Miami Dade College

Course Description

EET2527C | Motor Starters, Controllers, and Breakers | 3.00 credits

This course is designed for students specializing in industrial equipment maintenance covering AC and DC power distribution in the plant. Students learn operating principles, troubleshooting, repair, and maintenance of switch gear, motor control centers, breaker panel power, control, and instrument cable, raceways, protective devices and grounding as related to the generating station. Hands-on, laboratory exercises reinforce each major concept studied. Prerequisites: EET 1141C, EET 2515C.

Course Competencies

Competency 1: The student will demonstrate an understanding of motor controls by:

1. Explaining the principles of motor control
2. Identifying control component parts, explaining the function of each type of part, and describing how they operate
3. Discussing safety standards and procedures to follow when troubleshooting and performing motor maintenance
4. Reading and interpreting drawings, schematics, and manufacturer's literature to identify parts and operating conditions

Competency 2: The student will demonstrate an understanding of how fuses work and how to maintain them by:

1. Describing the function of fuses used in electrical motors
2. Differentiating between types of fuses and their uses
3. Explaining the basic mode of operation of a fuse
4. Identifying the specification information for different types of fuses
5. Testing fuses and identifying malfunctions
6. Performing maintenance operations to replace fuses, including removing a fuse, selecting the proper replacement fuse, and installing a new fuse

Competency 3: The student will demonstrate an understanding of how low voltage circuit breakers work and how to use them for maintenance operations by:

1. Describing the function and operation of circuit breakers
2. Identifying different types of circuit breakers and their respective uses, including molded case, multiple, and ground fault circuit breakers
3. Describing the operation of a small molded case circuit breaker
4. Verifying that a circuit is de-energized
5. Resetting a tripped circuit breaker
6. Interpreting a simple schematic of a circuit breaker control circuit to describe the operation of that breaker during remote operation and automatic tripping
7. Using a characteristic trip curve to interpret test results
8. Identifying and testing the operation of a ground fault circuit breaker
9. Installing a ground fault circuit breaker
10. Observing safety procedures when working with circuit breakers

Competency 4: The student will demonstrate an understanding of how medium voltage circuit breakers work and how to use them for maintenance operations by:

1. Describing the function and operation of medium voltage circuit breakers
2. Describing the construction, application, and operating principles for the following types of medium voltage circuit breakers: Air circuit switchgear Molded case breakers Low and medium power distribution breakers
3. Observing safety procedures when working with medium voltage circuit breakers

Competency 5: The student will demonstrate an understanding of how to maintain switches by:

1. Identifying types of switches and their uses
2. Explaining the operation of different types of switches, including rotary switches, selector momentary and

maintained push- button switches
3. Testing switches to determine if they are functioning properly
4. Explaining the concept of poles and throws
5. Reading and interpreting a switch connection diagram
6. Performing a continuity check on a push- button switch and removing and replacing a defective push-button contact block
7. Following safety procedures when performing maintenance on switches
8. Using circuit diagrams, manufacturer's literatures, and continuity checks to determine component malfunctions

Competency 6: The student will demonstrate an understanding of how to maintain coils and overloads by:
Identifying types of coils and overloads, explaining their uses, and describing how they operate

1. Using circuit diagrams, manufacturer's literatures, and continuity checks to determine component malfunctions.
2. Testing coils to identify malfunctions
3. Testing and replacing overload relays
4. Checking coils for overheating and breaks in the wire winding
5. Explaining how an overload relay protects a motor and describing how a bimetallic thermal overload relay works
6. Describing the characteristics of different types of overload relays and how they work, including melting-alloy thermal, magnetic, and electronic overload relays
7. Describing the common problems of thermal overload relays
8. Installing a thermal overload relay in a starter
9. Installing a thermal overload relay in a starter
10. Following safety procedures when performing maintenance on overload relays

Competency 7: The student will demonstrate an understanding of how to maintain magnetic starters by:

1. Identifying the parts of a magnetic motor starter and explaining its operation
2. Utilizing correct procedures for troubleshooting a magnetic motor starter
3. Using circuit diagrams, manufacturer's literatures, and continuity checks to determine starter schematic malfunctions
4. Determining starter malfunctions using diagrams, manufacturer's literature, continuity checks, and voltage and resistance tests
5. Reversing magnetic motor starters
6. Explaining the parts of a magnetic motor starter and its operation, including describing an electromagnet and explaining how the contactor works
7. Identifying troubleshooting steps and performing sensory inspections
8. Stating three protective features (overloads) that may be incorporated into a motor controller
9. Executing the disassembly of the motor starter
10. Explaining what an interlock is used for and how mechanical and electrical interlocks work

Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Formulate strategies to locate, evaluate, and apply information
- Use computer and emerging technologies effectively