Enrollment No:_____ **Exam Seat No:**_____

C. U. SHAH UNIVERSITY

Summer Examination-2022

Subject Name: Elements of Solid State Physics

Subject Code: 5SC03ESP1 **Branch: M.Sc. (Physics)**

Semester: 3 **Date: 21/04/2022** **Time: 02:30 To 05:30** **Marks: 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

SECTION – I

Q-1 Attempt the Following questions. **(07)**

a) What is called point defect? **01**
b) Define: Unit cell. **01**
c) What is quantization of lattice vibrations? **01**
d) Define the group velocity. **01**
e) What do you by non-primitive cell? **01**
f) Plot phonon dispersion curve for diatomic molecule. **01**
g) What is F-centre? **01**

Q-2 Attempt all questions **(14)**

a) Explain in brief Kroning Penny model. **07**
b) Describe the Bloch theorem. **07**

OR

Q-2 Attempt all questions **(14)**

a) Derive an expression of dispersion relation of lattice vibrations in monoatomic lattices. **07**
b) Distinguish between Conductors, Semiconductors and Insulators in brief. **07**

Q-3 Attempt all questions **(14)**

a) State and explain the Schrodinger wave equation. **07**
b) Explain Schottky and Frenkel defects in brief. **07**

OR

Q-3 Attempt all questions **(14)**

a) Explain: Reciprocal lattice of fcc. **07**
b) Explain about one two dimensional defect in details. **07**

SECTION – II

Q-4 Attempt the Following questions. **(07)**

a)	What is the formula of Bohr magneton?	**01**
b)	Define: Dielectric constant.	**01**
c)	Define: Piezoelectric effect.	**01**
d)	What is the formula of larmor frequency?	**01**
e)	Give some examples of ferrimagnetism.	**01**
f)	What do you understand by polarization?	**01**
g)	What is called magnetic moment?	**01**

Q-5 Attempt all questions **(14)**

a)	Explain the Weiss theory of ferromagnetism.	**07**
b)	Explain Langevin's theory of diamagnetism.	**07**

OR

Q-5 Attempt all questions **(14)**

a)	State and explain Clausius-Mossoti relation in terms of dielectric and polarizability.	**07**
b)	Explain Quantum theory of paramagnetism.	**07**

Q-6 Attempt all questions **(14)**

a)	Discuss ferromagnetic domains in details.	**07**
b)	Explain the Larmor precession phenomena of diamagnetic material.	**07**

OR

Q-6 Attempt all Questions

a)	Explain in details Local electric field of an atom.	**07**
b)	Explain : Hysterisis loop.	**07**