

## Applied Physics & Electro- Mechanical Fundamentals

|                    |                     |
|--------------------|---------------------|
| <b>Course Code</b> | <b>Credit Hours</b> |
| <b>PHY-113</b>     | <b>2-1</b>          |

### Course Description

This course equips the students with the applied concepts of Applied Physics and Electro- Mechanical Fundamentals. By the course completion, students would have developed a good understanding of the fundamentals covering vectors, applied mechanics, electrostatics, waves and oscillations, electrical elements and circuits, relevant electronics in Civil Engineering testing, thermodynamics, HVAC, and renewable energy systems.

### Text Book:

1. Physics, By: Halliday, Resnick & Krane, Edition: 10th Edition (or latest edition).
2. University Physics, BY: Hugh D. Young and R.A. Freedman, (latest edition).
3. Physics for Scientist & Engineers, by Serway, Jewett (latest edition).
4. Basic Electrical Engineering by Del Toro, Prentice Hall (latest edition).
5. Basic Electrical Technology by T.K. Nagasarkar & Suhkija, (latest edition).
6. Theraja, B.L. Electrical Technology, S. Chand publishing (latest edition).
7. Thermodynamics 'An Engineering Approach' By Yunus A. Cengel, Michael A. Boles
8. Trane Air Conditioning Manual
9. Electrical Technology by B.L.Theraja

### Reference Book:

**Prerequisites.** Nil

### ASSESSMENT SYSTEM FOR THEORY

|                   | <b>Without Project (%)</b> | <b>With Project/Complex Engineering Problems (%)</b> |
|-------------------|----------------------------|--|
| Quizzes           | 15                         | 10-15  |
| Assignments       | 10                         | 5-10   |
| Mid Terms         | 25                         | 25   |
| Project           | -                          | 5-10   |
| End Semester Exam | 50                         | 45-50  |

## ASSESSMENT SYSTEM FOR LAB

|  |     |
|--|-----|
| Lab Work/ Psychomotor Assessment/ Lab Reports        | 70% |
| Lab Project/ Open Ended Lab Report/ Assignment/ Quiz | 10% |
| Final Assesment/ Viva                                | 20% |

### Teaching Plan

| Week No      | Topics/Learning Outcomes   |
|--------------|--|
| 1            | Review of Vectors, Gradient of Scaler field, Divergence and Curl of Vector Field.<br>Application of Newton's law   |
| 2            | Tension, Normal & Frictional Forces. Dynamics of uniform circular motion, kinematics of rotational motion related problem solving.   |
| 3            | Simple Harmonic Motion and SHM energy.   |
| 4            | Damped & forced oscillations. Oscillations & wave propagation.   |
| 5-6          | Work-Energy, Energy & power carried by waves. Reflection, interference & diffraction.  |
| 7            | Rotational inertia of solid bodies.  |
| 8            | Nuclear Radioactive decay & radioactive dating, radiation detection instruments.   |
| <b>9</b>     | <b>Mid Semester Exam</b>   |
| 10-11        | <b>Introduction to Mechanical Technology:</b><br>Basic Concepts, Laws of thermodynamics & their applications. Thermodynamic air cycles, mean effective pressure.                           |
| 12-13        | <b>Air-Conditioning:</b><br>Introduction, Heating & cooling load & its calculations, comfort charts, outline of air-conditioning in buildings, natural ventilation & insulating materials. |
| 14-15        | <b>Electrical Elements &amp; Circuits:</b><br>Electrical units, electrical current Ohm's law, Kirchhoff's law, Intro to node voltage & loop current methods.                               |
| 16           | <b>Wiring &amp; illumination:</b><br>Principles of house wiring & industrial wiring, introduction to illumination, and earthing.   |
| <b>17-18</b> | <b>End Semester Exam</b>   |

### Practical

| <b>Experiment No</b> | <b>Description</b>  |
|----------------------|---|
| 1                    | To Verify Boyle's Law   |
| 2                    | To calculate the enthalpy of air blown in vapor. To calculate the cooling capacity of air cooler. To calculate the sensible heat/ rise in temperature between room intake & outlet. |
| 3                    | To verify the Kirchhoff's law & Ohm's law   |
| 4                    | Mini-launcher (Exp 1, 2, 3)   |
| 5                    | Mini-launcher (Exp 4,6)   |
| 6                    | Compound Pendulum   |

