

M.Sc.(Physics) (CBCS Pattern) Sem-III
PSCPHYT12-1 - Paper-XII - Foundation Course F1.1 : Fundamentals of Spectroscopy

P. Pages : 1

Time : Three Hours



GUG/W/22/11304

Max. Marks : 80

Either :

1. a) Explain how atomic states are represented by L-S and J-J coupling schemes using vector diagrams. 8
b) Describe Stern-Gerlach experiment. Show how it verifies the principle features of vector atom model. 8

OR

- e) With the help of Schrodinger wave equation, discuss the atomic energy levels of hydrogen atom. 8
f) Explain normal and anomalous Zeeman effect. 8

Either :

2. a) Discuss Born Oppenheimer approximation. 8
b) Explain rotational spectra of rigid diatomic molecules. 8

OR

- e) Explain Fourier transform infrared spectroscopy. 8
f) Discuss the salient features of vibrational rotational spectra. 8

Either :

3. a) What is Raman effect? Explain the theoretically observed characteristics of Raman spectrum of a diatomic molecule. 8
b) How are Raman spectra studied in the laboratory. 8

OR

- e) Discuss the effect of polarizability of the molecule on the Raman spectra. 8
f) Discuss the pure rotational Raman spectra. 8

Either :

4. a) State and explain Franck Condon principle. 8
b) Discuss the rotational fine structure of electronic vibrational transitions. 8

OR

- e) What is Fortrat Parabola? Explain in detail. 8
f) Discuss the phenomenon of fluorescence and phosphorescence. 8

5. Answer all the followings.

- a) Explain Stark effect in one electron system. 4
b) What are the advantages of FTIR spectrophotometer over conventional IR spectrophotometer? 4
c) A substance shows Raman line at 4567 \AA when exciting line 4358 \AA is used. Discuss the positions of Stoke's and Antistoke's line for the same substance when exciting line 4047 \AA is used. 4
d) Explain dissociation energy of diatomic molecule. 4
