

B.Sc. Semester - 5 (Remedial) (CBCS) Examination**March/April-2023 (NEW COURSE)****Spectroscopy and Optics(Core)****Time: 2:30 Hours****Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1(a) Answer the following question (any two). (10)

- (1) Write note on Bohr's theory of an atom.
- (2) Explain Franck-Hertz experiment.
- (3) Explain experimental study of Zeeman effect.

Q.1(b) Answer the following question (any one). (04)

- (1) Write a short note on Sommerfeld elliptical orbits.
- (2) Write short note on Stark effect.

Q.2(a) Answer the following question (any two). (10)

- (1) Write a note on experimental study of molecular spectra.
- (2) Explain theory of pure rotational molecular spectra.
- (3) Explain observation of Raman spectra.

Q.2(b) Answer the following question (any one). (04)

- (1) Explain theory of electronic band molecular spectra.
- (2) Explain structure determination from Raman spectroscopy.

Q.3(a) Answer the following question (any two). (10)

- (1) Explain production of x-ray.
- (2) Describe Bragg's spectrometer.
- (3) Write a note on powder crystal method.

Q.3(b) Answer the following question (any one). (04)

- (1) Write properties of x-rays.
- (2) An x-ray tube operating at 50 kv produces continuous x-ray spectrum.
If $h=6.624 \times 10^{-34}$ Js, $e=1.6 \times 10^{-19}$ coulomb and $c=3 \times 10^8$ m/s. Find the short wavelength limit.

Q.4(a) Answer the following question (any two). (10)

- (1) Write a note construction and working of Michelson's interferometer.
- (2) Explain the Twyman and Green interferometer.
- (3) Discuss about Fabry-Perot interferometer.

Q.4(b) Answer the following question (any one). (04)

- (1) Write any two applications of Michelson interferometer.
- (2) Explain Lummer and Gehrcke plate with neat diagram.

Q.5(a) Answer the following question (any two). (10)

- (1) Explain any two types of production of plane polarized light.
- (2) Write a note on double refraction in calcite prism.
- (3) Describe applications of polarized light.

Q.5(b) Answer the following question (any one). (04)

- (1) State and prove Malus law.
- (2) Write a short note on effect of polarizer on light of different polarization.
