

B.Sc. Semester - 6 (CBCS) Examination
March/April-2024 (OLD COURSE)
SPECTROSCOPY AND APPLIED OPTICS(CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

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

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- Que.1(A) Answer the following question. (any one) (07)
1. Write a note on quantum numbers and their physical interpretation.
 2. Explain in brief: Paschen-Back effect.
- Que.1(B) Answer the following question. (any one) (04)
1. Write a short note on Franck-Hertz experiment.
 2. Explain experimental study of Zeeman effect.
- Que.1(C) Answer the following question. (any three) (03)
1. When the matter in bulk heated, it emits spectra.
 2. Wein's displacement law is, $\lambda_m T = \dots\dots\dots$
 3. The band spectra are produced when emitting substance is in the state.
 4. The value of photon energy for Hg atoms returning to their normal state is eV.
 5. When single line is split up into three components under effect of magnetic field is known as Zeeman effect.
- Que.2(A) Answer the following question. (any one) (07)
1. write a note on experimental study of molecular spectra.
 2. Explain classical theory of Raman effect
- Que.2(B) Answer the following question. (any one) (04)
1. Write a short note on rotational-vibrational spectra.
 2. Explain observation of Raman spectra.
- Que.2(C) Answer the following question. (any three) (03)
1. The intensity gradually decreases from in molecular spectra.
 2. A close and regular arrangement of different groups of bands, forming a system.
 3. The band spectra is the most complex type of molecular spectra.
 4. If $\Delta\nu$ is positive, Raman spectra is said to consist of lines.
 5. Raman lines are strongly
- Que.3(A) Answer the following question. (any one) (07)
1. Write a note on three basic radiation process in Laser.
 2. Explain population inversion and pumping process in Laser.
- Que.3(B) Answer the following question. (any one) (04)
1. Write a short note on Ruby laser.
 2. Explain Nd-YAG laser.
- Que.3(C) Answer the following question. (any three) (03)
1. Give full form of Laser.
 2. Relation between photon energy E and frequency f is $E = \dots\dots\dots$
 3. The radiation which has only one wavelength is called
 4. For Einstein coefficients, $\frac{B_{21}}{B_{12}} = \dots\dots\dots$
 5. Laser used in CD players.

- Que.4(A) Answer the following question. (any one) (07)
1. Explain Bragg's spectrometer.
 2. Explain rotating crystal method.
- Que.4(B) Answer the following question. (any one) (04)
1. Explain production of X-rays.
 2. Write a short note on Laue method.
- Que.4(C) Answer the following question. (any three) (03)
1. When ever matter is bombarded by high velocity electrons, are produced.
 2. X-rays causein many substances like barium, cadmium, zinc sulphide etc.
 3. The short wavelength limit of the spectrum of X-ray is independent of the element of the
 4. The intensity of the continuous spectrum of X-rays increases when tube voltage
 5. Write equation for Bragg's law.
- Que.5(A) Answer the following question. (any one) (07)
1. Explain acceptance angle in optical fibre.
 2. Describe types of optical fibres.
- Que.5(B) Answer the following question. (any one) (04)
1. Explain optical fibre.
 2. Write a short note on fibre optic communinaction.
- Que.5(C) Answer the following question. (any three) (03)
1. An optical fibre consists of concentric elements.
 2. In fractional refractive index, Δ will be
 3. Snell's law is given by $n_1 \sin \phi_1 = \dots\dots\dots$
 4. The relative difference in the refractive indices of core and cladding is known as refractive index.
 5. The dimation of numerical aperture is
