C.U.SHAH UNIVERSITY Summer Examination-2020

Subject Name: Elements of Solid State Physics

Subject Code: 5SC03ESP1		Branch: M.Sc. (Physics)	
Semester: 3	Date: 25/02/2020	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	(07)
	a.	How the defects produced in crystal structure?	01
	b.	What is magnetization?	01
	c.	What will be size of atom if band gap is larger?	01
	d.	Draw a plot between group velocity vs wave vector.	01
	e.	What is dielectric constant?	01
	f.	What is quantization of lattice vibrations?	01
	g.	Give an example of Substitutional defect.	01
Q-2		Attempt all questions	(14)
	a)	Explain in detail one dimensional monatomic lattice vibration.	07
	b)	Describe the Bloch theorems.	07
		OR	
Q-2		Attempt all questions	(14)
	a)	Explain edge and screw dislocation with proper figure.	06
	b)	State and explain the Schrodinger wave equation.	05
	c)	Distinguish between acoustical and optical phonons.	03
Q-3		Attempt all questions	(14)
	a)	What is Wigner Seitz cell? Explain first Brillion zone with suitable figure.	07
	b)	Distinguish between conductor, insulator and semiconductor base on the band theory.	07
		OR	
Q-3		Attempt all questions	(14)
-	a)	Obtain an equation of the approximate number of Schottky defects present at temperature T.	07
	b)	Explain Berger vector with proper diagram.	07
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a What is the unit of Bohr magnetron? **b** What is F-centre? **c** What is called relaxation time? d Define: Piezoelectric effect. e Give the equation of Larmor frequency. f. Define dielectric constant. **g** What is primitive unit cell? Attempt all questions a) Discuss classification of magnetic materials and their characteristics in brief. **b**) Explain the Weiss theory of ferromagnetism. OR Attempt all questions a) Write note on Electron spin resonance. **b**) What is called polarization? Give its type. Explain in detail orientational polarization.

SECTION – II

	Attempt all questions	(14)
a)	State and explain Clausius- Mossoti relation in terms of dielectric and polarizability.	07
b)	Explain the magnetic moment of Ferromagnetic materials.	07
	OR	
	Attempt all Questions	(14)
a)	Explain the Larmor precession phenomena of diamagnetic material.	07
b)	What is origin of magnetic moment? Explain the value Bohr magnetron.	07

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Attempt the Following questions

Q-4

Q-5

Q-5

Q-6

Q-6

(07)

01

01

01

01

01

01

01

(14)

07

07

(14)

07

07