BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE PILANI, Hyderabad Campus

FIRST SEMESTER 2023-2024

Course Handout (Part II)

In addition to Part I (general Handout for all courses appended to the Time Table), this portion gives further specific details regarding the course.

Course No. : PHY F417
Course Title : Experimental Methods of Physics
Instructor : Souri Banerjee

Course Description: Optical and dielectric measurements, computer interfacing, Vacuum Techniques, Cryogenics, synthesis and properties of materials, structural characterization with modern experimental techniques including microscopy and spectroscopy.

Scope & Objective: The course will cover modern techniques used in experimental physics research laboratories and in industries working in related fields.

Text Book: No single textbook exists.

Reference books:

1. L.L. Marton, *Methods of Experimental Physics,* Volumes 1-26 (Academic Press, 1952, New York)
2. The Science & Engineering of Microelectronics Fabrication, S. A Campbell, Oxford Univ Press
3. R.C. Richardson and E. N. Smith, *Experimental Techniques in Condensed Matter Physics at Low Temperatures* (Addison-Wesley, 198, Redwood City)
4. G.K. White, *Experimental Techniques in Low Temperature Physics*, 3rd edition (Clarendon, 1987, Oxford)
5. L.G. Carpenter, Vacuum Technology, 2nd edition (Adam Hilger, 1983, Bristol)
6. J.F. O' Hanlan, *A User's Guide to Vacuum Technology*, 2nd edition (Wiley, 1989, New York)
7. Helfrick and Cooper, *Modern electronic instrumentation and measurement techniques* (Prentice Hall)

Course Plan:

Lecture No.	***Learning Objectives***	***Topics to be covered***	***Reference (Chap/Sec)***
1-4	The relevance of course	Important points that the course will cover	*Ref*
5-15	Methods to dope materials and test the doping level, Oxidation	Diffusion & ion implantation. Diffused profile analysis. Oxide thickness measurements	Lecture notes + relevant portions from reference books.
16-28	Lithography	Experimental methods involving various kinds of lithography	*Do*
29-35	Electron Microscopy and Spectroscopic Techniques	SEM, TEM, SPM	*Do*

36-42	Vacuum deposition	Thin films, CVD etc	*Do*

Evaluation Scheme:

EC No.	Evaluation Scheme	Duration	Weightage (%)	Date & Time	Nature of Component
1.	Midsem	90 mins.	30	07/10 - 4.00 - 5.30PM	Open Book
2.	Lab Project	----------	20		----------
3.	Research Seminar	----------	10		
4.	Comprehensive Examination	3 hrs.	40	05/12 AN	Open Book

Notices: Notices for the course will be displayed on **Physics** notice board.
Make-up Policy: Make up will be given strictly to **genuine cases only** i.e. **(i)** Sickness leading to hospitalization, **(ii)** Out of station with prior intimation &permission.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-Charge

PHY F417