TYBSC Physics Paper III (Atomic Physics) Sample Questions

1 Which of the statement is incorrect in case of Raman Effect?
a) Raman shift is a characteristic of the substance
b) Raman shift is dependent on the frequency of the incident radiation
c) Raman lines are polarized
d) Raman Effect is seen in homonuclear molecules also
2) For Carbon dioxide which of the statement is incorrect?
a) vibrational mode v_2 is Raman active
b) vibrational mode v_2 is IR active
c) vibrational mode v_3 is IR active
d) vibrational mode υ_1 is IR inactive
3) A Stokes line of wavelength 5540A was observed in a Raman Spectra when radiation of wavelength 5460 A was scattered by a medium . The frequency shift is
a) $7.93 \times 10^{14} \text{Hz}$
b) $7.93 \times 10^{12} \text{Hz}$
c) 79. $3 \times 10^{12} \text{Hz}$
d) $793 \times 10^{12} \text{Hz}$
4) Which of these properties must change for a mode to be Raman active?
a) Volume
b) Dipole moment
c) Polarisability
d) Mass
5) One of them is not a spherical top molecule:

a) Carbon Tetrachloride

b) Sulphur Hexafluoride
c) Methane
d) Carbon dioxide

a)	Equispa	ed ener	ov level:	S

- b) random difference in the energy levels
- c) Not equispaced energy levels
- d) difference in the energy levels = 2 times a constant

2)	If the rotational energy of the rigid rotator model of diatomic molecule is	$E_J = \frac{6\hbar^2}{2I}$, then
	the value of rotational quantum number $I = $	

- a) 0
- b) 1
- c) 2
- d) 3

3) _____ will exhibit rotational spectrum

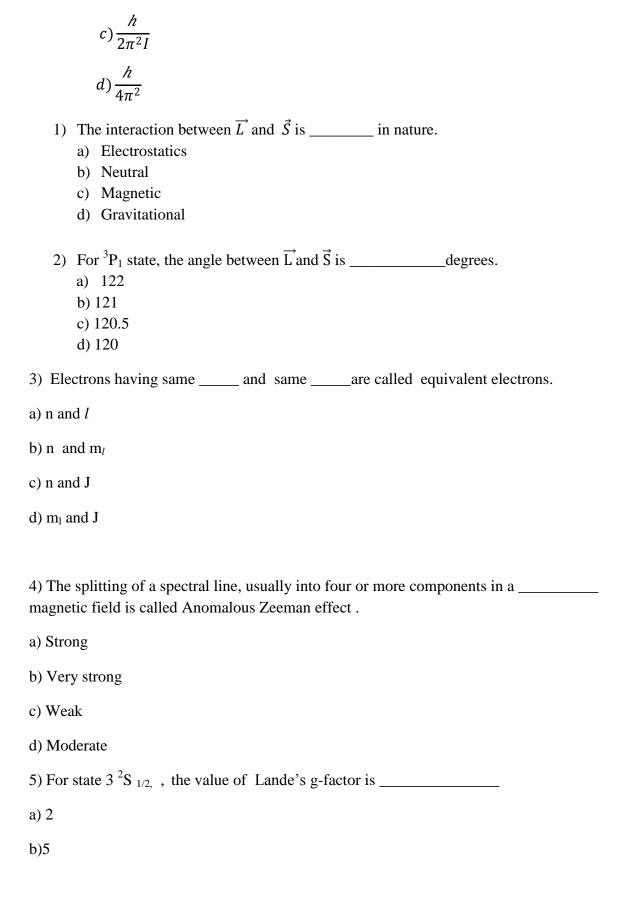
- a) CO
- b) O₂
- c) N₂
- d) H_2

4) Transitions between vibrational levels in diatomic molecules as SHO are restricted by the following _____ Selection rule :

- a) $\Delta v = 0$
- b) $\Delta v = \pm 1$
- c) $\Delta v = \pm 2$
- $d) \Delta v = \pm 3$

5) The frequency spacing between adjacent lines in P and R branches of Vibration-Rotation Spectra is _____

- a) $\frac{2h}{4\pi^2 I}$ b) $\frac{h}{4\pi^2 I}$



d)1.23

- 1) The Φ -part solution of the schrodinger's equation for hydrogen atom is _____
- a) $\Phi = Ae^{im_l\phi}$
- b) $\Phi = Ae^{i2\pi\phi}$
- c) $\Phi = Ae^{m_l\phi}$
- d) $\Phi = Ae^{i2\pi m_l \phi}$
- 2) The Orbital angular momentum of a hydrogen atom is_____
- a) Quantized in magnitude
- b) Quantized in direction
- c) Quantized in magnitude as well as direction
- d) Is not quantized
- 3) In Stern- Gerlach experiment, the magnetic field used was_____
 - a) Homogenous
- b) Non homogenous
- c) Function of time
- d) Parallel to beam of silver atoms
- 4) The gyromagnetic ratio for an electron's orbital motion is given by _____

a)
$$g_l = \left(\frac{e}{2m}\right)$$

b)
$$g_l = -\left(\frac{e}{2m}\right)$$

c)
$$g_l = -\left(\frac{e}{m}\right)$$

d)
$$g_l = \left(\frac{e}{m}\right)$$

- 5) Which of the statement is incorrect?
 - a) The zenith probability density varies with angle Θ for all states with non zero orbital quantum number
 - b) The probability densities for all states are spherically symmetric
 - c) The zenith probability density for zero orbital quantum number is $\frac{1}{2}$
 - d) The azimuthal probability density is a constant