**Indus University**

## Indus Institute of Technology & Engineering

**First Year Engineering (All Branches)**

* **Subject :** Elements of Mechanical Engineering
* **Subject Code :** EME107/207
* **Teaching Scheme**

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| **Teaching Scheme** | | | | **Examination Scheme** | | | | | | |
| Class Room Contact Hrs | Activity based learning/Tutorial | Practical | Credits | University Examination (Theory) | Mid Sem Examination (Theory) | Continuous Evaluation  (Theory) | University Examination (Practical) | Mid Sem Examination (Practical) | Continuous Evaluation  (Practical) | Total Marks |
| 02 Hrs | 02 Hrs | -- | 03 | 60 Marks | 25 Marks | 15 Marks | -- | -- | -- | 100 |

* **Objectives**
  + To provide the understanding of basic science of mechanical engineering.
  + To provide the understanding of basic thermodynamics and gas laws for engineering applications.
  + To provide understanding of converting efficiently energy into work for various applications.
  + To understand the basics of power & motion transfer between various components and systems.
* **Syllabus Content**

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| **Title & Content** |  |
| **Unit - I** |  |
| **Introduction** |  |
| Basic units and dimensional analysis & measurement of force and mass, pressure, work, power, energy, heat, temperature, specific heat capacity, Interchange of heat, change of state, mechanical equivalent of heat, Internal energy, enthalpy, entropy, efficiency, statements of Zeroth Law, First law and Second law of Thermodynamics. |  |
| **Properties of gases** |  |
| Gas laws, Boyle’s law, combined gas law, gas constant, Internal energy, Relation between Cp and Cv, Enthalpy, Non flow process, constant volume process, Constant pressure process, Isothermal process, Poly-tropic process, Adiabatic process. |  |
| **Unit – II** |  |
| **Fuels and Lubricants** |  |
| Different types of fuels, their properties and applications. Different types of lubricants, their properties and applications. |  |
| **Internal Combustion Engines** |  |
| Prime movers, Classifications, Elementary heat engines, Sources of energy, I.C. Engine cycles, Carnot cycle, Otto Cycle, Diesel cycle. Otto four-stroke cycle, Diesel-four-stroke cycle, Difference between Otto cycle and Diesel cycle, Two-stroke cycle, Difference between two- stroke and four-stroke cycle, indicated power (ip), Brake power (bp), Efficiencies. Governing of I.C. Engine |  |
| **Unit – III** |  |
| **Properties of steam** |  |
| Introduction, steam formation, types of steam, enthalpy, specific volume of steam and dryness fraction of steam, Internal energy, steam tables, Measurement of dryness fraction throttling calorimeter, separating calorimeter, Combined calorimeter. |  |
| **Steam boilers** |  |
| Introduction, Classification, Simple vertical and horizontal boiler, Boiler details, Boiler performance. Functioning of different mountings and accessories. |  |
| **Unit – IV** |  |
| **Refrigeration and Air-conditioning** |  |
| Introduction, Refrigerant, Vapor compression & absorption cycles & system, basic applications. |  |
| **Transmission of motion and power** |  |
| Introduction, Couplings methods of drive, power transmission elements, shaft and axle, Belt-drive, pulleys, power transmitted by a belt, Chain drive, Friction drive, Gear drive. |  |
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| **Text Books** |  |
| 1. Basant Agrawal ‘Basic mechanical Engineering’ Wiley-India, 2008. 2. Shanmugam G and Palanichamy M S, ‘Basic Civil and Mechanical Engineering’, Tata McGraw Hill publishing Co., New Delhi. |  |
| **Reference** |  |
| 1. Elements of Mechanical Engineering by K.P. Roy and Prof. S.K. Hajra Chaudhary, Media Promoters and publishers Pvt.Ltd.Bombat 2. A Text Book of Elements of Mechanical Engineering by S. M. Bhatt, H. G. Katariya, J. P. Hadiya – Books India Publications, New Delhi 3. Basic & Applied Thermodynamics by P K Nag - Tata McGraw Hill Pvt. Ltd., Mumbai |  |