Seat No. _____

HA-003-1104004

M. Sc. (Sem. IV) Examination

April - 2023

Physical Chemistry : CPM-PA-402

(Instrumental Techniques)

(New Course)

Faculty Code : 003

Subject Code : 1104004

Time : $2\frac{1}{2}$ / Total Marks : **70**

Instructions :

(1) All questions are compulsory.

(2) Total five questions.

(3) Each question carry equal marks (14).

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

(a) What is specific rotation ?

(b) Give the application of transmission electron microscopy.

(c) What is the principle of DSC ?

(d) How will you determine linkage isomerism by x-ray diffraction method ?

(e) What do you mean by polarization light ?

(f) How will you produce plane polarized light ?

(g) Give the application of DTA.

(h) Give the principle of scanning electron microscopy.

(i) State the various chemical properties which can determined by TGA.

(j) Define : X-ray absorption, X-ray diffraction and X-ray fluorescence methods.

2 Answer the following : (any two)

(a) Give the application of X-ray diffraction method.

(b) Discuss Bragg X-ray spectrometer method in detail.

(c) Give the X-ray diffraction method and discuss rotating crystal method in detail.

3 Answer the following :

(a) What is the enantiomeric excess and optical purity ? How will you calculate it ?

(i) (–)-2-butanol has a specific rotation of –13.5° while the specific rotation of (+)-2-butanol is +13.5°. Calculate optical purity of a mixture containing (+) and (–)-2-butanol if the mixture has an observed rotation of –8.55°. Does the mixture contain more (+) or more (–)-2-butanol ?

(ii) What is the enantiomeric excess of a mixture containing 25% (+)-2-butanol and 75% (–)-2-butanol if the specific rotation of (+)-2-butanol is 13.5°.

(b) Draw the diagram of polarimeter and give the functioning of it.

OR

(a) How will you monitoring mercury by flow injection analysis techniques ?

(b) How will you analyze blood sugar by multilayer thin film analyzer explain with diagram.

4 Answer the following :

(a) Discuss the theory of scanning electron microscopy.

(b) Derive Freeman-Carrol-Anderson and Chatergee methods for two determination of kinetics parameters from single heating rate TGA curve.

5 Answer the following : (any two)

(a) Explain kinetics parameters from thermograms.

(b) Describe the instrumentation of TEM in detail.

(c) Give the principle and procedure of automatic elemental analysis with diagram.

(d) What is optical rotatory dispersion (ORD) ? Draw the diagram and explain the principle of it.

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