Reg. No ..... Name **23U358**

B. Sc. DEGREE END SEMESTER EXAMINATION : NOVEMBER 2023

SEMESTER 3 : PHYSICS (COMPLEMENTARY FOR MATHEMATICS)

COURSE : **19U3CPPHY5 : MODERN PHYSICS AND ELECTRONICS**

(For Regular 2022 Admission and Improvement / Supplementary 2021/ 2020 / 2019 Admissions)

Time : Three Hours Max. Marks: 60

PART A

Answer any 8 (2 marks each)

1. Describe Nobel Prize winning discoveries of Madam Curie.
2. Distinguish between phosphorescence and fluorescence.
3. Nuclear force exhibits saturation property. Explain.
4. Draw the I -V charecteristics of a p-n juction diode in forward bias?
5. What is photoelectric effect?
6. Draw the symbol of a NAND gate and write its truthtable.
7. What is meant by a normalised wave function?
8. Explain the physical significance of the wave function.
9. Convert the following hexa decimal numbers to their decimal equivalents (i) A (ii) 3A
10. Explain how the Hα, Hβ, Hγ and Hδ lines are produced.

(2 x 8 = 16)

PART B

Answer any 6 (4 marks each)

11. Evaluate (i) 7_{10} - 19_{10} and (ii) 10_{10} - 26_{10} after converting to binary form and using 2's complement.
12. In a common base connection, current amplification factor is 0.9. If the emitter current is 1mA, determine the value of base current.
13. The work function of barium and tungsten are 2.5eV and 5eV respectively. Check whether these materials are useful in a photocell, which is to detect visible light.
14. 12 V r.m.s is applied to a bridge rectifier at its input. If the load resistance is 12 kΩ, calculate the d.c. output voltage and the d.c. output current.
15. Calculate the de Broglie wavelength of an electron having a kinetic energy of 1000 eV. Compare the results with the wavelength of X-ays having same energy.
16. The half life of radium is 3.82 days. In what time will the activity decay to (1/16) of its original value.
17. The first member of the Blamer series of hydrogen spectrum has a wavelength of 656.3 nm. Compute wavelength of the second member of the Paschen series.
18. An electron has a speed 1.05 x 10^4 m/s within an accuracy of 0.2%. Calculate the uncertainty in the position of the electron.

(4 x 6 = 24)

PART C
Answer any 2 (10 marks each)

19. What are universal logic gates? Draw athe NAND gate and write its truth table. Show how basic logic gates can be realized using the NAND gate?
20. What is Raman effect? Discuss the quantum theory explanation of this effect
21. Write an essay on natural radioactivity, explaining the properties of the emitted radiations.
22. With a Neat circuit diagram draw and explain the working of a half wave rectifier. Also derive the efficiency.

(10 x 2 = 20)