



New Steps to Learning

HVACR Electrical Systems Instructor Resource v2

All Subjects and Sections			1221	218
Topic and Subject#	Subjects		Total Slides	Review Questions
ELE1 Fundamentals			330	71
ELE1	S1	Atoms and Electrons, Ohm's Law, Resistance	68	22
ELE1	S2	AC and DC Current	37	13
ELE1	S3	Meters, Circuits, Loads and Switches	80	19
ELE1	S4	Symbols and Wiring Diagrams	145	17
ELE2 Motors and Motor Starting			509	79
ELE2	S1	Fan Motors	157	31
ELE2	S2	Compressor Relays and Capacitors	138	22
ELE2	S3	Contactors and Motor Starters	73	11
ELE2	S4	Troubleshooting Motors	141	15
ELE3 HVACR Controls and Devices			217	34
ELE3	S1	Thermostats and Heating Controls	87	15
ELE3	S2	Relays, Refrigeration Controls, and Timers	130	19
ELE4 Installation			165	34
ELE4	S1	Power Distribution, Delta and Wye Systems	34	8
ELE4	S2	Wire Sizing and Materials	45	8
ELE4	S3	Electrical Panels, Circuit Breakers & Disconnects	86	18

Topic and Subject#		Subjects	Total Slides	Review Questions
ELE1 Fundamentals				
ELE1	S1	<i>Atoms and Electrons, Ohm's Law, Resistance</i>		
		Title Slide	1	
		2-12 Atoms and Electrons	11	
		13-32 Ohm's Law	20	
		33-43 Resistance	11	
		44-68 Review Questions (22)	25	22
ELE1	S2	<i>AC and DC Current</i>		
		Title Slide	1	
		2 Terms	1	
		3-4 DC Basics	2	
		5-8 AC Basics	4	
		9-18 Generating AC	10	
		19-22 Inductance, Reactance, & Capacitance	4	
		23-37 Review Questions (13)	15	13
ELE1	S3	<i>Meters, Circuits, Loads and Switches</i>		
		Title Slide	1	
		2 Meter Types	1	
		3-6 Voltmeters	4	
		7-10 Ohmmeters	4	
		11-16 Ammeters	6	
		17-18 Circuit Resistance	2	
		19-33 Series Circuits	15	
		34-51 Parallel Circuits	18	
		52-59 Series-Parallel Circuit Diagrams	8	
		60-80 Review Questions (19)	21	19
ELE1	S4	<i>Symbols and Wiring Diagrams</i>		
		Title Slide and Intro	2	
		3-8 Electrical Loads	6	
		9-22 Contactors & Relays	14	
		23-39 Switches	17	
		40-65 Wiring Diagrams	26	
		66-94 Common Diagrams on A/C Units	29	
		95-110 Heat Pump Wiring Diagrams	16	
		111-114 3-Phase Wiring Diagrams	4	
		115-126 9-Lead Compressor Diagrams	12	
		127-145 Review Questions (17)	19	17

Topic and Subject#		Subjects	Total Slides	Review Questions
ELE2 Motors and Motor Starting				
ELE2	S1	Fan Motors		
		Title Slide	1	
		2-5 Basic Motor	4	
		6-8 Motor Starting	3	
		9-21 Shaded Pole Motors	13	
		22-26 Split Phase Motors	5	
		27-32 Centrifugal Switch	6	
		33-36 PSC Motors	4	
		37-52 Motor Speeds	16	
		53-58 Three Phase Motors	6	
		59-63 Motor Types	5	
		64-70 Motor Mounts	7	
		71-77 Motor Nameplates	7	
		78-92 Fan Motor FLA	15	
		93-114 ECMs	22	
		115-120 Motor Service Factor & Efficiency	6	
		121-124 Compressor RLA	4	
		125-157 Review Questions (31)	33	31
ELE2	S2	Compressor Relays and Capacitors		
		Title Slide	1	
		2-10 Compressor Starting	9	
		11-20 Current Relays	10	
		21-26 Adding a Start Capacitor	6	
		27-33 Small Compressor Relay & Overload	7	
		34-41 Potential Relays	8	
		42-49 Run Capacitors	8	
		50-56 PTC Relays	7	
		57-82 Start Kits	26	
		83-114 Making Sense of A/C Start Components	32	
		115-138 Review Questions (22)	24	22

