QP CODE: 24806170

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Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, DECEMBER 2024

Fifth Semester

INTEGRATED MSC BASIC SCIENCE-PHYSICS

CORE - IPH5CR02 - ATOMIC AND MOLECULAR PHYSICS - I

2021 Admission Onwards

6FA6E61E

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Differenciate absorbtion and emission spectra.
2. What is the direction of spin magnetic moment of an electron with respect to spin angular momentum?
3. What is spin orbit coupling?
4. What is LS coupling?
5. Can we obtain a pure vibrational spectrum for a molecule? Explain.
6. What is fluorescence?
7. What are the applications of Raman spectroscopy?
8. What is hyperfine structure?
9. What is NMR?
10. Distinguish between spin lattice and spin -spin relaxations.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Calculate a) Wavenumber b)Wavelength c)Frequency of the Hα line of Hydrogen
12. Find the wavelength of spectral line that corresponds to a transition in hydrogen atom from n=10 state to ground state in what part of the spectrum is this ?

13. Sketch the vector model for l=3 and l=4 for all possible values of Lz

14. Classify different types of molecules on the basis of moment of inertia.

15. The rotational constant for H35Cl is found to be 10.5909 cm-1. What is the value of B for H37Cl and for D35Cl ?

16. What is Microwave Spectrometer? Explain its basic functions with schematic representation.

17. What is ESR Spectrometer? Explain its basic principle and components required.

18. A free Electron is placed in a magnetic field of strength 1.3 T . Calculate the resonance frequency if g=2.0023

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. What is hyperfine structrure? Explain fine structure of sodium D lines

20. Explain quantum theory of anomalous zeeman effect

21. Explain IR Spectrometer with a neat diagram.

22. What is ESR Spectroscopy? Explain its basic principles and instrumentation.

(2×5=10 weightage)