Topic Subtopic	Year =	04	05	06	07	08	09	10	11	12	13	14
	# of Times											
Something About Phonons	11	1	1	1	1	1	1	1	1	1	1	1
Define Phonon	1	1										
Phonon Density of States	2						1					1
In 2d	1						1					
In 1d / diatomic	1				1							
How would you measure phonons (light/neutrons)	2		1		1							
Why is there a degeneracy of modes at…	2		1					1				
Debye Specific Heat	4		1	1			1			1		
Derivation in 3d	3				1					1		1
Derivation In 2d	2		1				1					
Derivation In 1d	1				1							
How many/ what kind of (acoustic/optical/transverse/longitudinal) phonon mod	5					1	1	1	1		1	
Describe Motion of acoustic/optical modes	4	1				1	1	1				
Some Sort of Harmonic Chain	7		1	1	1	1		1	1		1	
Diatomic with Two Masses	2					1	1					
Monatomic	3			1					1		1	
Alternating Sprint Constants	2		1					1				
Second or Further Neighbor interactions	1										1	
monatomic limit of diatomic	2		1				1					
Sketch Dispersions / monotomic diatomic	2	1							1			
Something about the Free Electron Gas	8		1		1	1	1	1		1	1	1
Derive Specific Heat of Fermi Gas	2		1			1						
Define Fermi Energy / Fermi Surface	3					1		1				1
Density of States of Free Electron Gas	3		1			1		1				
Definition of	1					1						
Derivation In 3d	1							1				
Derivation In 2d	2		1			0.5		0.5				
Derivation In 1d	0.5						0.5					
Estimate a Fermi Energy / Relationship of N to Ef	6		1		1		1			1	1	1

Topic Subtopic	# of Times	04	05	06	07	08	09	10	11	12	13	14
	0											
Something About Diffraction / Crystal Structure	11	1	1	1	1	1	1	1	1	1	1	1
Derive Structure Factor / Scattering Amplitude	6	1	1			1		1	1		1	
Calculate Interplanar distances	3		1							1	1	
Diffraction	7	1				1	1	1	1		1	1
Derive Systematic Absences	3							1	1			1
When two atoms scatter same; H not scattering	2			1					1			
Analyze a Powder Diffraction Pattern	5	1			1		1			1	1	
Predict Diffraction Data	2			1		1						
Write Down Structure Factor for X	4					1	1		1			1
Identify a unit cell doubling	2	1	1									
Plan View	2						1		1			
primitive vs conventional unit cell	4			1		1	1	1				
Identify Lattice/Basis	4			1		1				1	1	
Calculate Reciprocal Lattice	2	1	1									
Wigner Seitz / Brillouin Zone Construction	3	1						1		1		
Contrast neutron/xray	1						1					
Describe equipment for neutron/xray	2	1	1									

Topic Subtopic	Year =	04	05	06	07	08	09	10	11	12	13	14
	# of Times											
Something about Band Structure/Semiconductor Physics	10	1	1	1	1	1	1	1	1	1		1
Nearly Free Electron Model (NFEM)	6			1		1	1	1	1	1		
Derive Gaps of NFEM at zone boundary	3					1		1	1			
Draw Dispersion	2						1	1				
Describe Effective Mass	3					1		1		1		
Monovalent / Divalent - Metal/Insulator	3					1	1	1				
Gaps open when doubling unit cell	1						1					
Draw a fermi surface in 2d/3d for weak/strong potential	2					1			1			
Tight Binding Band	1			1								
Describe Density of States	1			1								
Describe opening of gap	1			1								
Define Effective Mass	4	1				1	1					1
Define Chemical Potential / Doping	1					1						
Define Mobility	4	1				1	1					1
Define Conductivity	1						1					
Define Hole	2		1									1
Signs of velocity, energy, current, …	2		1									1
Law of Mass Action / formula for n(T,mu)	5		1		1	1		1		1		
Derivation	4				1	1		1		1		
Use to calculate some density/mu when doped	4		1		1			1		1		
Temperature dependence of semiconductors	2	1					1					
Estimate band gap / doping from data	1						1					
How this would be measured	2	1					1					
How chemical potential changes with doping	1		1									
Density of States (1d, 2d, 3d)	2				0.5	0.5	0.5	0.5				
Optical Properties of Semiconductors	1						1					
Direct / Indirect Gap	1						1					
States bound to donors	1						1					
Drude Theory	2						1					1
Derive Hall Coefficient	1						1					

Topic	Subtopic	Year =	04	05	06	07	08	09	10	11	12	13	14
		# of Times											
	Derive Conductivity/Mobility	2	1					1					
	Extract mobility/density from experimental data	2						1					1

Topic Subtopic	Year =	04	05	06	07	08	09	10	11	12	13	14
	# of Times											
Something about magnetism	9	1	1	1	1	1		1	1		1	1
Define Para/Diamagnetism	5			1		1		1			1	1
Estimate Larmor Diamagnetism	1			1								
General Curie Law Derivation	1										1	
Curie Law Derivation for Spin 1/2	4			1		1		1				1
Derive Pauli Paramagnetism	1					1						
Adiabatic Demagnetization	1							1				
What is exchange J	2	1			1							
Molecular (mean) field	6	1	1	1	1				1			1
Relationship of J to Tc	3		1	1	1							
What causes domains	1	1										
Domain Relation to Hysteresis	2	1			1							
Derive Size of Bloch Wall	1	1										