

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

First Semester 2023-24

Mid-Semester Examination (Closed Book)

Course Name: Instrumental Methods of Analysis

Course No: PHA F313

Total Marks: 30

Date: 09-10-2023

Duration: 90 (min)

Note: Answer for all questions precisely with appropriate illustrations if required.

Give the answer for all sub-parts together in one place.

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- 1) a) Draw a neat schematic representation, principle of double beam UV-Visible spectrophotometer, label it's various components and mention their purpose briefly. (2x3=6)
b) Write a note on qualitative applications of UV-Visible spectrophotometer with examples.
- 2) a) Write the steps involved in quantitative chemical analysis using any type of relative analytical method. (2x3=6)
b) Classify spectroscopy with suitable examples. Write about the optimum conditions required during analytical method development using UV-Visible spectrophotometer.
- 3) a) Calculate the number of vibrational modes for carbon tetrachloride, hydrogen cyanide and berlyium hydride. (2x3=6)
b) Write the principle involved in IR spectroscopy. Draw a neat schematic representation of double beam FT-IR, label it's various components, mention their purpose and working method of the same.
- 4) a) Write a brief account on electronic, rotational and vibrational transitions in a molecule.
b) Write about various solid sampling techniques used in IR spectroscopy. (2x3=6)
- 5) a) Draw a neat diagram of nicol prism, lippich prism. Explain the construction and working principle of the same. (2x3=6)
b) The specific rotation of (*S*)-Tartaric acid is $+17.49^\circ$. Determine the % composition of a mixture of (*R*) and (*S*)-Tartaric acid if the specific rotation of the mixture is -5.27° .
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