**MODULE II**

**ELECTRICAL INSTALLATION TECHNOLOGY**

**ENG/OS/EI/CR/03/4/MB**

**WIND ELECTRICAL MACHINE**

**SEPTEMBER-NOVEMBER 2025**

**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)**

## PRACTICAL ASSESSMENT

**INSTRUCTIONS TO THE ASSESSOR:**

1. This assessment is to take place in the prescribed order as arranged in the tool.
2. Capture clear **photographs** and/or **videos** of each candidate's work at critical points as they perform the tasks and label all media files with: Candidate Registration Number, Unit Code, Practical Session Number, and Date.
3. Record candidate scores and assessor remarks in the observation checklists for each session.
4. Store all completed checklists, media files, and candidate drawings in a secure digital/physical folder per candidate.

**CANDIDATE & ASSESSOR DETAILS**

| | |
|---|---|
| **Candidate Name:** | **CDACC Reg. No.:** |
| **Assessor Name:** | **Assessor ID Number:** |

**PRACTICAL BRIEF**

In this practical, you will be required to demonstrate competence in winding electrical machine based on the provided drawing. The assessment will involve hands-on sessions and an oral assessment.

**SESSION 1 (3 HOURS): DISASSEMBLE ROTATING ELECTRICAL MACHINE**

| | |
|---|---|
| **Assessment Date:** | |
| **Assessment Venue:** | |

**PRACTICAL CHECKLIST**

| No. | Items of Evaluation | Max Marks | Awarded |
|---|---|---|---|
| 1. | Wore Personal Protective Equipment:<br>• Dustcoat/Overall *(Award 1 or 0)*<br>• Safety boots *(Award 1 or 0)*<br>• Safety gloves *(Award 1 or 0)*<br>• Face mask *(Award 1 or 0)* | <br>1<br>1<br>1<br>1 | |
| 2. | Ensured machine was electrically isolated before starting (Award 2 or 0) | 2 | |
| 3. | Applied good housekeeping practice:<br>• Ensured clean working area before beginning working. *(Award 1 or 0)*<br>• Tidy working area arrangement *(Award 1 or 0)* | <br>1<br>1 | |

| | | | |
|---|---|---|---|
| | • Proper Waste disposal *(Award 1 or 0)* | 1 | |
| 4. | Recorded Winding Data:<br>• Number of coils *(Award 2 or 0)*<br>• Number of turns per coil *(Award 2 or 0)*<br>• Wire gauge size *(Award 2 or 0)*<br>• Coil pitch *(Award 2 or 0)*<br>• Coil span *(Award 2 or 0)* | <br>2<br>2<br>2<br>2<br>2 | |
| 5. | Disassembled Machine Parts:<br>• Removed end shields/covers without damage *(Award 2 or 0)*<br>• Extracted rotor without damaging stator or windings *(Award 2 or 0)*<br>• Disassembled bearings using appropriate tools *(Award 2 or 0)*<br>• Organized and labelled parts for reassembly *(Award 1 x any 5)* | <br>2<br>2<br>2<br>5 | |
| | **TOTAL** | **30** | |
| **REMARKS:** | | | |

**NB: Photos and videos should be taken as the candidate performs item 5.**

## SESSION 2 (3 HOURS): INSTALL MACHINE WINDING

| | |
|---|---|
| **Assessment Date:** | |
| **Assessment Venue:** | |

### PRACTICAL CHECKLIST

| No. | Items of Evaluation | Max Marks | Awarded |
|---|---|---|---|
| 1. | Wore Personal Protective Equipment<br>• Dustcoat/Overall *(Award 1 or 0)*<br>• Safety boots *(Award 1 or 0)*<br>• Safety gloves *(Award 1 or 0)*<br>• Face mask *(Award 1 or 0)* | <br>1<br>1<br>1<br>1 | |
| 2. | Cleaned Rotating Machine Parts<br>• Cleaned stator slots of old insulation/debris *(Award 2 or 0)*<br>• Cleaned Rotor *(Award 3 or 0)* | <br><br>2<br>3 | |
| 3. | Wound new coils to correct specifications:<br>• Turns *(Award 4 or 0)*<br>• Size *(Award 3 or 0)*<br>• Shape *(Award 2 or 0)* | <br>4<br>3<br>2 | |
| 4. | Applied correct slot insulation/liners *(Award 2 or 0)* | 2 | |
| 5. | Laid Coils in Stator Slots<br>• Coils inserted correctly without damaging insulation *(Award 4 or 0)*<br>• Correct coil grouping and placement as per recorded data *(Award 3 or 0)*<br>• Wedges fitted to secure coils *(Award 2 or 0)* | <br><br>4<br><br>3<br>2 | |
| 6. | Cured Stator Windings<br>• Connected coil ends *(Award 2 or 0)* | <br>2 | |

| | | | |
|---|---|---|---|
| | • Soldered coil ends *(Award 2 or 0)*<br>• Applied appropriate insulating varnish/treatment *(Award 2 or 0)*<br>• Connections insulated with sleeves/tape *(Award 2 or 0)* | 2<br>2<br>2 | |
| | **TOTAL** | **37** | |
| **REMARKS:** | | | |

