



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 IV) Internal Examination - 2026
US04MAPHY02
Classical, Quantum and Solid State Physics

Date: 09/03/2026, Monday

Time: 2:45 PM to 4:15 PM

Total marks :30

Q-1 Multiple Choice Questions

[06]

- (1) The electrostatic forces are very much _____ than the gravitational forces in the interaction of atomic and subatomic particles.
(a) Poor (b) Stronger (c) Weak (d) Equal
- (2) The areal velocity of the particle in a central force field is _____.
(a) Conserved (b) Not Conserved (c) Infinity (d) Zero
- (3) The normalized wave function must have _____ norm
(a) Infinite (b) Finite (c) Zero (d) Complex
- (4) NaCl crystal is _____ crystal.
(a) triatomic (b) Diatomic (c) tetraatomic (d) Monoatomic
- (5) _____ is a secondary bond.
(a) Hydrogen (b) Ionic (c) Metallic (d) Covalent
- (6) Value of Madelung Constant of CsCl is _____.
(a) 1.746 (b) 1.762 (c) 1.75 (d) 1.632



Long Questions:

- Q-2** Derive the expressions for gravitational and electrostatic fields and potentials.

[06]

OR

- Q-2** Derive the equation of motion of equivalent one body and explain why apple falls toward the earth and not the earth towards the apple?

[06]

- Q-3** Derive Schrodinger's equation for matter waves in One dimension and Generalize it in three dimensions.

[06]

OR

- Q-3** Discuss the conservation of probability of the wave function and derive the necessary condition.

[06]

- Q-4** What is Madelung Constant? Calculate Madelung constant for NaCl.

[06]

OR

- Q-4** Discuss metallic bond in detail.

[06]

- Q-5** Discuss Seven crystal systems based on Lattice parameter in detail.

[06]

OR

- Q-5** Explain calculation of packing factor of FCC.

[06]

No of printed pages: 01

Supervisor sign

Seat No.:



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Bachelor of Science (Semester IV) Quiz - 2026
US04MAPHY02
Classical, Quantum and Solid State Physics

Date: 09/03/2026, Monday

Time: Maximum 20 minutes

Total marks :15

Q-1 Fill in the blanks with appropriate answer given in the bracket.

[08]

- (i) In equipotential surface, the value of Potential is _____.
(Constant, Varies from point to point)
- (ii) In Kepler's second law of planetary motion the _____ velocity (Areal, Radial)
- (iii) The square of the magnitude of the wave function is called _____.
(Current density, Probability density)
- (iv) _____ theorem convert volume integral in to surface integral (Gauss', Stoke's)
- (v) _____ bond is primary bond. (Ionic, hydrogen)
- (vi) NaCl have _____ bonding. (Covalent, Ionic)
- (vii) Coordination Number of SC _____. (6, 12)
- (viii) The atomic packing factor of BCC is _____. (0.52, 0.68)



Q-2 Whether the following statement is true or false. Write your answer in the box.

[07]

- (i) The strong & weak interactions are very short-range interaction. []
- (ii) The gravitational field is produced by the particles having mass. []
- (iii) According to de Broglie hypothesis a material particle in motion is associated with a wave of $\lambda = \frac{h}{mc^2}$ []
- (iv) If Δx denote the error in determination of position and Δp the error in momentum, then according to Heisenberg uncertainty principle $(\Delta p)(\Delta x) \geq \hbar$ []
- (v) There are 12 lattice parameter. []
- (vi) Ionic bond is primary bond. []
- (vii) The dissociation energy of NaCl is 4.5 eV. []