Topic	Subtopic	Year =	04	05	06	07	08	09	10
		# of Times							
Something About Phonons		7	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…		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	1
Describe Motion of acoustic/optical modes		4	1			1	1	1	
Some Sort of Harmonic Chain		5		1	1	1	1		1
	Diatomic with Two Masses	2				1	1		
	Monatomic	1			1				
	Alternating Sprint Constants	2		1					1
	monatomic limit of diatomic	2		1			1		
Sketch Dispersions / monotomic diatomic		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			1		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
		# of Times							
Something About Diffraction / Crystal Structure		7	1	1	1	1	1	1	1
Derive Structure Factor / Scattering Amplitude		4	1	1			1		1
Calculate Interplanar distances		1		1					
Diffraction		4	1				1	1	1
	Derive Systematic Absences	1							1
	When two atoms scatter same; H not scattering	1			1				
	Analyze a Powder Diffraction Pattern	3	1			1		1	
	Predict Diffraction Data	2			1		1		
	Write Down Structure Factor for X	2					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
		# of Times							
Something about Band Structure/Semicondcuctor Physics		7	1	1	1	1	1	1	1
Nearly Free Electron Model (NFEM)		4			1		1	1	1
	Derive Gaps of NFEM at zone boundary	2					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	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	1	0.5	0.5
	Density of States in 2d	1.5				0.5	1		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
		# 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
		# of Times							
Something about magnetism		6		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	4		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						