**B.Sc. V Semester (CBCS) Degree Examination, May/June- 2019**
**PHYSICS**
**Statistical Mechanics, Quantum Mechanics & Electronics- I**
**Paper No. - VI 5.2**

Time : 3 Hours                                                          Maximum Marks : 70

*Instructions to Candidates:*

1. Answer **all** the questions from Section - A in the first two pages only.

2. Answer any **five** from Section B and any **three** questions from Section C.

### SECTION - A

I. Answer **all** of the following.                                    (15×1=15)

   1. Which particle satisfies Bose-Einstein Statistics?

   2. Define Compton effect.

   3. What are Fermions?

   4. State Heisenberg's Uncertainty Principle.

   5. Write the expression for de-Broglie's Wave length.

   6. Write the physical significance of wave function.

   7. Write the equation for first eigen value of a particle in one dimensional box.

   8. Write the concept of Valance band.

   9. What is linear harmonic Oscillator?

   10. Give one example for pentavalent impurity.

   11. Define L-Section litter.

   12. Define Hall Effect.

   13. What is Zener diode?

   14. Define Solar Cell.

   15. Which material emit blue colour in LED?

### SECTION - B

II. Answer any **FIVE** of the following.                              (5×5=25)

   16. Explain Fermi-Dirac distribution function.

   17. Describe Davisson and Germer experiment.

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18. Derive an expression for energy of a particle in one-dimensional box.

19. Explain Linear Harmonic Oscillator.

20. Write a note on extrinsic semiconductor.

21. Explain L and $\pi$ section filter.

22. Write a note on photodiode.

## SECTION - C

III. Answer any **THREE** of the following.                                    (3×10=30)

23. a) Compare Maxwell-Boltzmann and Bose-Einstein distribution function.

   b) Write a note on Gibb's paradox.                                         (6+4)

24. a) Derive an expression for compton shift.

   b) Illustrate the Heisenberg's uncertainty principle by diffraction at a single slit.
                                                                              (5+5)

25. a) State and explain Hall effect in metal and semiconductor.

   b) Calculate the Hall Voltage developed in a Ge Crystal of thickness $0.5×10^{-3}$m. When a magnetic field of 0.7T is applied. The current density is 250Am$^{-2}$ and the electron density is $2×10^{23}$m$^{-3}$.                     (6+4)

26. a) Explain Zener diode as Voltage regulator.

   b) Describe transistor acts as an amplifier in CE mode.                    (5+5)

27. a) Write the advantages of LED.

   b) Explain Seven- segment display.                                        (5+5)

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