

Course Name: Recent trends in Physics**Course Code: RCW-4-18**

L	T	P	Cr
3	1	0	4

COURSE OBJECTIVES

To learn about the synthesis techniques of nano-materials. To understand the characterization tools and their application to analyze the materials, To analysis surface, composition and structure of materials, To evaluate the physical properties of materials , To learn the basic procedure of device fabrication and measurements, To learn basic MATLAB commands to writing programs ,To learn writing small MATLAB programmes for various numerical methods.

UNITS	CONTENTS	Contact Hrs.
I	Introduction to thin film, Thin film deposition using Physical Vapour Deposition (PVD), Thermal Evaporation, Magnetron sputtering (DC and RF), Pulsed laser deposition (PLD), Molecular beam epitaxy (MBE), Chemical vapour deposition (CVD), Top down and bottom up approach, Physical and chemical methods.	12
II	X-ray diffraction (XRD), Structure analysis, UV-VIS Spectroscopy, Estimation of optical constants, Estimation of particle size using EMA, Fourier Transform Infrared Spectroscopy (FTIR), Raman Spectroscopy, X-ray photoluminescence spectroscopy (XPS).	12
III	Scanning electron microscopy (SEM), Field emission-scanning electron microscopy (FE-SEM), Transmission electron microscopy (TEM), Scanning probe microscopy (SPM), Scanning tunneling microscope (STM), Atomic force microscope (AFM)	12
IV	Introduction to MATLAB Creating Variables, some useful MATLAB function, Data types, script files, plotting, Input and output statement, Conditional statement: logical operators, if else if, switch, Introduction to loops, for loops, while loops, nested loops, break statement, Arrays, function,	12
V	Writing Programes with Matlab, Adaptive Quadrature Methods, Gauss Quadrature, Fourier Integrals, Rung - Kutta method for, finite difference method, finite element method.	12

REFERENCE BOOKS :

1.	Elements of X-ray diffraction, B.D. Culity, S.R. Stock, Prentics Hall Publication.
2.	Infrared Spectroscopy: Fundamentals and Application, Barbara Stuart, Wiley
3.	Electron Microscopy and analysis, P.J Goodhew, J. Humphreys, R. Beanland, Taylor & Fransis.
4.	Materials Science of Thin Films: Deposition and Structure by Milton Ohring
5.	Scanning and Transmission electron Microscopy: An Introduction by Stanley L. Flegler
6.	Numerical Methods". E. Balagurusamy, Tata McGraw-Hill.

7.	Introduction to Methods of Numerical Analysis S.S. Sastry, PHI.
8.	Introduction to MATLAB by Rudra Pratap.
9.	MATLAB: A Practical Introduction to Programming and Problem Solving, 3rd edition Stormy Attaway, Elsevier, 2013.