TB213460V

Reg. No :.....

Name :.....

B. Sc. DEGREE (C.B.C.S) EXAMINATION, NOVEMBER 2022

(2021 Admissions Regular,2020 Admissions Supplementary/Improvement,2019 & 2018 Admissions Supplementary)

SEMESTER III - COMPLEMENTARY COURSE 2 (PHYSICS)

(For Chemistry)

PH3C02B18 - 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 Thomson atom model.
2. Describe LS coupling.
3. Describe phosphorescence.
4. State Stefan's law.
5. Explain the fundamental concepts of Planck's quantum theory.
6. Define stopping potential in photoelectric emission.
7. Sketch the V-I characteristics of a PN junction diode.
8. Differentiate between bulk resistance and junction resistance of a diode.
9. Explain the reason why CE configuration is preferred to other configurations.
10. Explain how BE/nucleon of the element is related to stability.
11. Define activity of radioactive element.
12. Write a note on fission process and by taking any example, determine the energy released per fission process.

Part B

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

13. Prove that the energy of electron occupying in Bohr orbit is 13.6eV.
14. Determine the possible quantum states of sp electrons by LS coupling.
15. The J = 2 to 3 absorption line of molecular occurs at a frequency of 22.444 cycles/sec. Calculate the moment of inertia and rotational constant.
16. State and explain Heisenberg uncertainty relation for position and momentum. Determine the minimum uncertainties in the positions of the electron if their speeds are known with a precision of 3.0×10^{-3}m/s?
17. A metal of work function 3.0 eV is illuminated by light of wavelength 3000 Å. Calculate (a) threshold frequency (b) maximum energy of photoelectrons (c) stopping potential.
18. A half wave rectifier uses a transformer of turn ratio 10:1. An ac voltage of 220V (rms), 50Hz is applied to the primary. The diode resistance is 100ohms and load resistance is 900 ohms. Find the average load current and dc output voltage.
19. A 9 V voltage regulated supply is required to run a car stereo system from 12V battery. A zener diode with Vz = 9V and P max = 0.25W is used as a voltage regulator. Find the value of series resistor R.

20. Explain Carbon dating.
21. Calculate the half-life and mean life time of the radioactive substance whose decay constant is 0.000428 per year.

Part C

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

22. Obtain the pure rotational spectrum of rigid molecules.
23. Derive Schrodinger equation for a particle in a box and obtain the expression for energy.
24. Give a detailed account of the working of a half wave rectifier with the help of a neat diagram. Draw the input and output waveforms and obtain the expression for its efficiency and ripple factor.
25. Derive the law of successive disintegration and discuss the case of transient and secular equilibrium.