Miami Dade College

Course Description

ETP3240| Power Systems | 3.00 credits

This is an upper division level course for students majoring in electronics engineering technology covering specific issues of electrical power systems. Students learn power factor, three phase circuits, and transformers. Prerequisite: EET 1025C.

Course Competencies

Competency 1: The student will apply complex number theory to solving problems involving phase and power factor by:

1. Plotting phasors on a real-imaginary axis
2. Computing phase shifts
3. Analyzing the effect of phase shifts on real, virtual and apparent power
4. Plotting time series given a phasor and a frequency
5. Computing apparent, real and reactive power flow in a system
6. Discussing the effects of complex power flow in circuits

Competency 2: The student will demonstrate the ability to solve problems related to power system efficiency by:

1. Calculating input power to a system
2. Defining and computing useful output power of a system
3. Modeling the transmission of electric power from generators to loads
4. Computing the efficiency of a system
5. Evaluating design methods for improving efficiency

Competency 3: The student will demonstrate an understanding of transformers by:

1. Comparing the various types of transformers relating to cores, oil etc. single tap, multiple tapmac2312
2. Computing the efficiency of a transformer
3. Analyzing transformer reliability
4. Discussing maintenance procedures for transformers
5. Discussing safety procedures and safe handling of transformers
6. Describing safe disposal and refurbishing procedures for transformers
7. Modeling transformer and load representations in power systems

Competency 4: The student will demonstrate the ability to solve phase, power factor, and efficiency problems related to three phase motors by:

1. Creating graphs to illustrate the concept of three phase waveforms
2. Identifying the benefits of three phases and providing examples of specific applications
3. Balancing a three-phase load
4. Performing y- delta and delta- y conversions, as a tool prior to further analysis
5. Comparing and analyzing balanced and unbalanced systems

Competency 5: The student will describe basics of three phase power-generating systems by:

1. Identifying typical components of a three-phase power-generation system
2. Analyzing the functionality of the components of a three-phase power generation system
3. Performing a cost-benefit analysis of electric power systems
4. Employing the per unit system analysis method to compare the efficiency and output power of systems
5. Developing written design recommendations based on system characteristics

Competency 6: The student will demonstrate knowledge of monitoring, maintenance and safety procedures by:

1. Troubleshooting and identifying faults on power systems using computer simulations

2. Recommending appropriate circuit interrupting devices
3. Reading and interpreting system instrumentation and taking appropriate action to insure safe operation
4. Comparing and contrasting various automatic protection schemes
5. Discussing safety regulations relating to power systems
6. Explaining the importance of grounding and describing safe grounding techniques and practices

Competency 7: The student will demonstrate an understanding of power generation and alternative power by:

1. Describing the energy conversion process through the use of photovoltaic cells
2. Describing chemical processes in batteries
3. Describing Electro-mechanical energy conversion

Competency 8: The student will demonstrate the ability to model power transmission lines by:

1. Defining terminology related to power transmission
2. Describing power transmission line parameters
3. Analyzing the steady-state operation of transmission lines
4. Modeling transient spikes in transmission lines
5. Loading and modifying transmission lines

Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Use computer and emerging technologies effectively