

This question paper contains **2** printed pages]

V—102—2017

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2017

(New Course)

PHYSICS

Paper XIII

(Solid State Physics)

(Friday, 17-11-2017)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

N.B. :- (i) All questions are compulsory.

(ii) All questions carry equal marks.

1. Attempt any *four* of the following : 8
 - (a) Define fundamental translation vectors.
 - (b) What is a short range order ?
 - (c) How does hydrogen bond differ from dipole bond ?
 - (d) State Dulong-Petit's law of specific heat.
 - (e) State Wiedemann-Franz's law.
 - (f) What are ionic crystals ?
2. Attempt any *two* of the following : 8
 - (a) What are Bravais lattices ? Explain cubic crystal system in three-dimensions using Bravais lattices.
 - (b) Explain in brief covalent bond formation in solids.
 - (c) Discuss Drude-Lorentz theory of free electrons and its shortcomings.
3. Attempt any *two* of the following : 8
 - (a) Define symmetry operations. Explain inversions in symmetry operations.

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- (b) Derive an expression for the specific heat of solids by using classical theory.
- (c) Derive an expression for electrical conductivity of metals.
4. Attempt any *one* of the following : 8
- (a) Explain formation of hydrogen bond in water molecule.
- (b) Derive the relation for specific heat of solids by Einstein's theory.
5. Write short notes on any *two* : 8
- (a) Bragg's law
- (b) FCC lattice
- (c) Behaviour of specific heat at low temperature for Debye's theory.
- (d) Quantum theory of free electron in a box.