

42. Physics Workshop Skills

Credits: 3 (Theory: 2, lab: 1)

Theory: 20 Lectures

Preferred minimum qualifications of the teacher/instructor: Assistant Professor of Physics or a B.E/B.Tech in Mechanical Engineering

The aim of this course is to enable students to get familiar with various mechanical and electrical tools in hands-on mode

Unit I: Introduction (4 Lectures)

Measuring units. conversion to SI and CGS. Familiarization with meter scale, Vernier calliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.

Unit II: Mechanical Skill (6 Lectures)

Concept of workshop practice. Overview of manufacturing methods: casting, foundry, machining, forming and welding. Types of welding joints and welding defects. Common materials used for manufacturing like steel, copper, iron, metal sheets, composites and alloy, wood. Concept of machine processing, introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils.

Unit III: Electrical and Electronic Skill (4 Lectures)

Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay.

Unit III: Introduction to prime movers: (6 Lectures)

Mechanism, gear system, wheel, Fixing of gears with motor axel. Lever mechanism, Lifting of heavy weight using lever, use of pulley, braking systems, working principle of electrical power generation systems.

Lab:

1. To study the use of meter scale, vernier caliper, screwgauge.
2. To measure dimension of solid block, volume of cylindrical beaker/glass, diameter of thin wire, thickness of metal sheet.
3. To measure height of building, mountain using sextant
4. To study the use of digital multimeter and CRO.
5. To do soldering of electrical circuit having discrete components on PCB.
6. To construct a regulated power supply with capacitor filter.
7. Demonstration of lifting of heavy weight using lever

Reference Books:

- [1] A text book in Electrical Technology-B L Theraja – S. Chand and Company.
- [2] Performance and design of AC machines – M.G. Say, ELBS Edn.
- [3] Mechanical workshop practice, K.C. John, 2010, PHI Learning Pvt.Ltd.
- [4] Workshop Processes, Practices and Materials, Bruce J Black 2005, 3rd Edn., Editor Newnes [ISBN: 0750660732]
- [5] New Engineering Technology, Lawrence Smyth/Liam Hennessy, The Educational Company of Ireland [ISBN: 0861674480]
