



V Semester B.Sc. Degree Examination, April/May - 2021
PHYSICS VI
5.2 - Statistical Mechanics, Quantum Mechanics and
Electronics - I
(CBCS)

Time : 3 Hours

Maximum Marks : 70

Instruction : Write answers to Section A questions in the first two pages only.

SECTION - A

Answer the following questions, each of 1 mark.

15x1=15

1. Which particle obey paulis exclusion principle ?
2. State Heisenberg's uncertainty principle. 1
3. What are matter waves ?
4. What are extrinsic semiconductors ?
5. What is Stirling's approximation ?
6. Define Ensemble.
7. What is zener diode ?
8. Write one use of Light Emitting Diode. 1
9. What is Solar cell ? 1
10. Define Efficiency of Full Wave Rectifier.
11. What is Liquid Crystal Display ? 1
12. Name two particles involved in the Compton Scattering. 1
13. What is a Linear Harmonic Oscillator ?
14. What is Zero point energy ?
15. On what factor colour of LED depends ?

P.T.O.

SECTION - B

Answer any five of the following.

5×5=25

16. Compare Maxwell Boltzmann and Fermi Dirac distribution functions. 1
17. Illustrate the Heisenberg uncertainty principle by Gamma ray microscope. 1
18. Derive an expression for electrical conductivity of a semiconductor. 1
19. Obtain an expression for energy of a particle in one dimensional box. 1
20. Explain the Transistor as an amplifier in CE mode with a neat circuit diagram. 1
21. Explain the construction and working of a photo diode. 1
22. Derive an expression for energy gap of a semiconductor. 1

SECTION - C

Answer any three of the following.

3×11=33

23. (a) State and prove Boltzmann equipartition theorem. 1
- (b) Write a note on Seven Segment Display. 1
24. (a) What is Compton effect? Derive an expression for Compton shift. 1
- (b) Calculate the wavelength associated with an electron of energy 150 eV. (Given $h = 6.625 \times 10^{-34}$ Js and Charge of an e = 1.6×10^{-19} C) 1
25. (a) Obtain Schrodinger's time independent wave equation. 1
- (b) Find the lowest energy of a neutron confined to a nucleus of size 10^{-16} m. (Given : Mass of the neutron = 1.67×10^{-27} kg, $\hbar = 1.054 \times 10^{-34}$ Js) 1
26. (a) What is Hall effect? Derive an expression for Hall coefficient and mention the importance of Hall effect. 1
- (b) The intrinsic carrier density at room temperature in Germanium is $2.37 \times 10^{15} \text{ m}^{-3}$ if the electron and hole mobilities are $0.38 \text{ m}^2 \text{V}^{-1} \text{s}^{-1}$ and $0.18 \text{ m}^2 \text{V}^{-1} \text{s}^{-1}$ respectively. Calculate the Resistivity. 1
27. (a) Explain with neat circuit diagram the construction and working of Bridge rectifier. 1
- (b) Explain L and Pi section filters with neat diagrams. 1

