SESSIONAL EXAMINATION-2021

CHEMISTRY

PAPER M 6.1 (SPECTROSCOPY) **Total Marks:30**

1. Considering a polar diatomic molecule to be a non rigid rotator, deduce an expression for the energy absorbed in the allowed rotational transitions. Draw schematic diagram to show the difference in the spectrum from that of a rigid rotator. 4+1 = **5**

2. Distinguish between emission and absorption spectra. State spectroscopic displacement law. Why the magnitude of energy of electron in all the energy levels of an atom should decrease by a factor of 0.99945. 3+2=**5**

3. Consider a diatomic molecule to be an anharmonic oscillator and write its energy as wave number. Deduce the expression for energy needed for allowed vibrational transitions. Indicate fundamental absorption and overtones. **5**

4. Discuss Franck-Condon principle to explain intensities of vibronic transitions due to absorption or emission of a photon of appropriate energy. **5**

5. Write the difference between fluorescence and phosphorescence. **5**

6. Which of the following systems will show ESR spectrum? Give reasons : **5**
   i. H
   ii. Na^+
   iii. $\cdot CH_3$
   iv. NO_2
   v. H_2