Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name : Elements of Solid State Physics

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

Semester : 3 **Date : 27/11/2018** **Time : 02:30 To 05:30** **Marks : 70**

Instructions:

(1) Use of Programmable calculator and 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** **(7)**

a. How the defects produced in crystal structure?

b. What is called permitive cell?

c. Define the group velocity

d. What is called point defect?

e. What is called energy band?

f. Draw a plot between group velocity vs wave vector.

g. What is quantization of lattice vibrations?

Q-2 **Attempt all questions**

a. Write on Frenkel defect and Substitutional disorder. **5**

b. Explain in detail one dimensional monatomic lattice vibration. **5**

c. Distinguish between acoustical and optical phonons. **4**

OR

Q-2 **Attempt all questions**

a. What is Knoning Penny Model? Draw figure for Knoning Penny one dimensional periodic potential and Kroning Penny Model **7**

b. Distingue between conductor, insulator and semiconductor base on the band theory. **7**

Q-3 **Attempt all questions**

a. Explain about one dimensional defect with appropriate figure. **7**

b. Obtain an equation of the approximate number of Schottky defects present at temperature T. **7**

OR

Q-3 **a.** Describe the Bloch theorems. **7**

b. Explain the Schrodinger wave equation how it's useful to calculate the potential energy of lattice. **7**

SECTION – II

Q-4 **Attempt the Following questions (each of 1 mark)** **(07)**

a. Define the dielectric constant.

b. Give the four example of paramagnetic materials.

c. What is the unit of Bohr magnetron?

d. What is called magnetic moment?

e. What is called relaxation time?

f. Define: Piezoelectric effect

g. Give the equation of Larmor frequency

Q-5 **Attempt all questions**

a. Discuss classification of magnetic materials and their characteristics in brief. **7**

b. What is called polarization? Give its type. Explain in detail orientational polarization. **7**

OR

Q-5 **a.** Explain the Weiss theory of ferromagnetism. **7**

b. Discuss ferromagnetic Domains. **7**

Q-6 **Attempt all questions**

a. Explain electronic and ionic polarization. **7**

b. Discuss on complex dielectric constant and dielectric losses in detail. **7**

OR

Q-6

a. Write note on Electron spin resonance **7**

b. Explain quantum theory of Paramagnetism. **7**