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|---|---|
| **INSTITUTE** | **FACULTY OF SCIENCE** |
| **PROGRAM** | **BACHELOR OF SCIENCE (CHEMISTRY)** |
| **SEMESTER** | **2** |
| **COURSE TITLE** | **MECHANICS AND THERMODYNAMICS** |
| **COURSE CODE** | **02PY0191** |
| **COURSE CREDITS** | **4** |

**Objective:**

1 To be able to introspect the fundamentals of energy, mechanical properties of matter, Kinematics of Gases, Heat and Thermodynamics and their applications.

**Course Outcomes:** After completion of this course, student will be able to:

1 Interpret the fundamentals of energy and mechanical properties of matter.

2 Apply the concepts of kinematics of gases, heat and thermodynamics.

3 Apply knowledge of physics in other branches of science to solve scientific problems

4 Solve the fundamental problems related to properties of matter and Thermodynamics

**Pre-requisite of course:**Student should have basic knowledge of vectors and algebra.

**Teaching and Examination Scheme**

| Theory Hours | Tutorial Hours | Practical Hours | ESE | IA | CSE | Viva | Term Work |
|---|---|---|---|---|---|---|---|
| 4 | 0 | 0 | 50 | 30 | 20 | 0 | 0 |

| Contents : Unit | Topics | Contact Hours |
|---|---|---|
| 1 | **Work, Potential and Kinetic Energy and Conservation of Energy**<br>Energy, Kinetic Energy, Work, Work and Kinetic Energy, Work done by the Gravitation Force, Work done by Spring Force, Work done by a General Variable Force, Power, Work and Potential Energy, Determining Potential Energy Values, Conservation of Mechanical Energy | 15 |
| 2 | **Mechanical Properties of Solids and Fluids**<br>Elasticity, Stress, Strain, Hookes law, Modulus of /Elasticity, Types of modulus of Elasticity, Fluid, Density and Pressure, Fluids at Rest, Measuring Pressure, Pascal's Principle, Archimedes Principle, Ideal /Fluid in Motion, The equation of Continuity, Bernoulli's Equation, Application of Bernoulli's Equation | 15 |

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| Contents : Unit | Topics | Contact Hours |
|---|---|---|
| 3 | **Kinetic Theory**<br>Avogadro's Number, Ideal Gases, Pressure, Temperature and RMS speed, Translational Kinetic Energy, Mean Free Path, The distribution of molecular speeds, The Molar Specific Heat of an Ideal Gas, Degree of Freedom of and Molar Specific Heats, , A Hint of Quantum Theory, The adiabatic Expansion of an ideal gas | 15 |
| 4 | **Heat and Thermodynamics**<br>Temperature, The Zeroth law of Thermodynamics, Measuring Temperature, The Celsius and Fahrenheit scale, The absorption of Heat by Solids and Liquids, The First Law Thermodynamics, Some Special Cases of the First Law of Thermodynamics, Irreversible Process and Entropy, The Second of law of Thermodynamics, Entropy in the Real World Engine, The efficiency of Real Engines, A stoical view of Entropy | 15 |
| **Total Hours** | | **60** |

**Textbook :**

1 Principles of Physics 10th edition , Halliday, Resnick and Walker, Wiley Publication, 2015

**References:**

1 SEARS AND ZEMANSKY'S University Physics with Modern Physics , SEARS AND ZEMANSKY'S University Physics with Modern Physics , H. D. Young and R. A. Freedman, Pearson Publication , 2012

2 Lectures on Physics , Lectures on Physics , Feynman, Pearson Publication , 2009

**Suggested Theory Distribution:**

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

| Distribution of Theory for course delivery and evaluation | | | | | |
|---|---|---|---|---|---|
| **Remember / Knowledge** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Higher order Thinking** |
| 20.00 | 30.00 | 25.00 | 15.00 | 10.00 | 0.00 |

**Instructional Method:**

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

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**Instructional Method:**

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

**Supplementary Resources:**

1 https://onlinecourses.nptel.ac.in/noc23_me76/preview

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