TB243183R

Reg. No :.....

Name :.....

BACHELOR'S DEGREE (C.B.C.S) EXAMINATION, NOVEMBER 2024

2023 ADMISSIONS REGULAR

SEMESTER III - COMPLEMENTARY COURSE 2 (PHYSICS)

PH3B02B23 - Modern Physics and Basic Electronics

Time : 3 Hours **Maximum Marks : 60**

Part A

I. Answer any Ten questions. Each question carries 1 marks **(10x1=10)**

1. Describe Rutherford atom model.
2. Describe jj coupling.
3. State Stefan's law.
4. Sketch the graph showing the variation of the stopping potential with the frequency of incident radiation. Determine the slope of the graph.
5. Discuss the important characteristics of a zener diode.
6. Distinguish between intrinsic and extrinsic semiconductors.
7. Explain the role of depletion region in a PN junction.
8. Discuss the effect of temperature on the position of the Fermi level of a semiconductor.
9. State and explain electron-proton hypothesis.
10. Explain different radioactive series occurring in the universe.
11. Explain the concept of charge conjugate symmetry.
12. Mention different categories of particle counters.

Part B

II. Answer any Six questions. Each question carries 5 marks **(6x5=30)**

13. Determine the possible quantum states of pd electrons by jj coupling.
14. Derive the expression for the radius of atom with atomic number Z.
15. Define photoelectric effect. State and explain the laws of photoelectric emission.
16. **In a photoelectric experiment, the wavelength of the light incident on metal is changed from 300 nm to 400 nm. Find the decrease in the stopping potential.**
17. A transistor with $\alpha = 0.998$ is connected in CE mode. The potential difference across 10kΩ resistance connected in the collector circuit is 10V. Find base current, emitter current, collector current and current gain.
18. Compare the properties of α, β and γ rays.
19. The half-life of $_{11}Na^{24}$ is 15 hours. How long does it take for 93.75 percent of a sample of this isotope to decay?
20. Write a note on particle antiparticle concept.
21. Explain the principle of Cyclotron.

Part C

III. Answer any Two questions. Each question carries 10 marks **(2x10=20)**

22. With necessary theory, explain the scattering effect of monochromatic light in organic solutions
23. Deduce the time independent Schrodinger wave equation for a free particle.
24. With a neat diagram describe the action of a full wave bridge rectifier. Compare its merits over that of a centre tap full wave rectifier.
25. With a neat diagram, explain the principle and working of Betatron.