E 2228 (Pages : 2) Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, AUGUST 2021

Third Semester

Complementary Course—PHYSICS—QUANTUM MECHANICS, SPECTROSCOPY, NUCLEAR PHYSICS, BASIC ELECTRONICS AND DIGITAL ELECTRONICS

(For B.Sc. Mathematics and Statistics)

(2013—2016 Admissions)

Time : Three Hours Maximum Marks : 60

Part A

Answer **all** *questions.*

Each question carries 1 *mark.*

1. The minimum frequency of radiation at which the emission of photoelectrons begins is called ————.
2. The ground state energy of hydrogen atom is ————.
3. Saturation of nuclear forces is due to ———— forces.
4. The alpha decay reduces the mass number of a nucleus by ————.
5. The ac component in the rectified output is ————.
6. Antimony is added to a pure semiconductor to get ————.
7. The binary number 10101 is equivalent to decimal number ————.
8. Half adder is a logical circuit that performs binary addition of ————.

(8 × 1 = 8)

Part B

Answer any **six** *questions.*

Each question carries 2 *marks.*

9. Give the various quantum numbers with vector atom model.
10. State Heisenberg's Uncertainty principle for position and momentum.
11. Explain packing fraction and binding energy.
12. Write a note on electric quadrapole moment.

Turn over

13. Write a note on doping of a semi-conductor.
14. Write a brief note on carbon dating.
15. Explain the working of a half wave rectifier.
16. State the law of radioactivity.
17. What is a truth table ? Explain the operation of AND gate.
18. How does transistor act as an amplifier ?

(6 × 2 = 12)

Part C

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

19. What are the observations of black body spectrum ? Explain Planck's radiation law.
20. What is the de Broglie wavelength of 30 keV electron used in a scanning electron microscope ?
21. Using Bohr's formula for energy quantization, determine the longest wavelength in the Lyman series of hydrogen atom.
22. Obtain the relationship between half-life and mean life.
23. A half wave rectifier is used to supply 50 V d.c. to a resistive load of 800Ω The diode has a resistance of 25Ω. Calculate the a.c. voltage required.
24. Obtain the truth table of NOR gate.

(4 × 4 = 16)

Part D

Answer any **two** *questions.*
Each question carries 12 *marks.*

25. What is Photoelectric effect ? What are the experimental results observed with the Photoelectric effect ? How did Einstein explain these results ?
26. Discuss the theory of vibrational spectra of rigid diatomic molecules.
27. How will you determine the input output characteristics of a CE connection experimentally ? Explain.
28. Explain the working of a bridge rectifier and derive expressions for efficiency and ripple factor.

(2 × 12 = 24)