



23105168

QP CODE: 23105168

Reg No :

Name :

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS,

MARCH 2023

Sixth Semester

CORE COURSE - PH6CRT10 - RELATIVITY AND SPECTROSCOPY

Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications & B.Sc Physics Model III Electronic Equipment Maintenance

2017 Admission Onwards

69149079

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. Explain newtonian relativity.
2. Write the two assumptions of Galilean transformation equations.
3. Write the final expression for the addition of velocities.
4. State the principle of equivalence in general theory of relativity.
5. Briefly describe the Quantum theory of radiation.
6. What is meant by 'stationary' orbits for an electron?
7. What are the new concepts introduced by the vector atom model?
8. Write all the possible values of the quantum number J of an atom for which $L=3$ and $S=1$.
9. Write the selection rules for a rotational and vibrational transition of a diatomic molecule.
10. How fluorescence and phosphorescence occur in molecules?
11. CH_4 do not show IR or Microwave spectrum. But it shows Raman spectrum. Justify your answer.



12. Write any two medical applications of NMR.

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Calculate the length of rod of length one meter moving with a speed of $2.5 \times 10^8 \text{ m/s}$.
14. Find the total energy of neutron whose momentum is 1.2 GeV.
15. Calculate the KE of an electron moving with a velocity of 0.98 c in the laboratory system.
16. Explain Thomson's model of atom.
17. Write a note on orbital and spin magnetic moment of an electron.
18. How strong is LS coupling in Paschen-Back Effect?
19. [a] What is meant by the term induced dipole moment? [b] Give the expression for induced dipole moment of a molecule exposed to external radiation.
20. With a help of a neat diagram explain the working of a microwave spectrometer.
21. Explain the theory of ESR and the construction of ESR spectrometer.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Describe Michelson-Morley experiment and explain the results.
23. Derive the basic equation of Lorentz transformation and prove that at very low velocity the Lorentz transformation equation reduces to Galilean transformation equations.
24. What is anomalous Zeeman effect? Explain it using vector atom model.
25. Explain the rotational spectrum of diatomic molecules. How much the spectral lines are separated and how the intensity of the lines varies with temperature.

(2×10=20)

