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Courses » Solid State Chemistry

Announcements

Course

Ask a Question

**Progress** 

## Unit 14 - Week 11: Theory of Electronic Structure of **Solids**

Register for **Certification exam** 

## Course outline

How to access the portal

Practice

Week 1 : Solid State And Solid State Materials

Week 2 Unit Cells And Lattices

Week 3: Symmetry In Crystals Part 1

Week 4: Symmetry in **Crystals Part 2** 

Week 5 : Crystal Systems, Point Groups and **Space Groups** 

Week 6: Crystallographic **Notations** 

Week 7: Coordination number, voids, defects in

## **Assignment 11**

The due date for submitting this assignment has passed. As per our records you have not submitted this

Due on 2019-04-17, 23:59 IST.

1) For a free electron in 3 dimensions travelling along the negative z direction, the waefunction **1** point in the usual notation is given by ( here k is a component of the wavevector)

 $e^{ikz}$ 

assignment.

 $e^{-ikz}$ 

 $e^{ik(x+y+z)}$ 

No, the answer is incorrect.

Score: 0

**Accepted Answers:** 

2) For an electron in 3 dimensions confined to a cubic box of length  $\,L\,$  located 1 point between x=0 and x=L,y=0 and y=L and z=0 and z=L, the wavefunction is proportional to (here  $n_x$ ,  $n_y$  and  $n_z$  are positive integers)

 $\sin\left(\frac{n_x\pi x}{L}\right)\sin\left(\frac{n_y\pi y}{L}\right)\sin\left(\frac{n_z\pi z}{L}\right)$ 

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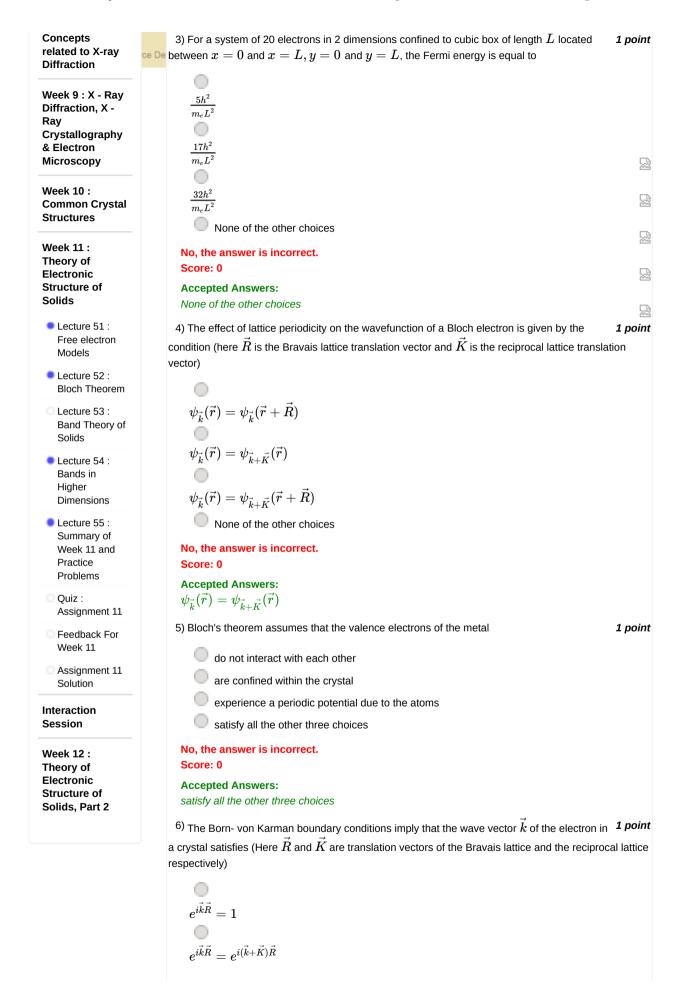
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$ec{k}=rac{n_x\pi}{L_x}\hat{i}+rac{n_y\pi}{L_y}\hat{j}+rac{n_z\pi}{L_z}\hat{k}$ where $L_x,L_y,L_z$ are the lengths of the cell in the three	
directions and $n_x, n_y, n_z$ are integers	
None of the other choices	
No, the answer is incorrect. Score: 0	
Accepted Answers:	2
$ec{k}=rac{n_x\pi}{L_x}\hat{i}+rac{n_y\pi}{L_y}\hat{j}+rac{n_z\pi}{L_z}\hat{k}$ where $L_x,L_y,L_z$ are the lengths of the cell in the three diam $n_x,n_y,n_z$ are integers	rections
7) For a 1D lattice of size $a$ in a crystal of size $L$ , the separation between allowed values of the wave vector $k$ is equal to	1 poi
	,
$2\pi/a$	C/M
$2\pi/L$	
$\pi/L$	
None of the other choices	
No, the answer is incorrect. Score: 0	
Accepted Answers:	
$\pi/L$	
8) The concept of band gap is illustrated by	1 point
the free electron model	
the free electron model with the constraint of lattice periodicity	attice
	attice
the free electron model with the constraint of lattice periodicity the nearly free electron model where the electron interacts weakly with the periodic land None of the other choices  No, the answer is incorrect.	attice
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