

IPS Academy, Institute of Engineering & Science, Indore
(A UGC Autonomous Institute, Affiliated to RGPV)

ESC 202	Basic Mechanical Engineering & Manufacturing Process	2L:1T:2P (5 Hrs)	4 Credits
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Prerequisite (s): 10+2 Level Physics, Chemistry

Course Objective:

To introduce and learn various aspects of Mechanical Engineering discipline and its applications to society and to inspire students to take up Mechanical Engineering as a career.

Course Content:

Module 1 **(10 hrs)**

Materials: Classification of engineering material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels their applications. Mechanical properties like strength, hardness, toughness, ductility, brittleness, malleability etc. of materials, Stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity, Introduction to UTM.

Module 2 **(12 hrs)**

Production Engineering: Elementary theoretical aspects of production processes like casting, carpentry, welding, Black smithy, fitting, Introduction to Lathe and Drilling machines and their various operations. Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier caliper, Micrometer, Dial gauge, Slip gauge, Sine-bar and Combination

Module 3 **(10 hrs)**

Fluids and Thermal Science: Fluid properties. Types of fluids, Newton's law of viscosity, Pascal's law, Bernoulli's equation for incompressible fluids, Only working principle of Hydraulic machines, Thermodynamic system, properties, state, process, zeroth's, first and second law of thermodynamics.

Module 4 **(9 hrs)**

Power Engineering: Classification and working of boilers, mountings and accessories, Performance and efficiency of Boiler, introduction to boiler draught. Formation of steam & its properties, T-V, H-S, T-S Diagram, use of steam table with simple Numerical Problem.

Module 5 **(9 Hrs)**

Engines: classification of Engine, Introduction to Gas power cycles, Carnot, Otto and Diesel Cycle with P-V and T-S Diagram, and its derivation for efficiency. Terminology used in IC Engine, Indicated, Brake power, Mechanical Efficiency. Working of two strokes & four strokes Petrol, Diesel engines.

Course Outcomes:

After completion of the course, the students are able to:

1. Define the Engineering Material, Properties and applications and list the various test on materials by UTM.
2. Demonstrate the working of different measuring instruments and to introduce various manufacturing processes.
3. Identify the Fluid properties, its laws and understand the basic concept of first and second Law of Thermodynamics.
4. Evaluate and analyze performance characteristics of Boilers.
Understand the working of internal combustion engines and their performance.

Text Book/ References:

1. Basic Mechanical Engineering, by C.M. Agrawal, Basant Agrawal, Publisher: Wiley 2008.
2. Basic Mechanical Engineering by Sadhu Singh, Publisher : S Chand 2009.
3. Kothandaraman & Rudramoorthy, Fluid Mechanics & Machinery, New Age, 2007.
4. Nakra & Choudhary , Instrumentation and Measurements, TMH, 2003
5. Nag P.K, Engineering Thermodynamics, TMH, 2010.
6. Ganesan , Internal Combustion Engines, TMH, 2008
7. M.I. Khan, Industrial Engineering, New Age International, 2004

List of Experiment:

1. To perform a tensile test on UTM.
2. To prepare a job in a Carpentry Shop.
3. To prepare a job in a Fitting Shop.
4. To prepare a job in Black Smithy.
5. To prepare a job in Welding Shop.
6. To verify Bernoulli's Theorem using Bernoulli's apparatus
7. Study of Boilers, their Mounting and Accessories.
8. Study of Two and Four Stroke SI Engine.
9. Study of Two and Four Stroke CI Engine.
10. To study the working of Lathe & Drilling Machines.