



Skills for Employment Investment Program (SEIP)

ASSESSMENT TOOL FOR ELECTRICAL INSTALLATION AND MAINTENANCE (*CONSTRUCTION SECTOR*)

Finance Division, Ministry of Finance
Government of the People's Republic of Bangladesh

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PART A – THE ASSESSOR

Instructions to Assessor

Assessment is the process of identifying a candidate's skills and knowledge set against the industry established standards in the workplace. It requires the candidate to consistently and over time demonstrate skills, knowledge and attitude that enable confident completion of workplace tasks in a variety of situations.

In judging assessment evidence, the assessor must ensure that the evidence is:

- authentic (the candidate's own work)
- valid (directly related to the current version of the endorsed competency standard)
- reliable (show that the candidate consistently meets the endorsed unit of competency)
- current (reflects the candidate's current capacity to perform the aspect of work covered by the endorsed unit of competency)
- sufficient (covers the full range of elements in the relevant unit of competency)

There are a number of assessment methods that may be employed including but not limited to:

- written examination
- oral questioning
- practical demonstration

A single unit of competency may be assessed or a group of units of competency may be assessed, either in an actual workplace or a simulated workplace environment.

Conducting Assessment

Prior to commencement of assessment, candidates must have the tasks clearly explained to them. Also, the assessor should provide candidates with clear advice and information about the:

- date, time and place for assessment
- structure of assessment
- number of times performance must be demonstrated or observed
- amount or type of assistance candidates can expect
- assessment environment
- resources required for assessment
- performance standards or benchmarks relevant to the qualification

As well as informing the candidate of what they will be required to do during the assessment, the assessor will also need to explain what evidence they will need to provide in response to the various assessment tasks.

If a candidate is required to submit evidence, any explanation must include specific guidance on:

- what to include as evidence
- how to present the evidence
- how to submit the evidence and to whom

Assessing Competence

Competency-based assessment does not award grades, but simply identifies if the candidate has the skills, knowledge and attitudes to undertake the required task to the specified standard.

Therefore, when assessing competency an assessor has two possible results (assessment decisions) that can be awarded:

- Competent (C)
- Not Yet Competent (NYC)

Competent (C)

If the candidate is able to successfully answer and demonstrate what is required to the expected standard of the assessment criteria, they will be deemed as 'Competent'.

The assessor will award 'Competent' if they feel the candidate has the necessary skills, knowledge and attitudes in all assessment tasks for a given package.

Not Yet Competent (NYC)

If the candidate is unable to answer and demonstrate competency to the expected standard, they will be deemed to be 'Not Yet Competent'.

This does not mean the candidate will need to complete all the assessment tasks again. When applying for reassessment, the focus will be on the specific assessment tasks that were not performed to the required standard.

The candidate may be required to:

- (a) undertake further training or instruction
- (b) undertake the specific assessment task again until they are deemed to be competent

Recording Assessment Information

When all assessment tasks are concluded, the evidence summary sheet should be completed, signed by all parties, and any outstanding activities or issues actioned.

The assessor should ensure that all appropriate forms are completed and signed by all parties.

CHECKLIST FOR ASSESSOR		
Prior to the assessment I have:	Tick (✓)	Remarks
Ensured the candidate is informed about the venue and schedule of assessment.		
Received current copies of the assessment criteria to be assessed, assessment plan and evidence plan.		
Reviewed the assessment criteria and evidence plan to ensure I clearly understood the instructions and the requirements of the assessment process.		
Identified and accommodated any special needs of the candidate.		
Checked the set-up and resources for the assessment.		
During the assessment I have:		
Introduced myself and confirmed identities of candidates.		
Collected the admission slips.		
Put candidates at ease by being friendly and helpful.		
Checked completed self-assessment guide.		
Explained to candidates the purpose, context and benefits of the assessment.		
Ensured candidates understood the assessment process and the assessment procedure.		
Provided candidates with an overview of the assessment criteria to be used.		
Gave specific and clear instructions to the candidates.		
Observed carefully the specified time limits provided in the assessment package.		
Stayed at the assessment area during the entire duration of the assessment activity.		
Ensured notes are made on unusual conditions or situations during the assessment and include these in the report.		
Did not provide any assistance during the assessment or indicated in any way whether the candidate is or is not performing the activity correctly (intervened only for health and safety reasons).		

Implemented the evidence gathering process and ensured its validity, reliability, fairness and flexibility.		
Collected appropriate evidence and matched relevance to the elements, performance criteria, range of variables and evidence guide in the relevant units of competency.		
Explained the results reporting procedure to the candidate.		
Encouraged candidates to seek clarifications if in doubt about the pre- and post-assessment activity procedures.		
Asked candidates for feedback on the assessment.		
Explained legal, health and safety, and ethical issues, if applicable.		
After the assessment I have:		
<p>Provided feedback on the assessment decision. This includes the following:</p> <ul style="list-style-type: none"> ▪ clear and constructive feedback on the assessment decision ▪ information on ways of addressing any identified gaps in competency revealed by the assessment ▪ opportunity to discuss the assessment process and outcome ▪ information on reassessment process (if necessary) ▪ information on appeal (if necessary) 		
<p>Prepared the necessary assessment reports. This includes the following:</p> <ul style="list-style-type: none"> ▪ record the assessment decision using the prescribed rating sheet ▪ maintain records of the assessment procedures, evidence collected and assessment decision ▪ endorse assessment decision to BTEB ▪ prepare recommendations for the issuance of certificate 		
Thanked candidate for participating in the assessment.		

