

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2022
(Third Semester)

Branch – PHYSICS

ATOMIC, MOLECULAR AND LASER PHYSICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

1. Identify Zeeman effect is the splitting of spectral line in the presence of

- (i) Electric field (ii) Magnetic field
(iii) inert environment (iv) vacuum

2. Einstein's photoelectric equation is _____.

- (i) $h\nu = h\nu_0 + \frac{1}{2}mv^2$ (ii) $h\nu_0 = h\nu + \frac{1}{2}mv^2$
(iii) $h\nu = +\frac{1}{2}mv^2$ (iv) $h\nu = h\nu_0 - \frac{1}{2}mv^2$

3. Mention the Bragg's law will have no solution, if _____.

- (i) $\lambda > 2d$ (ii) $\lambda < 2d$
(iii) $\lambda < d$ (iv) $\lambda = d$

4. Find the IR absorbance A=

- (i) $\text{Log}_{10}(T)$ (ii) $\text{Log}_{10}\left(\frac{1}{T}\right)$
(iii) $\text{Log}_e(T)$ (iv) $\text{Log}_e\left(\frac{1}{T}\right)$

5. The wavelength of ruby laser is -----A°.

- (i) 6493 (ii) 7493
(iii) 6943 (iv) 7943

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

6 a. Describe the effect of nuclei motion on atomic spectra.

OR

b. Compare normal Zeeman effect and anomalous Zeeman effect.

7 a. Explain the Photovoltaic cell.

OR

b. Explain the coupling schemes.

8 a. Derive Bragg's law. What is the importance of Bragg's law?

OR

b. Describe the Laue's method of studying crystal structure.

Cont...

- 9 a. State and explain Beer- Lambertz law.
OR
b. Discuss the applications of UV spectroscopy.
- 10 a. Explain laser energy requirements.
OR
b. Explain the medical applications of laser.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a. Outline the quantum theory of Zeeman effect.
OR
b Analyze the experimented determination of critical potential.
- 12 a State Stark effect. Discuss the experimental results of stark effect
OR
b Explain the experimental verification of Einstein's photoelectric equation.
- 13 a Discuss the construction of Bragg's spectrometer.
OR
b What is Compton effect? Discuss the experimental verification of Comptonscattering.
- 14 a Outline the instrumentation of Raman spectroscopy and discuss the characteristics of Raman lines.,
OR
b Discuss the instrumentation of IR spectrometers.
- 15 a Outline the principle construction and working of ruby laser.
OR
b Explain the principle construction and working of He-Ne laser.

Z-Z-Z

END