M.Sc. DEGREE (C.S.S.) EXAMINATION, NOVEMBER 2020

Second Semester

Faculty of Science

Branch II—Physics–A–Pure Physics

PH 2C 08—CONDENSED MATTER PHYSICS

(2012—2018 Admissions)

Time : Three Hours   Maximum Weight : 30

Part A (Short Answer Type Questions)

Answer any **six** *questions.*
Each question carries weight 1.

1. State and explain Bragg's law.

2. What is Drude-Lorentz model ?

3. Explain density of states.

4. State Bloch theorem.

5. Explain diffusion length.

6. What is Hall co-efficient ?

7. Briefly explain the thermal conductivity due to electron.

8. Explain hysteresis.

9. Explain adiabatic demagnetisation process.

10. What are quantum wells ?

$(6 \times 1 = 6)$

Part B

Answer any **four** *questions.*
Each question carries weight 2.

11. Obtain the reciprocal lattice to BCC and FCC lattices.

12. Briefly explain the movement of electrons in one dimensional potential well.

Turn over

13. Discuss the Fermi level and the carrier concentration in semiconductors.

14. Determine the classical model for specific heat of solids.

15. Give an account on antiferroelectricity and ferrielectricity.

16. Discuss on quantum theory of paramagnetism.

$(4 \times 2 = 8)$

Part C

Answer **all** *questions.*
Each question carries weight 4.

17. (a) Discuss the free electron theory of metals.

Or

(b) Bring out the atomic, geometrical and crystal structure factors affecting diffraction intensity.

18. (a) Describe the band theory of semiconductors.

Or

(b) Describe Hall Effect for semiconductors.

19. (a) Obtain the Einstein model for specific heat of solids. State merits and demerits of the model.

Or

(b) Give an analysis of dielectric properties of solids.

20. (a) Discuss the thermo and electro dynamics of superconductors.

Or

(b) Bring out the properties and applications of nanomaterials.

$(4 \times 4 = 16)$