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

Total No. of Questions : 09

M.Sc.(Chemistry) (2015 to 2017) (Sem.–2)

SPECTROSCOPY – I

Subject Code : MSCH-203

Paper ID : [A2802]

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. **Attempt FIVE questions in ALL including the Question No. 1 which is COMPULSORY and selecting ONE EACH from EACH UNIT.**

Q1. Answer briefly :

a) How the Lorentzian shape of a spectral line is different from the Gaussian?

b) Does the sample in the liquid state exhibit rotational spectroscopy?

c) What is meant by group frequency in vibrational spectroscopy?

d) Which of the following will not show IR spectrum?

i) CH_4 ii) CO_2 iii) O_2 iv) Cl_2

e) Indicate characteristic absorptions in 1-Hexyne in IR spectroscopy.

f) Amines absorb at higher wavelength than alcohols in UV. Why?

g) Give all possible electronic transitions in CH_4 and $H_2C = CH_2$?

h) Which type of transitions are considered to be the origin of the charge transfer bands?

i) Give factors on which the flame temperature depends in flame emission spectroscopy?

j) State various transformations in the sample during its analysis in PES? (10×2=20)

UNIT - I

Q2 a) Discuss briefly the computer averaging.

b) What is meant by band width and Doppler broadening?

c) Write a short note on Einstein coefficients in stimulated emission. (7,8,5)

Q3 a) Discuss the prolate symmetric tops. Cite examples.

b) Explain the selection rules of microwave spectroscopy.

c) How do the isotopes effect the transition frequencies in rotational spectrum? Cite examples. (6,6,8)

UNIT - II

Q4 a) Discuss the different types of amidic bonds in vibrational spectroscopy.

b) How intra- and intermolecular H-bonding can be identified by IR spectroscopy?

c) Discuss the instrumentation of IR spectroscopy. (7,5,8)

Q5 a) How polarisation of light is related to Raman spectroscopy? Explain.

b) Give any four applications of Raman spectroscopy.

c) Write a short note on finger printing region of IR spectroscopy. (8,6,6)

UNIT - III

Q6 a) How does the polarity of the solvent effects the position of R-band in electronic spectroscopy?

b) How the chemical reactions can be studied with the help of UV spectroscopy?

c) Account for the significance of extinction coefficient in electronic spectroscopy. (8,7,5)

Q7 a) Discuss Woodward-Fieser rules for unsaturated acyclic compounds with atleast three examples.

b) Write a short note on the shifts observed in $\lambda_{max.}$ Values in electronic spectroscopy.

c) How do the conjugation affects the position of UV bands? Cite examples. (8,6,6)

UNIT- IV

Q8 a) Briefly discuss the atomisation of samples in graphite furnace.

b) Describe the chemical and ionisation interferences in atomic absorption spectroscopy.

c) Discuss the instrumentation of ICP. (6,6,8)

Q9 a) What are the factors affecting the intensity of emitted radiation in Flame photometry? Explain.

b) What is the principle of plasma emission spectroscopy? Discuss.

c) Enumerate the applications of Luminescence spectroscopy for inorganic compounds. (8,4,8)