

(6 pages)

Reg. No. :

Code No. : 20042 E Sub. Code : CMPH 63

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2025.

Sixth Semester

Physics — Core

SOLID STATE PHYSICS

(For those who joined in July 2021 and 2022 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The primitive lattice cell is a _____ cell.
- (a) minimum volume
 - (b) maximum volume
 - (c) low density
 - (d) all the above

2. Coordination number for close packed crystal structure is

- (a) 16
- (b) 12
- (c) 8
- (d) 4

3. The Quazi crystals are _____.

- (a) nearly insulators
- (b) semi conductors
- (c) good conductors
- (d) none

4. Madelung constant for simple crystal structure is

- (a) 1.2–1.4
- (b) 1.6–1.8
- (c) 1.3–1.5
- (d) none

5. Lorentz field is

- (a) $E = \frac{P}{3\epsilon_0}$
- (b) $E = \frac{-P}{3\epsilon_0}$
- (c) $E = \frac{2P}{\epsilon_0}$
- (d) $E = \frac{3P}{\epsilon_0}$

6. Quartz is a _____ electric crystal.

- (a) Piezo
- (b) Ferro
- (c) Para
- (d) Dielectric

7. Hard superconductor is type _____ superconductor.
- (a) I (b) II
(c) III (d) None
8. Mercury, Tin, lead, zinc are the examples of
- (a) Type I superconductor
(b) Type II superconductor
(c) Superconductor
(d) None
9. An example of OD nanostructure is
- (a) Carbon nanowire
(b) Bucky ball
(c) Ice ball
(d) Quantum dot
10. The width of carbon nanotube is
- (a) 1 nm (b) 10 nm
(c) 5 nm (d) 40 nm

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) State and explain Bragg's law.
- Or
- (b) Explain the sodium chloride structure.
12. (a) Find the perpendicular distance between two parallel lines.
- Or
- (b) Explain the quasi crystals.
13. (a) Write a short note on piezo-electricity.
- Or
- (b) Write a short note on dielectric properties.
14. (a) Explain the isotope effects on superconductors.
- Or
- (b) Write a short note on type II superconductors.

15. (a) Define : Nanomaterials. Give five examples.

Or

(b) Write the applications of nano-materials with suitable examples.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss in detail about Wigner-Seitz cell.

Or

(b) Discuss in detail about miller indices.

17. (a) Describe the types of bonds with suitable examples.

Or

(b) Compare : ionic and covalent solids.

18. (a) Explain in detail about orientational polarization.

Or

(b) Discuss Weigs theory of Ferro-electricity. Give some applications of Ferroelectric materials.

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19. (a) Describe Meissner effect and Type I, II superconductors.

Or

(b) Obtain London equation.

20. (a) Describe neat sketch and synthesis of Sol-Gel technique.

Or

(b) Explain the following :

(i) CNT

(ii) Carbon Nanobuds

(iii) Inorganic nanotubes

(iv) Nano shells.

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