TB243210T

Reg. No :.....

Name :.....

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

2018, 2019, 2020, 2021, 2022 ADMISSIONS SUPPLEMENTARY

SEMESTER III - COMPLEMENTARY COURSE 2 (PHYSICS)

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 jj coupling.
3. Stoke's lines are more intense than anti-Stoke's lines. Justify the statement.
4. List down the failures of Classical Physics.
5. Discuss the effect of intensity and frequency of the incident light on photoelectric current.
6. Distinguish between group velocity and phase velocity.
7. Distinguish between ac and dc resistance of a diode.
8. Discuss the effect of temperature on the position of the Fermi level of a semiconductor.
9. Distinguish between CE and CC configuration.
10. Explain how BE/nucleon of the element is related to stability.
11. State Soddy Fajan's displacement law.
12. Write a note on fusion process.

Part B

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

13. Prove that Bohr radius is 0.053nm.
14. Determine the possible quantum states of pd electrons by jj coupling.
15. Calculate the value of moment of inertia and bond length of CO. Rotational constant B =5.44518 cm^{-1}.
16. Ultraviolet light of wavelength 2271Å from a 100W mercury source falls on a photocell whose cathode is made of molybdenum. If the stopping potential is -1.3eV, estimate the work function of the metal. How will the cell respond to a high intensity red light of wavelength 6328Å produced by He-Ne laser?
17. Monochromatic light of wavelength 632.8nm is generated by a helium-neon laser having power of 9.42mW. Evaluate a) energy and momentum of each photon b) the number of photons emitted per second.
18. Obtain the voltage- current equation of a PN junction diode and explain its symbols.The reverse saturation current of a silicon PN junction diode is 2x 10^{-7} A. Calculate the current flowing through it when a forward voltage of 0.5 V is applied across it.
19. Sketch the common emitter configuration of an NPN transistor. The values of base current and emitter current are 50μA and 2mA respectively for a transistor circuit. Find α and Ic.
20. Explain Carbon dating.
21. Calculate the ratio of number of atoms left behind to the original number of atoms after a time equals n half-life. Also calculate the percentage of original radioactive material after 7.5 days if half-life is 1.5 days.

Part C

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

22. Obtain the pure rotational spectrum of rigid molecules.
23. Deduce the time independent Schrodinger wave equation for a free particle.
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. With necessary theory, discuss transient and secular equilibrium.