

No. of Printed Pages : 04

Roll No.

18CC1804

M. Sc. EXAMINATION, 2020

(Third Semester)

(C Scheme) (Main & Re-appear)

PHYSICS

PHY607C

Condensed Matter Physics Spl.-II

(Characterization of Materials)

Time : 2½ Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

(3)M-18CC1804

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1. (a) Differentiate between Single and Double Crystal Diffractometer.
(b) Define Surface Topography and name the techniques used to study this.
(c) Explain the elementary concepts of Scanning used in various characterization techniques.
(d) Explain the difference between nuclear magnetic resonance (NMR) and electron spin resonance (ESR) spectroscopy.
(e) Discuss the physical meaning Optical Multichannel Analysis (OMA).
2. (a) Explain small angle X-ray scattering and discuss its application in evaluation of shape and size of surface particles.
(b) Define Neutron Scattering and discuss a technique based on it with reference to light elements in detail.

3. Define the imperfections in crystals and discuss a technique (XRD) based on it for the characterization of solids in detail.
4. Discuss principle and working of LEED (Low Energy Electron Diffraction) technique used, explains the analysis of surface structures.
5. (a) Define Electron Microscopy and explain the detail of SIMS (Secondary Ion Mass Spectroscopy) used to characterize the solids.
(b) What do you mean by Scanning Tunneling Microscopy ? Write its two applications also.
6. Explain the experimental study of Raman Effect. Discuss quantum theory of Raman effect and also its applications.
7. (a) What do you mean by IR Spectroscopy ? Discuss in detail Double Beam IR Spectrometer used to characterise the materials.

- (b) Write a note on Optic and Acoustic Modes in Solids.
8. What is Lande Splitting factor ? How is it calculated experimentally with the help of electron spin resonance (ESR) spectroscopy ?
9. Explain Mössbauer spectroscopy and write the principle and working of Mossbauer spectrometer. Discuss, how it is used to analysis oxidation state of iron.