

Major Test (PHL654, Experimental techniques)
Semester -I (2008-09)

Maximum Marks : 50

Duration : 2 Hr

Attempt all questions.

1. (a) Explain the basic principle of spectroscopic ellipsometry?
(b) What information you can get from ellipsometric data?
(c) How does parallel and perpendicular components of reflection varies with incidence angle for Si ($n=3.5$, $k=0$), glass ($n=1.5$) Show the proper graphs.
(4+3+4)
2. (a) Why do you need thermal analysis?
(b) Which information can you get from TGA.
(b) Compare DSC and DTA techniques.
(2x3)
3. **Answer the following (any FIVE)**
 - a. Which vibrational mode in a molecule is IR active? Give two examples of IR active bonds.
 - b. Name any two materials which are used for making windows and cells in IR spectroscopy instrument and why?
 - c. Which transitions are responsible for absorption in the 200-700 nm range?
 - d. What are the various fundamental modes of vibration in CH_2 - group?
 - e. How can you separate isotopes using IR spectroscopy?
 - f. How does the stretching frequency vary as we change the bonds from
(i) C-H, C-D, C-C and (ii) C-C, C=C, $\text{C}\equiv\text{C}$? Give reasons.(3x5)
4. **Answer the following (any SIX)**
 - (i) How can you prepare sample for TEM studies in the case of (i) powder, (ii) thin films?
 - (j) Why do we need differential pumping in electron or ion gun sources?
 - (k) What are the factors which influence resolution in SEM and how ?
 - (l) Compare secondary and backscattered electrons. (Give three points)
 - (m) Why do you get broad core level peaks in XPS?
 - (n) Name two sources which are used in Ultra violet photoelectron spectroscopy. Why?
 - (o) X rays has high penetration depth still XPS is a surface sensitive technique. why?(3x6)