## M.SC.(Physics) (CBCS Pattern) Fourth Semester CBCS PSCPHYT14 (Core-12) : Solid State Physics Paper - XIV

## P. Pages: 1

Time : Three Hours

## \* 3 5 0 6 \*

## GUG/W/18/11413

Max. Marks: 80

1.		Either	
	a)	State and prove Bloch theorem.	8
	b)	Using Kronig-Penny model, show that P<<1, the energy of lowest energy band is $E = \frac{h^2 p}{ma^2}$	8
		OR	
	c)	Explain Kronig-Penny model and explain the plot of allowed & forbidden energy regions.	8
	d)	What is effective mass of electron? Explain.	8
2.		Either	
	a)	Explain Dulong Petit law.	8
	b)	What is Brillouin zone, Explain.	8
		OR	
	e)	Give the theory of one dimensional monoatomic linear lattice vibrations & obtain an expression for angular frequency of vibration	8
	f)	Give detail theory of lattice specific heat given by Einstein model.	8
3.	Either		
	a)	Obtain an expression for energy of an electron moving in three dimensional potential well.	8
	b)	Explain the term quantum state and degeneracy in the suitable examples.	8
	c)	Obtain an expression of concentration of charge carriers in semiconductor particularly of in type semiconductor.	8
	d)	Obtain an expression for electrical conductivity (DC) in metals.	8
4.	Eith	ner	
	a)	Explain type I & II superconductors.	8
	b)	Discuss BCS theory of superconductor.	8
		OR	
	c)	Explain:	8
		i) Meissner Effect ii) Isotope effect in superconductors	
	d)	Explain Josephson effect in detail.	8
5.		All questions are compulsory.	
	a)	Discuss quantum theory of Paramagnetism.	4
	b)	Debye temperature of an unknown solid is 1500 k. calculate the highest vibrational frequency of that solid at 30k.	4
	c)	Explain theory of Hall effect and obtain expression for Hall coefficient.	4
	d)	State any four applications of superconductivity.	4
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