XE (H-3) – Ph (7)

2019

Time : 3 hours

Full Marks : 100

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

Answer any six questions, selecting two from each group.

Group – A

1. Obtain wave propagation in an isotropic plasma. Hence obtain condition for ionospheric reflection of the wave.
2. Obtain an expression for electric field due to an oscillating electric dipole.
3. Derive Saha's theory of ionisation.
4. Write short notes on any **two** of the following :
   (a) Pinch effect
   (b) Lienard-Wiechert potential
   (c) Alfven wave
   (d) Plasma oscillation

Group – B

5. Describe the diffraction condition of X-rays and obtain Bragg's law.
6. Describe the free electron gas model of metals. How does it help to explain the heat capacity of metals ?
7. Give theory of Kronig-Penny model. Discuss the conclusion obtained from the theory.
8. Explain Hall effect. Obtain an expression for Hall voltage and Hall co-efficient. How is Hall co-efficient determined experimentally ?

Group – C

9. Discuss the Bohr's theory of hydrogen spectra. Explain its shortcomings.
10. Discuss the features of rotational and vibrational spectra of diatomic molecule. Compare it with triatomic molecule.
11. Deribe the Rutherford's formula for scattering of α-particles. What is impact parameter ?
12. Write short notes on any **two** of the following :
    (a) Paschen-Back effect
    (b) Zeeman effect
    (c) Moseley's law
    (d) NMR

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