

SARDAR PATEL UNIVERSITY

Master of Science – Materials Science (M.Sc.) Semester –I

(Effect from June, 2024)

Course Code	PS01CMTS58	Title of the Course	PRACTICAL – I
Total Credits of the Course	4	Hours per Week	12 hr

Course Objectives:	1. To have hand on practice of different vacuum related instruments in the laboratory 2. Understanding the thermodynamic properties of materials.
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Course Content Unit		Description	Weightage* (%)
1		Operation of Vacuum coating unit.	
2		Deposition of metallic thin film using vacuum coating unit and spin coating unit.	
3		Estimation of thickness of film by multiple beam interferometry method.	
4		Preparation of thin film resistor using vacuum coating unit.	
5		Estimation of inter planer spacing and unit cell dimensions using electron diffraction pattern.	
6		Determination of specific heat of graphite rod at different temperature.	
7		Determination of thermal conductivity of aluminium rod.	
8		Calculate the d-spacing of grating using Bragg's law.	
9		Creep analysis of different materials at constant temperature and stress.	
10		Determination of specific heat capacity of aluminium and copper rod.	
11		Calculation of the Curie transition temperature (T_c) of $BaTiO_3$ ceramic material.	
12		Determination of depth of scratch of thin film by MBI method	

Teaching Learning Methodology	Demonstration/Group discussion/ Panel/Hands on training
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1	Learners acquire hands-on experience in operating sophisticated equipment, conducting experiments, and analyzing data. This practical skill set enhances their readiness for roles in research and development, quality control, or process optimization.
2	Graduates of this course gain exposure to various experimental techniques, including vacuum coating, interferometry, diffraction, and thermal analysis. This versatility makes them well-suited for a broad range of research and industrial applications.

Suggested References:	
1	Handbook of Physical Vapor Deposition (PVD) Processing" by Donald M. Mattox
2	Materials Science and Engineering: An Introduction" by William D. Callister Jr., David G. Rethwisch
3	Elements of X-ray Diffraction" by B.D. Cullity, S.R. Stock
4	Introduction to the Thermodynamics of Materials" by David R. Gaskell
5	The Science and Engineering of Materials" by Donald R. Askeland and Pradeep P. Fulay

On-line resources to be used if available as reference material	
1	https://nptel.ac.in/