ECET 4520 - Fall 2017 **Name:** _____

Lab Assignment #01

General Instructions: This assignment is to be completed individually.

All answers/work required for each problem should be neatly written in the space provided.

This assignment is due by the beginning of class (9^{30}am) on Aug. 31st. Submissions after the deadline will be considered "late" as specified within the course-policy handouts.

ARTICLE 100: As per the NEC, define the following terms:

1. **Ampacity**

2. **Continuous Load**

3. **Ground Fault Circuit Interrupter**

4. **Outlet**

ARTICLE 210: Complete each of the following statements and specify the exact article/sub-section or table number within the NEC that you utilized to obtain the information.

5. Special Purpose Branch Circuits that supply motors, motor circuits, and controllers are covered by Article # _____. Table: _____

6. The standard ratings for other than individual branch circuits are:

   _____, _____, _____, _____ and _____ amps. A/S.S.: _____

7. The nominal voltage of a branch circuit in a dwelling unit that supplies cord-and-plug connected loads rated 1440VA or less shall not exceed _____ volts. A/S.S.: _____

8. Ground Fault Circuit Interruption protection for personnel is required in "Other than Dwelling Units" for all 125V, 1Φ, 15A and 20A receptacles located in:

1) _____
2) _____
3) _____
4) _____
5) _____ A/S.S.: _____

9. Conductors used for General Branch Circuits rated not more than 600V shall have an ampacity (before any adjustments are applied) that is not less than _____ % of the non-continuous loads plus _____ % of the continuous loads. A/S.S.: _____

10. In terms of permissible loads on 15A and 20A branch circuits, the total rating of utilization equipment fastened in-place (other than luminaires) shall not exceed _____ % of the circuit's rating where lighting units and/or cord-and-plug-connected utilization equipment are also supplied. A/S.S.: _____

11. The minimum conductor size for copper circuit wires used in a 30A branch circuit is #_____.

Table: _____

ARTICLE 220: Complete each of the following statements and specify the exact article/sub-section or table number within the NEC that you utilized to obtain the information.

12. Specify the minimum unit load that can be used when calculating the general lighting load in the following occupancies:

Dwelling Units	_____	VA/m^2	or _____	VA/ft^2
Commercial Garages	_____	VA/m^2	or _____	VA/ft^2
Halls/Corridors of non-dwelling units	_____	VA/m^2	or _____	VA/ft^2

Table: _____

13. With respect to receptacle outlets, the minimum load for each outlet used for general-use receptacles shall be calculated at not-less-than _____ VA for each single or multi-receptacle on one yoke or _____ VA per receptacle for multi-receptacle outlets comprised of four or more receptacles. A/S.S.: _____

14. The Lighting Load demand factors for a dwelling unit are:

_____ % for the first 3,000 VA

_____ % for 3,001VA to 120,000 VA

_____ % for the remainder over 120,000VA Table: _____

15. The demand factors for non-dwelling receptacle loads are:

_____ % for the first 10kVA

_____ % for the remainder over 10kVA Table: _____

ARTICLE 240: Complete each of the following statements and specify the exact article/sub-section or table number within the NEC that you utilized to obtain the information.

16. Given the list of ampere ratings shown below, _____ A is <u>not</u> considered a standard ampere rating for fuses or inverse-time circuit breakers.

15A, 35A, 50A, 75A, 100A, 110A, 150A, 175A, 200A A/S.S.: _____

17. Overcurrent protection shall be provided for each ungrounded circuit conductor and shall be located _____

_____, except as specified… A/S.S.: _____

ARTICLE 310: Complete each of the following statements and specify the exact article/sub-section or table number within the NEC that you utilized to obtain the information.

18. When utilized in raceways, conductors of size # _____ (AWG) and larger shall be stranded.

A/S.S.: _____

19. Conductors of size # _____ (AWG) and larger shall be permitted to be connected in parallel.

A/S.S.: _____

20. Specify the temperature rating and application provisions for the following cable types:

THHN – Temp Rating _____ °C Application Provisions _____

THHW – Temp Rating _____ °C Application Provisions _____

RHW-2 – Temp Rating _____ °C Application Provisions _____

Table: _____

21. Utilize Table 310.15(B)(16) or 310.15(B)(17) along with 310.15(B)(2)(a) and 310.15(B)(3)(a) as needed to determine the ampacity (per conductor) for the following conductors/conditions:

a) A single copper #2 AWG, 600V, THHN, conductor rated at 90°C in open air with an ambient temperature of 50°C. Ampacity = _____ A

b) Two, aluminum 3-conductor, 300kcm, 600V, THHN cables, each rated at 75°C, located in the same raceway with an ambient temperature of 38°C, if all six conductors are considered "current-carrying". Ampacity = _____ A

OTHER CALCULATIONS: Complete each of the following tasks:

22. Determine the cross-sectional area in circular mils of a solid, rectangular conductor having cross-sectional dimensions: $\frac{3}{8}$" *x* $1\frac{3}{4}$".

23. Determine the DC resistance of a 400-foot long section of 2/0 AWG, copper conductor at 25°C.
(Note – refer to NEC Table 8 for this task)

24. If a 208V, 3Φ source is used to supply a delta-connected load having the per-phase impedance $Z_{\Delta}=18+j4\Omega$, determine the magnitude of the line currents and with the total complex power provided by the source to the load. Also, completely specify/characterize the power factor of the load.

25. If the load in problem #24 is reconfigured as a wye-connected load having the per-phase impedance $Z_{Y}=18+j4\Omega$, determine the magnitude of the line currents along with the total complex power provided by the source to the load.