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

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

P. Pages : 2 **GUG/W/23/11300**

Time : Three Hours Max. Marks : 80

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Either:

1. a) Discuss basic principles of interaction of spin and applied magnetic field. **8**

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

OR

e) Explain the concepts of NMR Spectroscopy. **6**

f) Discuss the terms spin – spin and spin – lattice relaxation. **6**

g) Explain chemical shift. **4**

Either:

2. a) Explain three and four level laser systems. **6**

b) Explain construction and working of He-Ne laser. **6**

c) Explain coherence length. **4**

OR

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

f) Write a note on width of spectral lines. **6**

g) Explain the terms LS and JJ coupling. **6**

Either:

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

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

OR

e) Explain Molecular polarizability. **6**

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

g) Discuss Raman effect on the basis of Quantum theory. **6**

Either:

4. a) Explain Franck Condon principle with its application. **8**

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

OR

e) Discuss electronic spectra of diatomic molecules. **6**

f) Explain dissociation and pre-dissociation. **4**

g) Explain Born-Oppenheimer approximation. **6**

5. Answer all the followings.

a) Explain spin – spin interaction in NMR. **4**

b) Explain in detail diode laser. **4**

c) Write a note on Raman Effect. **4**

d) Discuss vibrational coarse structure of electronic bands. **4**

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