C. U. SHAH UNIVERSITY
Winter Examination-2021

Subject Name: Solid State Physics

Subject Code: 4SC05SSP1   **Branch: B.Sc. (Physics)**

Semester: 5   **Date: 17/12/2021**   **Time: 11:00 To 02:00**   **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.

Q-1		**Attempt the following questions:**	**(14)**
	a)	Define Unit Cell.	01
	b)	What is the basis in crystal structure?	01
	c)	Define lattice translation vector.	01
	d)	Define: Specific heat.	01
	e)	State: Dulong and Pettit law.	01
	f)	Write formula for Einstein's temperature.	01
	g)	Who observed the phenomenon of superconductivity?	01
	h)	What is DC Josephson effect?	01
	i)	Write the formula for London's penetration depth.	01
	j)	What do you mean by dielectrics?	01
	k)	Write examples of Polar molecules.	01
	l)	Define Electrical susceptibility.	01
	m)	Define reciprocal lattice.	01
	n)	What is Meissner effect?	01

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	(A)	Explain: Kroning Penny model.	08
	(B)	Explain: BCS theory.	06
Q-3		**Attempt all questions**	**(14)**
	(A)	Explain Debye's theory of specific heat.	07
	(B)	Explain the London's theory in details.	07
Q-4		**Attempt all questions**	**(14)**
	(A)	Explain in details Einstein's theory of specific heat.	07
	(B)	Derive the formula for Ionic Polarizability.	07

Q-5		**Attempt all questions**	**(14)**
	(A)	Derive an expression for Claussis Mosotti equation.	05
	(B)	Explain Hall effect with diagram in details.	03
	(C)	Explain: Reciprocal lattice of bcc.	06

Q-6		**Attempt all questions**	**(14)**
	(A)	Give the application of superconductivity.	05
	(B)	Explain Josephson effect.	06
	(C)	Critical temperature of mercury with isotopic mass 199.5 is 4.185 ̇K. Calculate its critical temperature when its isotopic mass changes to 203.4.	03

Q-7		**Attempt all questions**	**(14)**
	(A)	Explain in details Local electric field of an atom.	08
	(B)	Derive the formula for Electrical Polarizability.	06

Q-8		**Attempt all questions**	**(14)**
	(A)	Explain: Classical theory with all assumptions.	07
	(B)	Explain: Brillouin zone of sc lattice.	07