

**B. Sc. DEGREE END SEMESTER EXAMINATION - OCT. 2020 : JANUARY 2021****SEMESTER 3 : COMPLEMENTARY PHYSICS FOR B Sc MATHEMATICS****COURSE : 19U3CPPHY5 : MODERN PHYSICS AND ELECTRONICS***(For Regular - 2019 Admission)*

Time : Three Hours

Max. Marks: 60

**PART A****Answer any 8 (2 marks each)**

1. What is meant by phosphorescence?
2. Summarise the fundamental concepts of Planck's quantum theory.
3. Mention the factors that led to the development of wave mechanics.
4. Briefly explain spatial quantization.
5. What are radioisotopes? Mention some of their uses. (atleast two).
6. What do you mean by 'radiation hazards'?
7. Draw the I -V charecteristics of a p-n junction diode in forward bias?
8. Add the two binary numbers 0000 1110 and 0000 0110.
9. Convert the following hexa decimal numbers to their decimal equivalents (i) B (ii) 8F
10. Write the 1's complement of 1010 1111 and 1001 1100

**(2 x 8 = 16)****PART B****Answer any 6 (4 marks each)**

11. Estimate the wavelength associated with a particle of mass 0.01 gm moving with a velocity of 2000 m/s.
12. Normalize the wave function  $\phi(x) = A \exp(-ax^2)$ , A and a are constants over the domain  $-\infty \leq x \leq \infty$
13. The work function of barium and tungsten are 2.5eV and 4.2eV respectively. Check whether these materials are useful in a photocell, which is to detect visible light.
14. Find the ratio of the nuclear radii of gold isotope  ${}_{79}\text{Au}^{197}$  and silver isotope  ${}_{47}\text{Ag}^{107}$ .
15. Calculate the time required for 10% of a sample of Thorium to disintegrate. Assume the half-life of Thorium to be  $1.4 \times 10^{10}$  years.
16. Calculate the mean life and half life of a radioactive sample whose disintegration constant happens to be 0.0021/years.
17. In a common base connection , the emitter current is 1mA. If the emitter circuit is open, the collector current is  $50 \mu\text{A}$ . Find the total collector current. Given  $\alpha = 0.92$ .
18. In a bridge rectifier the r.m.s input voltage is 57.5V and the load resistance is 200  $\Omega$ . Find the (i) d.c. output voltage (ii) peak inverse voltage (iii) output frequency.

**(4 x 6 = 24)****PART C****Answer any 2 (10 marks each)**

19. Discuss how de Broglie developed his idea of matter waves. Obtain an expression for de Broglie wavelength.
20. Give an account of the Bohr model of the atom. Explain the origin of spectral lines of hydrogen on the basis of this theory.
21. With a Neat circuit diagram draw and explain the working of a half wave rectifier. Also derive the efficiency.
22. Draw the Symbol and truth table of a (i) NOT gate (ii) AND gate (iii) OR gate (iv) NOR gate and (v) NAND gate.

**(10 x 2 = 20)**