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SUBJECT CODE NO:- B-2151
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. T.Y (Sem-VI) Examination OCT/NOV 2019
Physics Paper-XIX
(Atomic Molecular Physics & Laser)

[Time: 1:30 Hours] **[Max.Marks:50]**

Please check whether you have got the right question paper.

N.B i) Solve all questions.
ii) Draw the neat diagram whenever necessary

Q.1 (a) Explain origin of spectral lines and hence discuss the series of spectrum of hydrogen atom using Bohr's theory. 10

(b) Explain normal Zeeman effect and Stark effect. Discuss importance of these effects. 10

OR

(a) Explain Raman effect and Raman shift. Write down applications of Raman effect. 10

(b) Give the principle construction and Working of Ruby Laser. Write down its applications. 10

Q.2 A (i) Write short notes on Bohr atom model. 05

(ii) Calculate the velocity of electron in first Bohr orbit of radius $0.53A^{\circ}$.(Mass of electron $= 9.1 \times 10^{-31}kg$ Planck's constant = $6.63 \times 10^{-34}J-S$. 05

B (i) Write short notes on Rayleigh Law of Scattering. 05

(ii) Find the bond length of a molecule of moment of inertia $4.5 \times 10^{-45}Kgm^2$ and reduced Mass $1.62 \times 10^{-27}\ Kg$. 05

OR

Q.2A (i) Write a short note on vector atom model.

(ii) Find the change in wavelength between modified lines and unmodified lines of wavelength $4000A°$ when magnetic induction of 2.5 T is applied in normal Zeeman effect. 05

B (i) Write a short note on population inversion 05

(ii) Calculate the change in electron energy transferred to atom in order to stimulate the emission of light of wave length $3000A°$. (Planck'Ss constant 6.63×10^{-34} J -S velocity of light $3 \times 10^{8}m/s$) 05

Q.3 Choose the Correct answer 05 10

1. The frequency of one photon of wavelength 5000 A.U is

(a) $6 \times 10^{15} H_z$ (b) $6 \times 10^{14} H_z$ (c) $0.6 \times 10^{12} H_z$ (d) $3 \times 10^{14} H_Z$.

2. Which of the following is example of optical pumping

(a) He – Ne laser (b) Ruby laser
(c) Semiconductor laser (d) Dye laser.

3.The ratio of energy of rotational level for J=1 to J=2 is

(a) 2:1 (b) 1:2 (c) 1:3 (d) 4:1

4. The energy of diatomic molecules in ground state is

(a) zero (b) Infinite (c) positive (d) Negative

5. According to Rayleigh scattering law Intensity of scattered Light is proportional to

(a) λ (b) $\frac{1}{\lambda}$ (c) λ^4 (d) $\frac{1}{\lambda^4}$

6. In L - S coupling for three electrons system S values are

(a) 1 and 1 (b) 2 and 1 (c) $^3/_2$ and $^1/_2$ (d) 3 and 1

7. Magnetic Quantum number for spin can have values.

(a) 1 (b) $+\frac{1}{2}$ (c) $-^1/_2$ (d) $+^1/_2$ and $^{-1}/_2$

8. Velocity of electron in Bohr orbit is proportional to

(a) n (b) n^2 (c) $\frac{1}{n^2}$ (d) $\frac{1}{n}$

9. Shortest Wave length for Balmer Services of Hydrogen Spectra.

(a) R (b) $\frac{1}{R}$ (c) $^R/_4$ (d) $^4/_R$

10. Plum- pudding atom model is suggested by

(a) Rutherford (b) Thomson
(c) de-Broglie (d) Dalton.