CMGT 235 – Electrical and Mechanical Systems
Homework #29 – Residential Service Entrance Calculation
Due: 12/1/2022
Points: 20

Name: **Answers**

1. What is the demand load for a 1 hp 120 VAC food waste disposal, ½ hp trash compactor, 1800-watt 120 VAC dishwasher, and a 15A 120 VAC Whirlpool Bathtub?

Food Waste Disposal	16 A x 120 V =	1920 VA
trash compactor	9.8 A x 120 V =	1176 VA
Dishwasher		1800 VA
Hydro Tub	15 A x 120 V =	1800 VA
Total		6696 VA

Apply 75% demand factor if Four or More "Fastened-in-Place" Appliances

Demand Load = 6696 VA x 0.75 = 5022 VA

2. What size grounding electrode conductor is required for a 15,000 sq. ft. commercial building that has installed 400 copper ungrounded service-entrance conductors? Where in the NEC do you find the answer?
   1/0 AWG CU
   Table 250.66

Table 250.66 Grounding Electrode Conductor for Alternating-Current Systems

Size of Largest Ungrounded Service-Entrance Conductor or Equivalent Area for Parallel Conductors[a] (AWG/kcmil)		Size of Grounding Electrode Conductor (AWG/kcmil)	
Copper	Aluminum or Copper-Clad Aluminum	Copper	Aluminum or Copper-Clad Aluminum[b]
2 or smaller	1/0 or smaller	8	6
1 or 1/0	2/0 or 3/0	6	4
2/0 or 3/0	4/0 or 250	4	2
Over 3/0 through 350	Over 250 through 500	2	1/0
Over 350 through 600	Over 500 through 900	1/0	3/0
Over 600 through 1100	Over 900 through 1750	2/0	4/0
Over 1100	Over 1750	3/0	250

Notes:
1. If multiple sets of service-entrance conductors connect directly to a service drop, set of overhead service conductors, set of underground service conductors, or service lateral, the equivalent size of the largest service-entrance conductor shall be determined by the largest sum of the areas of the corresponding conductors of each set.
2. Where there are no service-entrance conductors, the grounding electrode conductor size shall be determined by the equivalent size of the largest service-entrance conductor required for the load to be served.
[a]This table also applies to the derived conductors of separately derived ac systems.
[b]See installation restrictions in 250.64(A).

3. What size Over Current Protection Device (OCPD) is recommended for a 6500 W, 208V 3 phase sauna?

I = 6500 W / 208 V x 1.73 = 18 A

FLA (Continuous)
I = 18 A x 1.25 = 22.6 A

OCPD = 25 A Circuit Breaker or Fuse

Table 240.6(A) Standard Ampere Ratings for Fuses and Inverse Time Circuit Breakers

Standard Ampere Ratings				
15	20	25	30	35
40	45	50	60	70
80	90	100	110	125
150	175	200	225	250
300	350	400	450	500
600	700	800	1000	1200
1600	2000	2500	3000	4000
5000	6000	—	—	—

4. Given a single-family residence with a general lighting load of 24,500 watts. What is the demand lighting load for the residence?

3000 VA @ 100% =	3000 VA
24,500 – 3000 = 21,500 @ 35% =	7525 VA
Total Demand	10,525 VA