

Reg. No

Name

22U350

B. Sc. DEGREE END SEMESTER EXAMINATION : OCTOBER 2022

SEMESTER 3 : COMPLEMENTARY PHYSICS FOR B Sc MATHEMATICS

COURSE : 19U3CPPHY5 : MODERN PHYSICS AND ELECTRONICS

(For Regular - 2021 Admission and Improvement / Supplementary - 2020 / 2019 Admissions)

Time : Three Hours

Max. Marks: 60

PART A

Answer any 8 (2 marks each)

1. State the selection rules for L, S and J.
2. What is meant by dual nature of matter waves?
3. Convert the following decimal numbers to their binary equivalents (i) 255 (ii) 25
4. A radioactive species is kept in a room of degree 35°C. The time taken by that element to reach its equilibrium state is 1 year. The same element is now kept in another room of degree 50°C. What is the time taken by that element to reach equilibrium state? Explain briefly.
5. Briefly describe various quantum numbers in the vector atom of model.
6. Write down Schrödinger's time independent wave equation in three dimensions and mention the symbols.
7. Write the 1's complement of 1010 1111 and 1001 1100
8. Write the four properties of a Junction transistor.
9. What do you mean by radioactive equilibrium?
10. Classical theory fails in the explanation of optical spectra. Summarise

(2 x 8 = 16)

PART B

Answer any 6 (4 marks each)

11. Find the strength of nuclear force using uncertainty principle.
12. Estimate the de Broglie wavelength associated with a proton moving with $1/10^{\text{th}}$ of the velocity of light. Mass of the proton = 1.673×10^{-27} kg and $h = 60624 \times 10^{-34}$ Js.
13. In the case of a center tap full wave rectifier the applied input r.m.s voltage is 46V. The load resistance is 100 Ω . Calculate the DC output voltage.
14. A bridge rectifier uses silicon diodes (knee voltage 0.7 V). The input voltage is 12 V r.m.s and the load resistance is 12 k Ω . Calculate the d.c. output voltage and the d.c. output current.
15. An electron has a speed of 1000m/s with an accuracy of 0.004%. Calculate the certainty with which we can locate the position of the electron.
16. Evaluate (i) $17_{10} - 12_{10}$ and (ii) $18_{10} - 22_{10}$ after converting to their binary form and using 2's complement.
17. Describe briefly classification of the nucleus
18. The wavelength of the H γ line in the hydrogen spectrum is 4341 Å. Find the wavelength of the second line of the Paschen series.

(4 x 6 = 24)

PART C

Answer any 2 (10 marks each)

19. Derive Schrödinger's time dependent equation
20. Describe the working of a Bridge rectifier with a neat circuit diagram and obtain its efficiency.
21. Draw the Symbol and truth table of a (i) NOT gate (ii) AND gate (iii) OR gate (iv) NOR gate and (v) NAND gate.
22. Give an account of the Bohr model of the atom. Explain the origin of spectral lines of hydrogen on the basis of this theory.

(10 x 2 = 20)