B.Sc. DEGREE EXAMINATION,APRIL 2020
III Year VI Semester
Spectroscopy and Laser Physics

Time : 3 Hours **Max.marks :60**

Section A $(10 \times 1 = 10)$ Marks

Answer any **TEN** questions

1. How to characterize the wave in terms of its wavelength?
2. Write the different regions of electromagnetic spectrum.
3. Show that the energy of CO_2 as the bond is compressed or extended.
4. What is meant by overtones?
5. State the rule of mutual exclusion.
6. Define: Moleucular polarizability.
7. Give any two characteristics of LASER.
8. Write any four applications of LASER.
9. What is holography?
10. Write any two applications of holography.
11. What are sources of IR radiations?
12. Write the characteristics of Raman lines.

Section B $(5 \times 4 = 20)$ Marks

Answer any **FIVE** questions

13. Obtain the rotational energy levels allowed to the rigid diatomic molecules.
14. Explain the instrumentation details of UV-visible spectrometer with suitable diagram.
15. Write a note on energy levels and selection rules for pure rotational Raman spectra.
16. Explain stimulated absorption and stimulated emission in laser process.
17. Explain how a hologram is prepared and viewed.
18. Obtain the vibrational energy levels and allowed transitions for a diatomic molecules undergoing simple harmonic motion.
19. Explain the molecular polarizability based on quantum theory of Raman effect.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Discuss the basic elements of emission and absorption spectroscopy with its block diagrams.
21. Discuss the techniques and instrumentation details of a double beam IR spectrometer.
22. Explain the instrumentation detail of Raman spectrometer for structure determination.
23. Deduce the Einstein coefficients and threshold condition for laser action.
24. Explain the theory of reconstruction of wavefront in holography.

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