24000633

QP CODE: 24000633

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, MARCH 2024

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

EBFE4EDB

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. Discuss the concept of space and time in the special relativity theory.
4. Write the expression for relativistic kinetic energy.
5. What is the range of visible spectrum? Why is it called so?
6. What does the principal quantum number indicate?
7. In the case of Sodium D lines, give the transitions and selection rules applied.
8. Graphically represent the precession of L and S vectors around the magnetic field in the case of Paschen-Back Effect.
9. Distinguish between absorption spectrum and emission spectrum.
10. Describe the occurrence of stokes and anti- stokes lines based on quantum theory.
11. Write any two medical applications of NMR.
12. Why microwave source and techniques have to be applied for the observation of ESR?

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. Show that for values of v << c, Lorentz transformation reduces to the Galilean transformation.

14. How fast should a rocket ship move relative to an observer in order that one year on it may correspond to two years on the earth.

15. At what speed does the kinetic energy of a particle equal its rest energy?

16. Explain why the laws of classical Physics fail in describing an atom?

17. Explain the Hydrogen spectrum based on Bohr atom model.

18. State Pauly's exclusion principle. What are the consequences of this principle?

19. For a HCl molecule which among the following transitions are allowed between the rotational energy levels. Substantiate your answer. (a) J=0 to J=2, (b) J=1 to J=2, (c) J=3 to J=2, (d) J=4 to J=2

20. Explain the rotational vibrational spectra of a molecule.

21. With neat diagram explain the experimental setup to observe Raman effect.

(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 law of addition of velocities using Lorentz transformation equations.

24. What type of Zeeman effect is observed when a weak magnetic field is applied to Sodium atom? Explain this quantum mechanically. What will happen to this spectrum if magnetic field is continuously increased?

25. Explain the main components of Raman spectrometer? Why do Laser sources are preferred over other conventional sources?

(2×10=20)