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Reg. No. : .....

Name : .....

Fourth Semester B.Sc. Degree Examination, August 2022

First Degree Programme under CBCSS

Physics

Complementary Course for Chemistry and Polymer Chemistry

PY 1431.2 : ATOMIC PHYSICS, QUANTUM MECHANICS AND ELECTRONICS

(2013-2017 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

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

1. How the radius of a permissible radius of atomic hydrogen is related to principal quantum number?

2. Which are the possible orientations of spin angular momentum with respect to a magnetic field?

3. State Pauli's exclusion principle.

4. Which type of magnetic material is more likely to be a superconductor?

5. Failure of which classical law lead into the birth of Quantum mechanics.

6. Write the equation for energy quantization of a particle in a box and explain the symbols?

P.T.O.

7. Name the essential components of an IR spectrometer?

8. Compare the efficiencies of a half wave and full wave rectifiers.

9. Find the current amplification factor in common emitter transistor configuration.

10. What is Q-point regarding transistor operation?

(10 × 1 = 10 Marks)

SECTION – B

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

11. What is spatial quantization?

12. Write down the sets orbital quantum numbers and magnetic quantum numbers for $n = 4$.

13. How spin angular momentum can be obtained from spin quantum number and draw its orientation with respect to external magnetic field.

14. Write four important properties of superconductors.

15. Give a physical significance of wave function and how it is related to probability density of a particle.

16. Write down the postulates of quantum mechanics and also Schrodinger's steady state equation explaining the symbols.

17. Write down the expression for normalized wave function representing a particle confined in a box of width L and plot its wave function for n = 1, 2 and 3.

18. Discuss briefly about mass spectrometer.

19. Draw the circuit of a full wave bridge rectifier.

20. How a zener diode enables voltage regulation.

21. Obtain a relation between current amplification factors in common base and common emitter transistor configurations.

22. Plot the frequency response of a common emitter amplifier and explain band width.

(8 × 2 = 16 Marks)

SECTION – C

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

23. Derive equation for total energy of an electron according to Bohr atom model.

24. How the physical and chemical properties are accounted in the periodic table.

25. Discuss Mesissner effect.

26. A particle is moving in a one dimensional box, of infinite height and width 1.0 nm. Determine the probability of finding a particle within 0.1 nm at the centre of the box.

27. Derive the energy quantization of a particle in a potential box.

28. Distinguish between absorption and emission spectroscopy.

29. Calculate the ripple factor of a full wave rectifier.

30. A transistor amplifier is biased with feed back resistor of R_B = 100KΩ. gf Vcc = 25V, R_c = 1 K Ω and β = 200, find zero signal I_c and V_{CE}.

31. Discuss about the important biasing methods in transistor operation.

(6 × 4 = 24 Marks)

SECTION – D

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

32. Discuss Bohr atom model and explain energy transitions between permitted orbits.

33. Derive Schrodinger's time dependent equation.

34. Briefly explain IR spectrometer with its schematic diagram. Also explain different sample handling techniques used in it.

35. Draw and explain the working of a common emitter transistor amplifier. Briefly describe its frequency response.

(2 × 15 = 30 Marks)