G – 4042

Reg. No. : ....

Name : ....

Fourth Semester B.Sc. Degree Examination, July 2019

First Degree Programme under CBCSS

Complementary Course

PY 1431.2 : ATOMIC PHYSICS, QUANTUM MECHANICS AND ELECTRONICS

(for Chemistry and Polymer Chemistry)

(2013 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in one or two sentences. **Each** question carries **1** mark.

1. Specify the possible quantum transitions in Balmer series.

2. How the angular momentum and magnetic dipole moment of an orbiting electron are directed.

3. Write down the electronic configuration of Magnesium.

4. What distinguishes a Type I and Type II superconductors?

5. Write the form of normalization condition for a wave function ψ.

6. What is the relation between wave function and probability density?

7. If the wavelength of an electromagnetic wave is about the size of the diameter of an apple, what type of radiation is it?

P.T.O.

8. Which type of diode is used for voltage regulation?

9. Which is the most lightly doped region in a transistor?

10. Which of the transistor configuration is generally used for impedance matching?

<div align="right">(10 × 1 = 10 Marks)</div>

SECTION – B

Answer any **eight** questions not exceeding a paragraph. **Each** question carries **2** marks.

11. State Bohr's correspondence principle.

12. Write how the orbital quantum number is related to orbital angular momentum of an electron.

13. Prove that K-shell can have only two electrons according to Pauli's exclusion principle.

14. What is Critical field regarding superconductivity.

15. Write any two applications of superconductors.

16. What are inadequacies of Classical Physics?

17. What are essential properties of an acceptable wave function?

18. Describe Planck's hypothesis.

19. Explain the ripple factor of a rectifier? Compare the ripple factors of a half wave and full wave rectifiers.

20. Write two properties of zener diode which makes it unique against an ordinary diode.

21. Which of the transistor configuration is mostly preferred and why?

22. Draw frequency response curve of a CE amplifier and indicate band width.

<div align="right">(8 × 2 = 16 Marks)</div>

SECTION – C

Answer any **six** questions. **Each** question carries **4** marks.

23. Discuss the spectral series of hydrogen atom using energy level diagram.

24. Explain L-S coupling in atoms.

25. Discuss the isotope effect of superconductors.

26. Find normalization constant A for the wave function $\psi = Ae^{im\phi}$ for $\phi = 0$ to 2π.

27. Obtain steady state form of Schrodinger equation.

28. Write a short note on NMR and ESR spectroscopy.

29. Explain the forward and reverse biasing of a junction diode, define knee voltage and breakdown voltage.

30. Discuss about the voltage divider bias in amplifier circuits.

31. For a transistor circuit, the values of base current and collector current are $40\,\mu A$ and 0.00196A. Find α and emitter current.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. Discuss the vector atom model and the associated quantum numbers.

33. Describe the energy and wave function quantization of a particle in a potential box.

34. Discuss about the six spectroscopic regions in electromagnetic spectrum.

35. Explain an *npn* transistor. Describe the input and output characteristics of a transistor in common base configuration.

(2 × 15 = 30 Marks)

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