No. of Printed Pages : **2**

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Sl. No.

M.Sc. III Semester Degree Examination, April/May - 2024

INDUSTRIAL CHEMISTRY

DSC - 9 : Spectroscopy

(NEP)

Time : 3 Hours Maximum Marks : 70

Instruction : *Answer **any five** of the following questions with Question **No.1** is **Compulsory**, each question carries **equal** marks.*

1. (a) What are rotational energy levels ? Explain the factors affecting the rotational energy levels. **4+3+3+4**

(b) Write the techniques and instrumentation of microwave spectroscopy.

(c) Give short notes on :

(i) fundamental vibrations

(ii) overtones.

(d) Explain the classical theory of Raman effect.

2. (a) With a neat diagram, explain the instrumentation of IR spectroscopy. **5+5+4**

(b) How IR spectroscopy is helpful in determination of functional groups ? Explain.

(c) Explain the factors affecting the band shapes and frequencies of IR spectra

3. (a) Discuss the role of solvent in electronic spectroscopy. **5+5+4**

(b) How Woodword-Fischer rule is helpful in structural determination ?

(c) Explain the theory of Mass spectrometry.

4. (a) Write a note on splitting of NMR signals in 1HNMR spectroscopy. **5+5+4**

(b) What is chemical shift ? Explain the electronegativity effect on chemical shift.

(c) Write a note on relaxation process in NMR spectroscopy.

5. (a) Explain the theory of Mössbauer spectroscopy. **5+5+4**

(b) What is 'g' value ? Discuss briefly the factors affecting the g value.

(c) With neat diagram explain the instrumentation of ESR spectroscopy.

6. (a) With a neat diagram explain the instrumentation of UV-Vis spectroscopy. **5+5+4**

(b) With Examples, explain the different modes of vibrations of a molecule in IR spectroscopy.

(c) Explain the Mc-Lafferty rearrangements with example.

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7. (a) With a neat diagram, explain the instrumentation of mass spectrometry. **5+5+4**

(b) With a neat diagram explain the instrumentation of NMR spectroscopy.

(c) Write a note on Isomer shift and quadrapole interactions in Mössbauer spectra.

8. (a) What is red shift and blue shift in UV-Vis spectroscopy ? **5+5+4**

(b) What are stoke's and anti-stokes lines ?

(c) Identify the Proton NMR signals for (i) Ethanol (ii) Benzyl alcohol

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