

Approved in 37th BoA Meeting (29-10-2020)

Course Name : Eng. Physics Practicum
Course Number : EP402P
Credits : 1-0-5-4
Prerequisites : PH301 or PH513 and PH501 or PH523.
Intended for : B.Tech. in Engineering Physics
Distribution : Core course for B.Tech. in Engineering Physics.

Preamble: This experimental course is expected to develop the art of experimentation and analysis skill, collaborative learning skills among students along with the hands-on training in making the devices.

Course Outline: The course content includes basic physics experiments from various modules of physics, the theory of which students have learnt during their core courses and basic training in device making.

Part A

1. Hall Effect in Semiconductor

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. Diffraction of ultrasonic waves

Fraunhofer and Fresnel diffraction and determine the wavelength of the ultrasound wave. Students may also develop their own sound wave generator and receiver and perform this experiment.

3. Geiger-Müller-Counter

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

4. Dispersion and resolving power of a grating

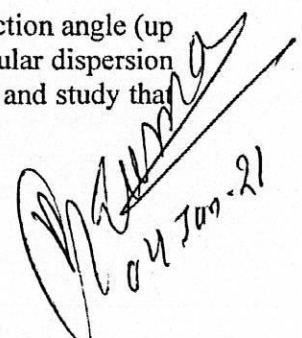
Determination of the grating constant of a Rowland grating based on the diffraction angle (up to the third order) of the high intensity spectral lines. Determination of the angular dispersion and resolving power of a grating. Students may also design their own gratings and study that using this experimental technique.

Devices Fabrication Technologies

- **Basic clean room training and introduction to instruments**

Draw a comprehensive wafer clean process flow/cleaning of wafer and validate the hydrophobic and hydrophilic nature through contact angle measurements.

- **Metal-Semiconductor contact fabrications and characterizations**


04 Jan-21

Proposal for a New Course

Design and fabricate basic metal semiconductor junction and do the characterization. Basic characterization may also be extended to thin films grown via spin coater or any other technique.

Textbooks:

1. R. A. Dunlop, Experimental Physics, Oxford University Press (2012).
2. S. K. Ghandhi, VLSI Fabrication Principles: Silicon and Gallium Arsenide, 2nd Edition. (2014)

References:

1. A. C. Melissinos, Experiments in Modern Physics, Academic Press (1996).
2. E. Hecht, Optics, Addison-Wesley; 4 edition (2011)
3. J. Varma, Nuclear Physics Experiments, New Age Publishers (2010)
4. B. L. Worsnop and H. T. Flint, Advanced Practical Physics for Students, Methusen & Go. (1950).
5. E. V. Smith, Manual for Experiments in Applied Physics. Butterworths (1970).
6. D. Malacara (ed), Methods of Experimental Physics, Series of Volumes, Academic Press Inc. (1988).
7. D. K. Schroder, Semiconductor Material and Device Characterization, 3rd Edition.

1. Similarity Content Declaration with Existing Courses

S.N.	Course Code	Similarity Content	Approx. % of Content
1	PH515P	Part of section A	20%

2. Justification for new course proposal if cumulative similarity content is > 30%:

NA.