Topic and Subject#	Subjects	Total Slides	Review Questions
ELE2 Motors and Motor Starting			
ELE2	S3	Contactors and Motor Starters	
		Title Slide	1
		2-13 Contactors	12
		14-44 Contactor Troubleshooting	31
		45-52 Ratings of Contactors	8
		53-60 Motor Starters	8
		61-73 Review Questions (11)	13
			11
ELE2	S4	Troubleshooting Motors	
		Title and Info Slides	3
		4-5 Basic Fuse Checking	2
		6-11 Meter CAT Ratings & Safety	6
		12-23 Checking Fused Disconnects	12
		24-40 Checking Motor Windings	17
		41-69 Real Life Compressor Problems	29
		70-78 Voltage & Unbalance	9
		79-93 Troubleshooting Capacitors	15
		94-103 Troubleshooting Start Relays	10
		104-111 Fan Blades	8
		112-124 Condenser Motor Troubleshooting	13
		125-141 Review Questions (15)	17
			15

Topic and Subject#		Subjects	Total Slides	Review Questions
ELE3 HVACR Controls and Devices				
ELE3	S1	<i>Thermostats and Heating Controls</i>		
		Title Slide	1	
		2-6 Line Voltage Thermostats	5	
		7-14 Low Voltage Transformers	8	
		15-28 Low Voltage Thermostats	14	
		29-33 Communicating Thermostats	5	
		34-58 Gas Heating Controls	25	
		59-63 Electric Heating Controls	5	
		64-70 Thermostat Troubleshooting	7	
		71-87 Review Questions (15)	17	15
ELE3	S2	<i>Relays, Refrigeration Controls, and Timers</i>		
		Title & Info Slides	2	
		3-16 Contacts, Poles, & Throws	14	
		17-22 Relay Switching	6	
		23-41 Lockout Relays	19	
		42-68 Comm Ref Controls & Defrost Clocks	27	
		69-84 Pressure Controls	16	
		85-95 Crankcase Heaters	11	
		96-102 Heat Pump Controls & Wiring Diagram	7	
		103-109 EEV - Electronic Expansion Valves	7	
		110-130 Review Questions (19)	21	19

Topic and Subject#		Subjects	Total Slides	Review Questions
ELE4 Installation				
ELE4	S1	<i>Power Distribution, Delta and Wye Systems</i>		
		Title Slide	1	
		2-12 Power Distributions	11	
		13-18 Wye & Delta Configurations	6	
		19-24 Buck-Boost Transformers	6	
		25-34 Review Questions (8)	10	8
ELE4	S2	<i>Wire Sizing and Materials</i>		
		Title & Info Slides	2	
		3-6 Ampacity	4	
		7-23 Wire Marking	17	
		24-31 Sizing Wire, Fuses, & Circuit Breakers	8	
		32-35 Extension Cords	4	
		36-45 Review Questions (8)	10	8
ELE4	S3	<i>Electrical Panels, Circuit Breakers & Disconnects</i>		
		Title & Info Slides	4	
		5-8 Electrical Panels	4	
		9-18 Neutral and Ground	10	
		19-24 Circuit Breakers	6	
		25-36 Ground Fault Interrupter	12	
		37-45 Hair Drier Experiment	9	
		46-53 Arc Fault Interrupter	8	
		54-63 Disconnects for Technician Safety	10	
		64-66 Lock-Out Tag-Out	3	
		67-86 Review Questions (18)	20	18