M.Sc. S.Y. (Physics) (CBCS Pattern) Semester-III

PSCPHYT11-3 - Core Elective Paper-XI - Atomic and Molecular Physics-I

P. Pages : 2 **GUG/S/25/11300**

Time : Three Hours * 1 3 4 8 * Max. Marks : 80

Either :

1. a) Explain Quantum states of an electron in an atomic electron spin. **8**

b) Explain the concept of NMR spectroscopy. **8**

OR

e) Explain the Mossbauer effect of x-rays. Describe its experimental techniques. **8**

f) How the magnetic field generate the effective role in hyperfine interactions. **8**

Either :

2. a) Explain construction and working of He-Ne laser. **8**

b) What is spontaneous and stimulated emission. Obtain the relation between Einstein A & B coefficients. **8**

OR

e) Explain the principle of E. S. R. Write the experimental techniques. **8**

f) Explain three and four level laser systems. **8**

Either :

3. a) Explain Raman effect. Describe the experimental set-up to study it outline the theory of Raman effect. **8**

b) Explain rotational and vibrational energy of diatomic molecules. **8**

OR

e) Explain molecular polarizability. **8**

f) Explain intensity alteration in Raman spectra of diatomic molecules. **8**

Either :

4. a) Explain electronic spectra of diatomic molecules. **8**

b) Explain Franck – Condon principle with its application. **8**

OR

e) Discuss Born-Oppenheimer approximation. **8**

f) Explain the general treatment of molecular orbitals. **8**

5. Answers all the followings.

a) Explain chemical shift. **4**

b) Explain Paschen back effect. **4**

c) Explain Hund's rule. **4**

d) Discuss dissociation and pre-dissociation. **4**

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