

**-SQA-SCOTTISH QUALIFICATIONS AUTHORITY**

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GLASGOW G2 7NG**

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**NATIONAL CERTIFICATE MODULE DESCRIPTOR**

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**-Module Number- 0074136 -Session-1987-88**  
**-Superclass- XJ**

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**-Title- REPAIR AND REWINDING OF A.C. MACHINES**  
**(x 1<sup>1</sup>/<sub>2</sub>)**

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**-DESCRIPTION-**

Type and Purpose A specialist module which enables a student to acquire an understanding of the principles and practice of the repair and rewinding procedures used for a.c. rotating machines.

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Preferred Entry Level 74135 Basic Dismantling and Reassembly of Electrical Machines and 64167 Electrical Machine Principles

Learning Outcomes The student should:

1. know the systems of windings for one-phase and three phase stators of alternating current rotating machines.
2. know methods of establishing the pole, group and phase connections of stator windings.
3. establish winding data for a stator rewind.
4. know methods of removing windings from stator.
5. rewind a stator.
6. test alternating current machines.

Content/ Context	<p>Safety regulations and safe working practices and procedures should be observed at all times.</p> <p><u>Corresponding to Learning Outcomes 1-6:</u></p> <ol style="list-style-type: none"> <li>1. Construction operation and windings of 3-ph and 1-ph stators i.e. star/delta connections, starting and running windings.</li> <li>2. Necessity for correct connection of coils relative to type of winding, speed and 1-ph or 3-ph operation. Winding connections for dual speed and pole change motors. British Standard terminal markings.</li> <li>3. Relationship between operating voltage, current capacity, number of turns, size of wire, rewinding for change in voltage, types of coil, evolute and mush, coil span and overhang.</li> <li>4. 'Burn off' and chemical stripping.</li> <li>5. Types of insulation to British Standard. Classification, and selection. Preparation and insulation of slots. Use of wedges. Size shape and winding of small motor coils.</li> </ol> <p>Inserting coils in slots for single layer and double layer (full coil and half coil) windings.</p> <ol style="list-style-type: none"> <li>6. Insulation and resistance tests before stoving and varnishing.</li> </ol> <p>Insulation and resistance tests after reassembly.</p> <p>Speed test.</p> <p>Advantages of load testing.</p>
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Suggested Learning and Teaching Approaches	<p>This module primarily involves workshop activities.</p> <p>The approach to LO1, LO2 and LO4 could be instructional and that to LO3, LO5 and LO6 should involve workshop practice, individually or in groups.</p>
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Learning Outcomes could be combined to form a series of practical projects. Every opportunity should be taken to provide practical examples and to ensure the student obtains "hands on" experience of components and techniques.

Safety and good workmanship elements must be stressed continuously.

Assessment  
Procedures

Acceptable performance in the module will be satisfactory achievement of the performance criteria specified for each Learning Outcome.

Where cutting scores are stated these are intended to be for guidance. The precise cutting score for a test will depend on the difficulty of the test and will have to be decided by the Tutor aided by the Assessor.

The following abbreviations are used below:

LO Learning Outcome  
IA Instrument of Assessment  
PC Performance Criteria

LO1 IA Ten short answer questions in which the student, given diagrams of systems or actual systems of windings, is required to identify these systems and to give a short written, oral or graphic description of each.

Five questions should be on 1-ph windings.

Five questions should be on 3-ph windings.

PC Differences between 1-ph and 3-ph machines should be clearly identified and their methods of operation accurately described.

Cutting score 70%.

LO2 IA Ten short answer questions in which the student is required to describe one method of establishing each of the following:

- (a) polarity;
- (b) group connections;
- (c) phase connections

for 1-ph and 3-ph stator windings.

Three questions should be on 1-ph windings.

Seven questions should be on 3-ph windings.

- PC Descriptions should contain:
- (i) appropriate choice of method;
  - (ii) application of methods in correct sequence to establish (a), (b) and (c).
  - (iii) methods to comply with British Standard terminal markings.
- Cutting score 70%.
- LO3 IA Practical exercise and a written list. The student is required to examine an electric motor, extract information from name plate and, by taking measurements, draw up a short written list of the necessary data for a stator rewind.
- PC List to contain all necessary information including operating voltage, current capacity, number of turns, size of wire, rewinding for change in voltage, types of coil, evolute and mush, coil span and overhang.
- LO4 IA Short written exercise in which the student is required to describe the two methods of removing windings from a.c. machines:
- (a) 'burn-off'
  - (b) chemical stripping
- PC Descriptions should include all procedures necessary to carry out each method with appropriate safety precautions.
- LO5 IA Practical exercise in which the student, from given rewinding data for a double layer winding, is required to:
- (a) manufacture coils;
  - (b) insulate stator slots;
  - (c) cut wedges;
  - (d) insert windings;
  - (e) connect windings.

- PC (a) correct physical shape and dimensions;
- (b) correct classification of material and correct dimensions;
- (c) use correct classification of material and correct dimensions.
- (d) ensuring phase barriers in position and windings undamaged and correctly positioned;
- (e) use of appropriate method.
- LO6 IA Practical exercise in which the student carries out tests on a stator to establish:
- (a) insulation resistance;
- (b) ohmic balance.
- PC Uses all correct testing equipment and procedures following all safety precautions.
- Interprets results correctly in line with expected results.