Australian Government

Assessment Requirements for UEEIC0040 Solve problems in polyphase electronic power control circuits

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- applying sustainable energy principles and practices
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- determining the extent of the polyphase electronic power control problem
- developing, evaluating and testing solutions to polyphase electronic power control problem
- documenting justification of solutions implemented in accordance with workplace procedures
- following scheduled timeframes
- obtaining electronic device and circuit parameters, specifications and performance requirements appropriate to each problem
- resolving problems in polyphase electronic power control circuits
- testing and documenting solutions to polyphase electronic power control circuits.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- job safety assessments or risk mitigation processes, including risk control measures
- three phase rectifier circuits, including:
  - three phase circuit configurations
  - resistive/inductive loads
  - output voltages/waveforms
  - ripple voltage/frequency
  - peak reverse voltages
  - freewheeling diodes

    - measurement of rectifier output parameters
- three phase half wave-controlled rectifiers, including:
    - phase control
    - purpose/operation of half wave-controlled rectifiers
    - circuit configuration
    - rectifier performance and operation - resistive loads
    - output voltage resistive load
    - rectifier performance and operation - inductive loads
    - rectifier output waveforms
    - applications and limitations
    - advantages and disadvantages three phase half wave-controlled rectifiers
- three phase half-controlled bridge rectifier, including:
    - purpose/operation of a half-controlled bridge rectifiers
    - circuit configuration and connections
    - rectifier output - resistive loads
    - output voltage resistive loads
    - rectifier output - inductive loads
    - output voltage - inductive loads
    - flywheel diode
    - output voltage calculations
    - applications and limitations
    - advantages and disadvantages three phase half-controlled bridge rectifiers
- three phase fully controlled bridge rectifier, including:
    - purpose/operation of a fully controlled bridge rectifiers
    - circuit configuration and connections
    - rectifier output - resistive loads
    - output voltage resistive loads
    - rectifier output - inductive loads
    - output voltage - inductive loads
    - flywheel diode
    - output voltage calculations
    - applications and limitations
    - advantages and disadvantages three phase fully controlled bridge rectifiers
- three phase alternating current (a.c.) controllers, including:
    - circuit configurations
    - circuit operation
    - triacs and silicon controlled rectifier (SCR) circuits
    - triggering requirements
    - output voltage and waveforms

    - determination of output voltage
    - applications
    - advantages and disadvantages
- direct current (d.c.) converters, including:
    - purpose and operation of d.c. converters
    - circuit configurations
    - voltage control methods
    - forced commutation methods
    - calculation of load voltage
    - output voltage/waveforms
    - applications
    - advantages and disadvantages
- cyclo-converters, including:
    - purpose/operation of a cyclo-converter
    - basic circuit configurations
    - measurement of output voltage
    - calculation of load voltage
    - output voltage/waveforms
    - applications and limitations
    - advantages and disadvantages
- inverters, including:
    - purpose/operation of an inverter
    - basic circuit configurations
    - measurement of inverter outputs
    - output voltage
    - applications and limitations
    - advantages and disadvantages
- thyristor protection, including:
    - power control devices failure
    - protection techniques
    - snubber networks
    - series inductors
    - amp trap high rupturing capacity (HRC) fuses
    - gate pulse suppression
- installation of thyristor devices and circuits, including:
    - need for heat sinking of power thyristor devices
    - heat sink features and types
    - installation methods for all types of thyristor packages
    - basic thermal model, only to demonstrate the effect of different heat sink

    - types and profiles and installation methods on thyristor junction temperature
- series and parallel thyristor connections, including:
    - purpose of series/parallel connection
    - series connections
    - reasons
    - operational problems
    - parallel connections
    - reasons
    - operational problems
- fault finding three phase thyristor circuits, including:
    - fault finding procedures
    - typical faults power and trigger circuits
    - characteristics displayed by common faults
    - comparison of test data with expected data (voltage/current waveforms)
    - location and replacement of faulty components
- problem-solving techniques
- relevant manufacturer specifications
- relevant tools, equipment and testing devices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6