Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (Chemistry) (2018 Batch) (Sem.-2)

SPECTROSCOPY-II

Subject Code : CHL-414-18

M.Code : 75984

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains EIGHT questions carrying FIVE marks each and students have to attempt any SIX questions.**
3. **SECTION-C will comprise of two compulsory questions with internal choice in both these questions. Each question carries TEN marks.**

SECTION-A

1. Write briefly :

a) What do you understand by Stark effect?

b) Write the number of vibrations in case of pyridine, sulphur dioxide, acetylene and toluene.

c) What is (are) the conditions for Raman active?

d) What is the basic principle of Mossbauer spectroscopy?

e) Why Stokes lines are more intense than anti-Stokes lines?

f) How Nuclear quadrupole resonance (NQR) spectroscopy is different from Nuclear magnetic resonance (NMR) spectroscopy? Explain.

g) What photoelectron spectroscopy is used for?

h) Which types of molecules are used for electron paramagnetic resonance spectroscopy? Explain by giving suitable examples.

i) What do you mean by Krammer's degeneracy?

j) How does X-ray photoelectron spectroscopy (XPS) work?

SECTION-B

2. What are the selection rules for vibrational frequency? Discuss applications of vibrational frequency.

3. Differentiate following :

   a) Overtones and combination bands

   b) Harmonic and anharmonic oscillators

4. State the selection rules for rotation Raman transitions. Derive expression for Stokes' and antistokes' lines.

5. Discuss the principles and applications of Mossbauer spectroscopy.

6. Explain briefly the X-ray photoelectron spectroscopy of nitrogen and oxygen.

7. Write a short note on determination of asymmetry parameter with suitable examples for NQR spectroscopy.

8. What are chemical shifts in XPS? Explain shake up process.

9. Discuss the EPR spectra of methyl radical and pyrazine anion.

SECTION-C

10. Discuss the fundamentals and applications of Nuclear Quadruple Resonance spectroscopy.

OR

Write a short note on higher spin states of Mossbauer spectroscopy.

11. Explain the factors affecting the magnitude of g value.

OR

Differentiate Ultraviolet photoelectron spectroscopy and X-ray photoelectron spectroscopy.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.