Topic	Subtopic	Year =	04	05	06	07	08	09	10	11
		# of Times								
Something About Phonons		8		1	1	1	1	1	1	1
Define Phonon		1		1						
Phonon Density of States		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		3			1	1		1		
	Derivation in 3d	1				1				
	Derivation In 2d	2			1			1		
	Derivation In 1d	1				1				
How many/ what kind of (acoustic/optical/transverse/longitudinal) phonon		4					1	1	1	
Describe Motion of acoustic/optical modes		4		1			1	1	1	
Some Sort of Harmonic Chain		6			1	1	1	1		1	1
	Diatomic with Two Masses	2					1	1			
	Monatomic	2				1					1
	Alternating Sprint Constants	2			1					1	
	monatomic limit of diatomic	2			1			1			
Sketch Dispersions / monotomic diatomic		2		1							1
Something about the Free Electron Gas		5			1		1	1	1	1	
Derive Specific Heat of Fermi Gas		2			1		1				
Define Fermi Energy / Fermi Surface		2						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		3			1		1		1		

Topic	Subtopic	Year =	04	05	06	07	08	09	10	11
		# of Times								
Something About Diffraction / Crystal Structure		8		1	1	1	1	1	1	1	1
Derive Structure Factor / Scattering Amplitude		5		1	1			1		1	1
Calculate Interplanar distances		1			1						
Diffraction		5		1				1	1	1	1
	Derive Systematic Absences	2								1	1
	When two atoms scatter same; H not scattering	2				1					1
	Analyze a Powder Diffraction Pattern	3		1			1		1		
	Predict Diffraction Data	2				1		1			
	Write Down Structure Factor for X	3						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		2				1		1			
Calculate Reciprocal Lattice		2		1	1						
Wigner Seitz / Brillouin Zone Construction		2		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
		# of Times								
Something about Band Structure/Semiconductor Physics		8	1	1	1	1	1	1	1	1
Nearly Free Electron Model (NFEM)		5			1		1	1	1	1
	Derive Gaps of NFEM at zone boundary	3					1		1	1
	Draw Dispersion	2						1	1	
	Describe Effective Mass	2					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		3	1				1	1		
Define Chemical Potential / Doping		1					1			
Define Mobility		3	1				1	1		
Define Conductivity		1						1		
Define Hole		1		1						
	Signs of velocity, energy, current, …	1		1						
Law of Mass Action / formula for n(T,mu)		4		1		1	1		1	
	Derivation	3				1	1		1	
	Use to calculate some density/mu when doped	3		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						
Quantum Well		2.5			0.5	0.5	0.5	0.5	0.5	
	Density of States in 2d	1.5				0.5	0.5		0.5	
	Density of States In 1d	0.5						0.5		
Optical Properties of Semiconductors		1						1		
	Direct / Indirect Gap	1						1		

Topic	Subtopic	Year =	04	05	06	07	08	09	10	11
		# of Times								
	States bound to donors	1						1		
Drude Theory		1						1		
	Derive Hall Coefficient	1						1		
	Derive Conductivity/Mobility	2		1				1		
	Extract mobility/density from experimental data	1						1		

Topic	Subtopic	Year =	04	05	06	07	08	09	10	11
		# of Times								
		0								
Something about magnetism		7		1	1	1	1	1		1	1
Define Para/Diamagnetism		3				1		1		1	
Estimate Larmor Diamagnetism		1				1					
Curie Law Derivation for Spin 1/2		3				1		1		1	
Derive Pauli Paramagnetism		1						1			
Adiabatic Demagnetization		1								1	
What is exchange J		2		1			1				
Molecular (mean) field		5		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							