar, spherical and spatial mechanisms, examples of mechanisms; mobility; classification of mechanisms; Grashof's law; mechanical advantage; Mechanical Engineering design; types of design; design considerations; types of loads; factor of safety; codes & standards; economics of design; reliability; safety.

## **Module 6 Contents**

Manufacturing Engineering & Materials: Introduction and history of materials and manufacturing; engineering materials; metals, alloys, composites, microstructures, heat treatment, physical properties of materials and material testing; methods of manufacturing; examples of manufactured products; Computer Integrated manufacturing; lean production & agile manufacturing; environmentally conscious design & manufacturing; organization for manufacture.