



**PS-003-1104002-1104004** Seat No. \_\_\_\_\_

**M. Sc. (Chemistry) (Sem. IV) (CBCS) Examination**

**August - 2020**

**(CPA) & CPM - 402 : Instrumental Techniques**

*(New Course)*

**Faculty Code : 003**

**Subject Code : 1104002-1104004**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

**Instructions :**

- (1) All questions are compulsory.
- (2) All questions carry equal marks.

**1 Answer the following : (any seven) 14**

- (a) How will you take measurement of  $\lambda$  and  $d$  by Bragg's law ?
- (b) How will you determine state of anneal in metals by X-ray diffraction ?
- (c) What are the advantages and disadvantages of DTA ?
- (d) State the different methods of single heating rate for the determination of kinetic parameters by TGA.
- (e) What is optical activity ? Give example.
- (f) Define : Polarized light, unpolarized light, cotton effect and circular dichroism.
- (g) Give the principle of scanning electron microscopy.
- (h) Give the application of transmission electron microscopy.
- (i) What are the automated methods of chemical analysis ? Differentiate automatic and automated methods of analysis.
- (j) How will you analyze blood sugar by multilayer thin film analytical technique ?

**2 Answer the following : (any two) 14**

- (a) Give the X-ray diffraction methods and discuss powder crystal method in detail.

- (b) Discuss the various physical and chemical properties evaluated by DSC and TGA methods.
- (c) What is flow injection analysis technique ? Discuss in detail with suitable example.

**3** Answer the following : (any two) **14**

- (a) Give the principle and instrumentation of transmission electron microscopy in detail.
- (b) Explain ORD and CD. Describe with diagram optical rotation dispersion spectroscopy.

**OR**

- (a) Explain the instrumentation of scanning electron microscopy and give its application.
- (b) Give the principle of organic elemental analyzer. Discuss the analysis procedure with diagram.

**4** Answer the following : **14**

- (a) Discuss Bragg X-ray spectrometer method in detail.
- (b) Discuss the principle and working of DSC. Draw a hypothetical DSC curve and label various types of transitions.

**5** Answer the following : (any two) **14**

- (a) Discuss the theory of transmission electron microscopy.
- (b) Discuss the principle and working of DTA technique and give its application.
- (c) Give the applications of X-ray diffraction methods.
- (d) Give the principle of multilayer thin film analysis. Discuss the analysis of blood urea by this technique.