SYLLABI OF PHYSICS SEC PAPERS

SEMESTER-I

PHYSEC101

PART-A: WORKSHOP SKILL

Contact Hours: 30

Marks = 100 [ESE (50) IT (20) LAB (30)]

Course objective: *The aim of this course is to enable the students to familiar and experience with various mechanical and electrical tools through hands-on mode.*

Unit 1: Introduction

Units of measurements. 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. **(6 Lectures)**

Unit 2: Mechanical Skill

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, alloy and wood. **(6 Lectures)**

Unit 3: Machining Process

Concept of machine processing, introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils. Cutting of a metal sheet using blade. Drilling of holes of different diameter in metal sheet and wooden block. Use of bench vice and tools for fitting. **(6 Lectures)**

Unit 4: Electrical and Electronic Skill

Multimeter, Use of Multimeter as ammeter, voltmeter and ohmmeter. Specifications of good multimeters. Cathode Ray Oscilloscope, Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration, uses of CRO. Regulated power supply, Relays, Fuses and switches, Electronic switch using transistor. **(7 Lectures)**

Unit 5: Introduction to prime movers

Principle of Lever Mechanism, 1^{st} ,2^{nd} and 3^{rd} kind of lever with examples, Lifting of heavy weight using lever, gear system, Fixing of gears with motor axel, wheel, Braking systems, pulleys. Working principle of power generation systems. **(5 Lectures)**

LAB: PART-B: 30 hours. (Practical /Project/Field work):

Following are the lists of practicals:

1. Cutting of a metal sheet using blade to give a symmetrical shape.
2. Drilling of holes of different diameter in metal sheet and wooden block.
3. Soldering of electrical circuits having discrete components (R, L, C and diode) and ICs on PCB.
4. Demonstration of pulley experiment.
5. Construction of regulated power supply.
6. Measurement of (a) voltage (b) rise and fall times (c) time period of a periodic waveform using CRO.

Expected learning outcomes: *At the end of this course the students are expected to develop theoretical knowledge on various workshop skills such as mechanical skills, machining process, electrical skills and electronic skills along with their hand on experience.*

Reference Books:

i. A text book in Electrical Technology - B L Theraja – S. Chand and Company.

ii. Performance and design of AC machines – M.G. Say, ELBS Edn.

iii. Mechanical workshop practice, K.C. John, 2010, PHI Learning Pvt. Ltd.

iv. Workshop Processes, Practices and Materials, Bruce J Black 2005, 3rd Edn., Editor Newnes [ISBN: 0750660732].

v. New Engineering Technology, Lawrence Smyth/Liam Hennessy, The Educational Company of Ireland [ISBN: 0861674480].

vi. https://ncert.nic.in/vocational/pdf/kvcj3103.pdf