M.Sc. (Physics) Third Semester

MSc231011 - Elective-I - Spectroscopy-I Paper-XI

P. Pages : 1 **GUG/W/18/2311**

Time : Three Hours * 1 8 0 5 * Max. Marks : 80

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1. Either

a) Explain the theory of stark effect. Components of H_α – line of H_2 – molecule. **8**

b) Explain penetrating and non-penetrating orbits of valence electrons. **8**

OR

e) Explain Zeeman effect and discuss the theory of anomalous Zeeman effect. **8**

f) What is Paschen Back effect? In what way it is different from anomalous Zeeman effect. **8**

2. Either

a) What is Doppler effect? Explain Doppler broadening with suitable examples. **8**

b) Explain Saha's theory of ionization and it's application in Astrophysics. **8**

OR

e) Derive wave equation for many electron atom. **8**

f) How complex spectra explains hyperfine structure? Explain it. **8**

3. Either

a) Discuss Raman spectra of vibrating and rotating diatomic molecule. **8**

b) Explain non rigid rotator energy level. **8**

OR

e) Explain the quantum mechanical treatment of vibration and rotation spectrum of diatomic molecule. **8**

f) How an anharmonic oscillator describes vibrational energy levels of diatomic molecule? Explain it. **8**

4. Either

a) Discuss intensities of rotational, vibrational spectra of diatomic molecules. **8**

b) Explain Isotopic effect in rotational and vibrational spectra of a diatomic molecule. **8**

OR

e) Describe the vibrational spectra of polyatomic molecules. **8**

f) Discuss Hund's Rule of maximum multiplicity. What is the basis of hund's rule. **8**

5. Answer all the followings:

a) Write short note on normal and inverted terms. **4**

b) Explain meaning of asymmetric and pressure shift in broadening of spectral line. **4**

c) What is Morse Potential? **4**

d) Describe the symmetric top molecules. **4**

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