

B.Sc. Semester - 6 (CBCS) Examination
May/June-2021 (OLD COURSE)
SPECTROSCOPY AND APPLIED OPTICS(CORE)

Time: 1:30 Hours**Marks: 42****Instructions:**

1. Figure to the right indicate marks.
 2. There are five questions in the question paper.
 3. Answer any three of the following questions.
-

Q.1(A) Answer The Following Questions. (Any One Out of Two) (07)

1. Explain quantum numbers and their physical interpretation.
2. Give the classical interpretation of normal Zeeman effect.

Q.1(B) Answer The Following Questions. (Any One Out of Two) (04)

1. Explain the space quantization.
2. Explain Stark effect.

Q.1(C) Answer The Following Questions. (Any Three Out of Five) (03)

1. Band spectra is also known as _____ spectra.
2. The anomalous Zeeman effect occurs in _____ magnetic field.
3. When a single spectral line is split up into three components is known as _____ Zeeman effect.
4. The action of electric field on the spectrum is known as _____ effect.
5. _____ component is absent in parallel view of Zeeman effect.

Q.2(A) Answer The Following Questions. (Any One Out of Two) (07)

1. Explain the theory of pure rotational spectra.
2. Explain quantum theory of Raman Effect.

Q.2(B) Answer The Following Questions. (Any One Out of Two) (04)

1. Explain the theory of Electronic band spectra.
2. Give the applications of Raman spectra.

Q.2(C) Answer The Following Questions. (Any Three Out of Five) (03)

1. Molecular spectra are produced by the substance when it is in _____ state.
2. A band has a sharp intense edge on one side is called _____.
3. Raman lines are strongly _____.
4. Line frequency is always _____ then the incident frequency for fluorescence spectra.
5. In Raman spectra, the lines of same frequency as the incident beam is also known as _____ lines.

Q.3(A) Answer The Following Questions. (Any One Out of Two) (07)

1. What is pumping? Discuss the three level and four level pumping schemes.
2. Explain the construction and working of Ruby laser.

Q.3(B) Answer The Following Questions. (Any One Out of Two) (04)

1. Discuss: Laser in industry.
2. Explain LIDAR.

- Q.3(C) **Answer The Following Questions. (Any Three Out of Five)** (03)
1. Write full form of LASER.
 2. In Ruby laser _____ ions are active centres.
 3. In spontaneous emission, emitted light is monochromatic. (True/False)
 4. _____ is the process of supplying energy to the laser medium.
 5. He-Ne laser is a _____ laser.
- Q.4(A) **Answer The Following Questions. (Any One Out of Two)** (07)
1. With neat diagram explain Bragg's spectrometer.
 2. Obtain Brillouin zones for bcc lattice.
- Q.4(B) **Answer The Following Questions. (Any One Out of Two)** (04)
1. Write the properties of X-rays.
 2. Explain Bragg's law.
- Q.4(C) **Answer The Following Questions. (Any Three Out of Five)** (03)
1. X-rays produce chemical effect on photographic plate. (True/False)
 2. X-rays having energy more than _____ Mev are capable of producing electron-positron pair.
 3. Formation of lane spots can be explain with the help of _____ law.
 4. Give the expression for Bragg's law.
 5. The intensity of continuous spectrum increases at all wavelengths as the accelerating voltage_____.
- Q.5(A) **Answer The Following Questions. (Any One Out of Two)** (07)
1. Derive the expression for acceptance angle of the optical fibre.
 2. Draw the block diagram of fibre optics communication system and discuss the function of its components.
- Q.5(B) **Answer The Following Questions. (Any One Out of Two)** (04)
1. Give medical applications of optical fibre .
 2. Explain total internal reflection.
- Q.5(C) **Answer The Following Questions. (Any Three Out of Five)** (03)
1. Core is surrounded by a co-axial middle region known as the_____.
 2. The phenomenon in which light is totally reflected from denser to rarer medium boundary is known as_____.
 3. Fractional refractive index is of the order of_____.
 4. _____is used as a source of light in optical fibre.
 5. _____mode fibre has the core diameter of the order of 8 to 12 μm .
