# LESSON PLAN

| Discipline :<br>**MECHANICAL ENGG.** | Semester :<br>**1ST** | Name of the Teaching Faculty:<br>**SOVAKARA SING, ANJALI KUJUR &<br>ABINASH NANDI** |
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| Subject: **APPLIED<br>PHYSICS-I** | No. of days/per week class<br>allotted: **04** | Semester from date 06.08.2025 to<br>04.12.2025<br>No. of Weeks: 15 |

| Week | Class<br>day | Theory/ Practical Topics |
|---|---|---|
| 1st | 1st | Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units) |
| | 2nd | Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations |
| | 3rd | Applications of Dimensional analysis (conversion from one system of units to other) |
| | 4th | Applications of Dimensional analysis (checking of dimensional equations) |
| 2nd | 1st | Applications of Dimensional equations (derivation of simple equations), Limitations of dimensional analysis. |
| | 2nd | Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), |
| | 3rd | Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures. |
| | 4th | Scalar and Vector quantities – examples, representation of vector, types of vectors. |
| 3rd | 1st | Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), |
| | 2nd | Scalar Product |
| | 3rd | Vector Product |
| | 4th | Resolution of a Vector and its application to inclined plane and lawn roller. |
| 4th | 1st | Force, Momentum, Statement and derivation of conservation of linear momentum |
| | 2nd | Applications of conservation of linear momentum such as recoil of gun, rockets, Impulse and its applications. |
| | 3rd | Circular motion, definition of angular displacement, angular velocity, angular acceleration, |
| | 4th | frequency, time period, Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical), |
| 5th | 1st | Centripetal and Centrifugal forces with live examples, |
| | 2nd | Expression and applications such as banking of roads and bending of cyclist. |
| | 3rd | Work: Concept and units, examples of zero work, positive work and negative work |
| | 4th | Friction: concept, types, |

| Week | Class day | Theory/ Practical Topics |
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| 6th | 1st | laws of limiting friction, coefficient of friction, reducing friction and its engineering applications |
| | 2nd | Work done in moving an object on horizontal plane |
| | 3rd | Work done in moving an object on inclined plane for rough and plane surfaces and related applications. |
| | 4th | Energy and its units, kinetic energy |
| 7th | 1st | gravitational potential energy with examples and derivations, |
| | 2nd | mechanical energy, conservation of mechanical energy for freely falling bodies, trans-formation of energy (examples). |
| | 3rd | Power and its units, power and work relationship, calculation of power (numerical problems). |
| | 4th | Translational and rotational motions with examples |
| 8th | 1st | Definition of torque and angular momentum and their examples, |
| | 2nd | Conservation of angular momentum (quantitative) and its applications |
| | 3rd | Moment of inertia and its physical significance (Relation of torque and moment of inertia, Relation of angular momentum and moment of inertia) |
| | 4th | radius of gyration for rigid body |
| 9th | 1st | Theorems of parallel and perpendicular axes (statements only), |
| | 2nd | Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only). |
| | 3rd | Elasticity: definition of stress and strain |
| | 4th | moduli of elasticity, Hooke's law, |
| 10th | 1st | significance of stress-strain curve. |
| | 2nd | Pressure: definition, units, atmospheric pressure |
| | 3rd | gauge pressure, absolute pressure, Fortin's Barometer and its applications. |
| | 4th | Surface tension: concept, units |
| 11th | 1st | cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation) |
| | 2nd | applications of surface tension, effect of temperature and impurity on surface tension. |
| | 3rd | Viscosity and coefficient of viscosity |
| | 4th | Terminal velocity |
| 12th | 1st | Stoke's law and effect of temperature on viscosity |
| | 2nd | application in hydraulic systems. |
| | 3rd | Hydrodynamics: Fluid motion |
| | 4th | stream line and turbulent flow |
| 13th | 1st | Reynold's number & Equation of continuity |
| | 2nd | Bernoulli's Theorem (only formula and numerical) and its applications |
| | 3rd | Concept of heat and temperature |
| | 4th | modes of heat transfer (conduction, convection and radiation with examples) |

| Week | Class day | Theory/ Practical Topics |
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| 14th | 1st | specific heats |
|      | 2nd | scales of temperature and their relationship |
|      | 3rd | Types of Thermometer :-Mercury thermometer, Bimetallic thermometer & |
|      | 4th | Platinum resistance thermometer, Pyrometer and uses thermometers. |
| 15th | 1st | Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions |
|      | 2nd | Relation between coefficient of linear & surface expansion |
|      | 3rd | Relation between coefficient of linear & cubical expansion, relation amongst them |
|      | 4th | Co-efficient of thermal conductivity, engineering applications |

1. Text Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
2. Text Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T
3. Text Book of Engineering Physics by Barik, Das, Sharma, Kalyani Publisher
4. Concepts in Physics by H. C. Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
5. J. Walker, Principle of Physics, 9th Edition, Hoboken, New Jersey: Wiley-2011
6. M.E. Browne, Schaum's outline of Physics for Engineering and Science, 4th Edition, McGraw-Hill, 2019