

M.Sc.-Chem.-IS-(404)

2019

(January)

Time : 3 hours

Full Marks : 80

The figures in the right hand margin indicate marks.

Answer from both the Sections as per direction.

(Physical Spectroscopy)

Section -A

1. Answer any **four** of the following : (4x4=16)

- (a) Explain Frank-Condon principle.
- (b) Explain various factors effecting IR values.
- (c) Explain selection rule for Raman Spectra.
- (d) Explain isotopic substitution in microwave spectroscopy.
- (e) Charge transfer spectra.
- (f) Auger electron spectroscopy.

OR

2. Answer **all** questions (2x8=16)

- (a) Explain spectra of alkali metal Na⁺
- (b) Explain energies of Molecular orbitals.
- (c) What are overtones ?
- (d) What are combination bands ?
- (e) What is Stark effect ?
- (f) What is ESCA ?
- (g) What are hot bands ?
- (h) What is CARS ?

(Turnover)

(2)

Section -B

Answer **all** questions

(16x4=64)

3. (a) Explain vibrational progressing and electronic spectra of polyatomic molecules.

OR

- (b) Explain the following :

- (i) Geometry triplet state
- (ii) Spectra of H-atom, alkali and atom.

4. (a) Explain Microwave spectroscopy of Non-rigid rotator, applications.

OR

- (b) Explain spin-orbit coupling and Zeeman splitting.

5. (a) (i) Explain about P, Q, R, branches.
(ii) Group frequencies, overtones.

OR

- (b) Explain factors affecting the band positions and intensities for IR - region.

6. (a) Explain classical and quantum theories of Raman effect.

OR

- (b) Explain the following :

- (i) Koopmans thermo photo electronic effect
 - (ii) Chemical information from ESCA.
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