Reg. No. : ....

Name : ....

Fourth Semester B.Sc. Degree Examination, July 2018
First Degree Programme Under CBCSS
(Complementary for Chemistry and Polymer Chemistry)
PY 1431.2 : ATOMIC PHYSICS, QUANTUM MECHANICS AND ELECTRONICS
(2013 Admission Onwards)

Time : 3 Hours

Total Marks : 80

SECTION – A

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

1. State Bohr's correspondence principle.

2. What is meant by energy level ?

3. What are type II superconductors ?

4. What is Meissner effect ?

5. Why do we say that Rayleigh-Jeans formula was a failure ?

6. What is photoelectric effect ?

7. What is meant by emission spectrum ?

8. Expand the acronym – NMR.

9. What do you mean by ripple factor ?

10. What is an avalanche breakdown ?

(10×1=10 Marks)

SECTION – B

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

11. What are the postulates of Bohr atom model ?

12. State and explain Pauli's exclusion principle.

13. Write a brief note on isotope effect.

14. List some important applications of superconductivity.

15. Explain de Broglie's wave hypothesis.

16. What is spatial quantization ?

17. Write down time dependent and time independent Schrodinger equations.

18. Write a brief note on UV light.

19. Explain the basic idea behind ESR spectrometer.

20. What do you mean by emission and absorption spectra ?

21. Write down the relations connecting α and β in the context of transistors.

22. Draw the circuit diagram for a full wave rectifier.

(8×2=16 Marks)

SECTION – C

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

23. Given that Rydberg constant is 1.097×10^7 m^{-1}, calculate the wavelength of the first line of the Balmer series.

24. Ionisation energy of hydrogen atom is – 13.6 eV. Calculate the energy of photon corresponding to H – alpha line and express it in electron volts.

25. Discuss applications of superconductors.

26. Calculate the energy corresponding to a photon corresponding to UV light of wavelength 100 nm. (Speed of light c = 3×10^8 m/s, Planck's constant h = 6.6×10^{-34} Js.)

27. In a half wave rectifier, the load resistance is 1 k Ω, the forward resistance of the diode is 100 Ω and the input alternating voltage is 325 volts. Find the peak value and r.m.s. value of the output current.

28. A silicon diode has a bulk resistance 2.5 Ω and a forward current of 10 mA. What is its forward voltage if its knee voltage is 0.62 V.

29. The base current and emitter current of a silicon transistor in common base configuration are 50 µA and 2mA respectively at an instant. Find its collector current and current amplification factor.

30. A transistor in a common emitter configuration with $\beta = 100$ delivers a base current of 100 µA. Determine its collector current and emitter current.

31. Write a note on the concept of wave function in quantum mechanics. **(6×4=24 Marks)**

SECTION – D

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

32. Discuss the vector atom model, various quantum numbers and the shell structure.

33. Derive the expression for energy levels for a particle in a one dimensional box.

34. Write an essay on the electromagnetic spectrum.

35. With neat diagrams explain the circuit and operation of CE amplifier.

(2×15=30 Marks)