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Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, JUNE 2019

Second Semester

Faculty of Science

Branch II : Physics–A–Pure Physics

PH 2C 08—CONDENSED MATTER PHYSICS

(2012 Admission onwards)

Time : Three Hours Maximum Weight : 30

Part A (Short Answer Type Questions)

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

1. What is reciprocal lattice ?
2. What is meant by density of states ?
3. State and explain Widemann —Franz-Lorentz law.
4. What are Brillouin zones ? Explain.
5. Give the properties of metal - semiconductor junction.
6. State the features of phonons.
7. Briefly explain dipole theory of ferroelectric materials.
8. Explain piezoelectric effect.
9. State Hund's rule.
10. List the uses of grapheme.

$(6 \times 1 = 6)$

Part B

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

11. Show that $2d \sin\theta = n\lambda$. Give one application.
12. Discuss the facts and figures of electronic specific heat.
13. Bring out the construction of Brillouin zones in two dimensions.

Turn over

14. Establish the effect of temperature on the electrical conductivity of semiconductors.

15. Describe the quantisation of elastic waves in a diatomic lattice.

16. Give an account on superconducting fullerenes.

(4 × 2 = 8)

Part C

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

17. (a) Describe electrical conductivity of metals with the support of FD statistics.

Or

(b) Explain Ewald construction process. Describe SC, BCC and FCC lattices and properties.

18. (a) Describe the classification of materials according to Krong and Penny.

Or

(b) Explain Hall Effect. Bring out the experimental set-up and theory for the determination of Hall co-efficient.

19. (a) Discuss the Einstein model for specific heat of solids. Also give experimental evidences.

Or

(b) Bring out a comparative study of ferroelectric, antiferroelectric and ferrielectric properties of solids.

20. (a) Discuss the adiabatic demagnetisation of a paramagnetic material for extreme low temperatures.

Or

(b) Discuss the BCS theory for super conductivity.

(4 × 4 = 16)