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A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE
(AUTONOMOUS) (Grant-in-Aid)
Affiliated to Sardar Patel University
VALLABH VIDYANAGAR-388120



Bachelor of Science (Semester 4) External Examination - 2026

Subject: Physics

US04MIPHY01 Physics of Solids

Date: 27-03-2026, Friday

Time: 01:45 AM to 03:15 PM

Total marks :25

Q-1 Write the most appropriate answer from the following multiple-choice questions. [05]

(1) _____ has a covalent bond.

- (a) Na (b) Mg (c) Cu (d) Si

(2) The Madelung constant for NaCl structure is _____.

- (a) 2.25 (b) 1.75 (c) 1.25 (d) 0.75

(3) The condition $a = b \neq c$; $\alpha = \beta = \gamma = 90^\circ$ is true for _____ structure.

- (a) Cubic (b) Monoclinic (c) Tetragonal (d) Trigonal

(4) The number of atoms present in unit cell of FCC structure is _____.

- (a) 6 (b) 4 (c) 2 (d) 1

(5) The atomic packing factor of simple cubic structure is _____.

- (a) 52% (b) 68% (c) 74% (d) 39%

Q-2 (A) Calculate the Madelung constant in one dimension and three dimensions for ionic crystal by taking example of NaCl. [06]

(B) Write a note on Born-Haber cycle. [04]

OR

Q-2 (A) Define metallic bond. Discuss properties of metallic bond in detail. [06]

(B) Write a note on hydrogen bond. [04]

Q-3 (A) Define atomic packing factor (APF). Calculate APF for FCC structure. [06]

(B) Discuss cubic and hexagonal crystal systems on the basis of lattice parameters. [04]

OR

Q-3 (A) Discuss twenty-three symmetry elements in a cubic crystal. [06]

(B) Discuss the method to determine Miller indices of a plane with proper example. [04]