

E 3976

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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2016

Third Semester

Complementary Course—Physics

QUANTUM MECHANICS, SPECTROSCOPY, NUCLEAR PHYSICS AND ELECTRONICS

(For Chemistry and Geology)

[2013 Admission onwards]

Time : Three Hours

Maximum : 60 Marks

Part A (Short Answer Questions)

*Answer all questions.
1 mark each.*

1. State Heisenberg's Uncertainty principle for position and momentum.
2. What is Raman effect ?
3. Define Curie.
4. What is meant by background radiation ?
5. What is meant by degeneracy ?
6. Explain hyperfine structure.
7. What are power reactors ?
8. What is ripple factor in rectifiers ?

(8 × 1 = 8)

Part B (Brief Answer Questions)

*Answer any six questions.
2 marks each.*

9. Explain de-Broglie hypothesis.
10. How many α and β particles are emitted when ${}_{92}\text{U}^{238}$ decay to Lead (${}_{82}\text{Pb}^{206}$) ?
11. Define the term packing fraction.
12. The half life of a radioactive element is 3 days. What fraction of a sample of the radioactive element will remain after 9 days ?
13. Write a note on electric quadrupole moment.
14. Distinguish between radioactivity and fission.

Turn over

15. Give two effects of radiation on the human body.
16. What are α , β and γ radiations composed of?
17. Give the salient features of vector atom model.
18. Write a note on doping of a semi-conductor.

(6 × 2 = 12)

Part C (Problems/Derivations)

Answer any **six** questions.
4 marks each.

19. What are the observations of black body spectrum? Explain Planck's radiation law.
20. Write a note on the following :
 - (i) Controlled thermonuclear reactions
 - (ii) Stellar energy
21. Find the longest wavelength of Balmer series of hydrogen corresponding to H_β line.
22. What is the de Broglie wavelength of 30 keV electron used in a scanning electron microscope?
23. Write a note on classification of molecules according to moment of inertia.
24. What is Zener effect? Explain the use of a Zener diode as voltage regulator.

(4 × 4 = 16)

Part D (Long Answer/Problems Questions)

Answer any **two** questions.
12 marks each.

25. Explain the setup of Division Germer experiment. What are its conclusions?
26. Write a note on thermonuclear reactions on sun and explain $p-p$ and $c-n$ cycle.
27. Discuss the theory of vibrational spectra of rigid diatomic molecules.
28. What is biasing of a transistor? Explain different types of transistor biasing. Design a voltage divider biasing circuit for an amplifier application.

(2 × 12 = 24)