Course Name : **Physics Laboratory**

Course Number : **PH 515P**

Credits : **0-0-5-3**

Prerequisites : **Faculty consent**

Intended for : **I-Ph.D.**

Distribution : **Core**

Semester : **Odd**

Preamble **:** This experimental course is expected to develop the art of experimentation and analysis skill, understanding the basis of knowledge in physics, and collaborative learning skills among students.

Course Outline **:** The course content includes standard physics experiments from various modules of physics, the theory of which students have learnt during their final year of B. Sc.

Experiments :

1. Hall Effect in Semiconductor

Objective: To measure the resistivity and Hall voltage of a semiconductor sample as a function of temperature and magnetic field. The band gap, the specific conductivity, the type of charge carrier and the mobility of the charge carriers can be determined from the measurements.

2. Michelson Interferometer

Objective: To determine the wavelength of the light source by producing interference pattern.

3. Fabry-Perot Interferometer

Objective: To investigate the multibeam interference of a laser light. Also, the determination of the wavelength of light source and thickness of a transparent foil.

4. Zeeman Effect

Objective: To observe the splitting up of the spectral lines of atoms within a magnetic field (normal and anormalous Zeeman effect) and find the value of Bohr's magneton.

5. Diffraction of ultrasonic waves

Objective: To observe Fraunhofer and Fresnel diffraction and determine the wavelength of the ultrasound wave.

6. Frank-Hertz Experiment

Objective: To demonstrate the quantization of atomic energy states and determine the first excitation energy of neon.

7. Fourier optics

Objective: To observe Fourier transformation of the electric field distribution of light in a specific plan.

8. Dispersion and resolving power of a grating

Objective: Determination of the grating constant of a Rowland grating based on the diffraction angle (up to the third order) of the high intensity spectral lines. Determination of the angular dispersion and resolving power of a grating.

9. Geiger-Müller-Counter

Objective: To study random events. Determination of the half-life and radioactive equilibrium. Verification of the inverse-square law for beta and gamma radiation.

10. Scintillation counter

Objective: Energy dependence of the gamma absorption coefficient / Gamma spectroscopy.

Books:

1. R. A. Dunlop, Experimental Physics, Oxford University Press (1988).
2. A. C. Melissinos, Experiments in Modern Physics, Academic Press (1996).
3. E. Hecht, Optics, Addison-Wesley; 4 edition (2001)
4. J Varma, Nuclear Physics Experiments, New Age Publishers (2001)
5. E. Hecht, Optics, Addison-Wesley; 4 edition (2001)
6. Worsnop and Flint, Advanced Practical Physics for Students Methusen & Go. (1950).
7. E.V. Smith, Manual for Experiments in Applied Physics. Butterworths (1970).
8. D. Malacara (ed), Methods of Experimental Physics, Series of Volumes, Academic Press Inc. (1988).