**NB: Photos and videos should be taken as the candidate performs items 3, 5 and 6.**

## SESSION 3 (3 HOURS): ASSEMBLE MACHINE AND PERFORM TESTING

| | |
|---|---|
| **Assessment Date:** | |
| **Assessment Venue:** | |

### PRACTICAL CHECKLIST

| No. | Items of Evaluation | Max Marks | Awarded |
|---|---|---|---|
| 1. | Assembled Rotating Machine<br>• Rotor and stator correctly aligned *(Award 2 or 0)*<br>• Air gap is even *(Award 2 or 0)*<br>• End shields/covers fitted correctly and evenly *(Award 2 or 0)*<br>• Bolts and nuts fastened to correct torque/ tightness *(Award 2 or 0)*<br>• Bearings correctly fitted and seated *(Award 2 or 0)*<br>• Bearings lubricated with appropriate grease *(Award 2 or 0)* | 2<br>2<br>2<br>2<br>2<br>2 | |
| 2. | Performed Electrical Tests<br>• Continuity Test: Confirmed all windings are continuous *(Award 4 or 0)*<br>• Polarity Test: Confirmed winding polarity is correct *(Award 4 or 0)*<br>• Insulation Resistance Test: IR value > 1 MΩ as per IEC *(Award 5 or 0)*<br>• Voltage/Current Balance Test: Readings are within acceptable balance *(Award 4 or 0)* | 4<br>4<br>5<br>4 | |

| | | | |
|---|---|---|---|
| 3. | Carried out Housekeeping<br>• Tools cleaned and returned to storage *(Award 2 or 0)*<br>• Work area left clean and tidy *(Award 2 or 0)* | <br>2<br>2 | |
| | **TOTAL** | **33** | |
| **REMARKS:** | | | |

**NB: Photos and videos should be taken as the candidate performs items 1 and 2.**

**SECTION 3: ORAL ASSESSMENT (25 MARKS)**

Assessor to award marks for each correct response by the candidate in the table below:

| Q# | Question | Expected Key Points | Max Marks | Awarded |
|---|---|---|---|---|
| 1 | Why is it critical to record winding data before disassembly? | To ensure the new winding matches the original design for correct speed, torque, and performance. | 1 | |
| 2 | State three safety hazards when disassembling a motor. | Electrical shock (if not isolated), cuts from sharp metal edges, crush injury from dropping heavy parts. | 3 | |
| 3 | Explain the purpose of slot insulation. | To provide electrical isolation between the copper windings and the earthed stator core, preventing a short circuit. | 2 | |
| 5 | Explain the consequence of over-greasing a bearing. | Excess grease can cause overheating due to churning and may damage the bearing seals. | 2 | |
| 6 | Explain the purpose of the continuity test. | To verify there is a complete path for current flow and no open circuits within the windings. | 2 | |
| 7 | What does an Insulation Resistance (IR) test check? | It checks the quality of the insulation between the windings and the motor frame (earth) to ensure it is not weak or broken down. | 2 | |
| 8 | State the minimum acceptable IR value for a motor as per IEC standards. | 1 Megaohm (1 MΩ). | 1 | |
| 9 | What would a failed polarity test indicate? | That the internal connections between coil groups are incorrect, which will | 1 | |

| | | | | |
|---|---|---|---|---|
| | | affect the direction of rotation and the strength of the magnetic field. | | |
| 10 | State two reasons why final housekeeping considered part of the professional work procedure. | It ensures a safe work environment, maintains tool integrity, and reflects professionalism and pride in one's work. | 2 | |
| 11 | Name two common types of bearings used in electric motors. | Ball bearings and roller bearings. | 2 | |
| 12 | State three safety measure that must be observed during machine winding. | Wear PPE<br>Use correct tools<br>Keep the area clean and<br>Ensure the machine is de-energized to avoid trips and electric shock. | 3 | |
| 13 | Explain two likely problems if a reassembled motor draws high current but does not turn? | Mechanical seizure, bearings installed incorrectly, rotor misaligned and rubbing on stator). | 2 | |
| | **TOTAL** | | **25** | |

**SUMMARY OF ASSESSMENT**

| **SECTION** | **Total Marks** | **Marks Awarded** |
|---|---|---|
| Assessment 1 | 30 | |
| Assessment 2 | 37 | |
| Assessment 3 | 33 | |
| **TOTAL** | **100** | |
| **Percentage %** | | |
| **ORAL ASSSESMENT** | | |
| **Oral assessment** | **25** | |
| **Percentage %** | | |

**ASSESMENT OUTCOME**

The candidate was found to be:

Competent ☐ Not yet Competent ☐

*(Please tick as appropriate)*

The candidate is competent if the candidate obtains at least 50%