

Number of units 6	T 4	Pr 2	Th 2	Number of weekly hours	Annual System 30 weeks	Al-Esra'a University College Department: Engineering of Refrigeration and Air Conditioning Technologies
				Electrical and Electronic Engineering		Third stage
<u>Course Objective</u>						
To study the principles of electrical machines and electronic devices that are necessary for refrigeration and air conditioning engineer.						

Week	Topic	Lab. Experiment Assignments	Notes
1	D.C motors, construction, commutator, types of D.C motors	Basic wiring diagram for electrical measurements	
2	Back e.m.f, speed equation, speed control	Measurement of inductive reactance of comp. windings	
3	Starting of D.C motor, starter connection, torque of D.C motors	Test of current, voltage and solid state relay	
4	Speed-torque characteristics of each type of D.C motor	Test and calibrate pressure switch and thermostat	
5	Examples to evaluate the starting current of D.C motor with and without starter, also for speed control	Test of overload and defrost	
6	Single phase induction motor, split-phase, capacitor-start, shaded-pole type	Start-up compressor with solid state relay	
7	3-phase induction motor , construction , synch. Speed, slip .	Start-up compressor with current relay	
8	Control of three-phase induction motor using voltage frequency control .	Start-up compressor with current relay and capacitor	
9	Starting of 3-phase induction motor, star-delta method, step down transformer	Stardelta starter	
10	Torque characteristic, max torque	Teststart and run winding ,effect of damage of winding	
11	3-phase system, star and delta connection, line current, line voltage, phase current and voltage	Makefault on voltage and current relay, effect offaults	
12	Instruments and measurements, ammeters, voltmeter, ohmmeter, kw - h meters .	Simulationof block for refrigerant , notice the effects	
13	Contactors, relays, timers	Simulationof valve damage, notice the	

		effects	
14	Thermal overload, starter (contactor +timer)	Simulationof insufficient refrigerant, notice the effects	
15	Fuse, circuit breakers, types, choice	Dismantlingof induction motor	
Half-year Break			
16	Voltage drop in cables, calculation for choice the size of cable		
17	Diode, V-I characteristic, half –wave rectifier		
18	Full-wave rectifier, bridge and center-top transformer rectifier	Diodecharacteristics	
19	Transistor, construction, types	Halfwave rectifier	
20	Transistor biasing, collector characteristic curves.	Halfwave rectifier with filter	
21	Saturation, active, break-down region and cutoff regions	Fullwave rectifier	
22	Transistor as amplifier and Transistor as electronic switch.	Fullwave rectifier with filter	
23	Thyristor , construction , characteristics , silicon- controlled rectifier .	Diodelimiters	
24	Effect of firing angle on the SCR .	Zenerdiode	
25	SCR applications.	Outputcharacteristics of common emitter transistor	
26	Diac – Traic , characteristics applications with SCR .		
27	Control of A.C devices using solid – state speed control choppers.(1)		
28	Control of A.C devices using solid – state speed control choppers.(2)		
29	Operational amplifier 741.		
30	Integrated circuit applications.		