Assessment Evidence Guide

The purpose of assessment is to confirm that an individual can perform to the standards expected by in the workplace, as expressed in the competency standards.

To attain the certificate of **Electrical Installation and Maintenance**, a candidate must demonstrate competent skill and knowledge in all the units of competency listed below. Upon successful completion of all assessment activities, a candidate shall be awarded with a certificate.

CODE	UNIT OF COMPETENCY
Generic Competencies	
GN1001A1	Use basic mathematical concepts
GN100112A1	Communicate in the workplace
GN2003A1	Apply occupational health and safety (OHS) practices in the workplace
GN2004A1	Operate in a self-directed team
Sector-specific Competencies	
LG-EIM	Interpret drawings and specifications in electrical installation
SEIP-LIG-ELE-2-S	Use hand and power tools for electrical works
LG-EIM	Work with industrial electrical sector
Occupation-specific Competencies	
SEIP-LIG-ELE-3-O	Perform channel wiring
SEIP-LIG-EIM-2001A1	Perform conduit wiring
SEIP-LIG-ELE-5-O	Install earthing and atmospheric lighting protection system
SEIP-LIG-EIM-2002A1	Perform service connection
SEIP-LIG-EIM-3001A1	Perform motor connection with protective and controlling devices
SEIP-LIG-EIM-3003A1	Install and maintain of electric motor with control system

Assessment Evidence Plan

An assessment evidence plan is a document that assists in establishing what evidence needs to be collected by the assessor to ensure that the candidate meets all the appropriate requirements of the competency standard. It usually contains a record of:

- evidence requirements as set out in the competency standard
- who will collect the evidence
- time period needed to collect the evidence

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Use basic mathematical concepts					
Unit Code:	GN1001A1					
Assessment Method:	P	O	W			
	Performance <i>(including demonstration and observation)</i>	Oral questioning	Written examination <i>(including short-answer, multiple choice, and true or false questions)</i>			
Element	Performance Criteria			P	O	W
1. Identify calculation requirements in the workplace	1.1. Calculation requirements are identified from workplace information.					√
2. Select appropriate mathematical methods for calculation	2.1. Appropriate method is selected to carry out the calculation requirement.			√		√
	2.2. System and units of measurement to be followed are determined.			√		√
3. Use basic mathematical concepts to calculate workplace calculation	3.1. Calculations are completed using appropriate methods such as addition, subtraction, multiplication and division.			√		√
	3.2. Systems and units of measurement for the task are applied to workplace calculation.			√		√

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Communicate in the workplace					
Unit Code:	GN100112A					
Assessment Method:	P	O	W			
	Performance <i>(including demonstration and observation)</i>	Oral questioning	Written examination <i>(including short-answer, multiple choice, and true or false questions)</i>			
Element	Performance Criteria			P	O	W
1. Receive verbal instructions	1.1. Instructions are accessed and interpreted.					√
	1.2. Questions are asked to clarify understanding or gain more information.				√	

	1.3. Information/instruction is properly recorded.			√
2. Interpret verbal and written instructions	2.1. Written instructions are interpreted.			√
	2.2. Work signage is responded.	√		
	2.3. Routine written instructions are followed in sequence.	√	√	
	2.4. Feedback is given to the workplace supervisor.		√	
3. Convey instructions using verbal and written forms of communication	3.1. Relevant communication methods are used to transmit instructions.	√	√	
	3.2. Appropriate non-verbal communication is used.	√	√	
	3.3. Channels of communication identified and followed.	√		√
	3.4. Communication tools and equipment are operated, and faults are identified and reported.	√	√	
	3.5. Information is conveyed using appropriate forms.	√		√
4. Complete written documentation	4.1. All required documentation is completed accurately and on time.			√
	4.2. Workplace data is recorded using approved formats or templates.			√
	4.3. Written information/instruction are passed to appropriate personnel.		√	
5. Participate in workplace meetings and discussions	5.1. Meetings are attended regularly and on time following well-disseminated agenda.		√	
	5.2. Meeting inputs are consistent with the meeting purpose and established protocols.			√
	5.3. Opinions are expressed without interruption.			√
	5.4. Meeting outputs are processed and implemented.			√

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Apply occupational health and safety (OHS) practice at workplace					
Unit Code:	GN2003A1					
Assessment Method:	P	O	W			
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)			
Element	Performance Criteria			P	O	W
1. Identify OHS policies and procedures	1.1. OHS policies and safe operating procedures are interpreted.					√

	1.2. Personal protective equipment (PPE) are identified and used.	√		
	1.3. Safety signs and symbols are identified and followed.	√		
	1.4. Response, evacuation procedures and other contingency measures are interpreted as per standard.		√	
2. Apply personal and safety practices	2.1. OHS policies and procedures are applied in the workplace.	√		
	2.2. Common health issues are recognised.			√
	2.3. Common safety issues are identified and followed.		√	
3. Report hazards and risks	3.1. Hazards and risks are identified.	√		
	3.2. Hazards and risks assessment and controls are interpreted.			√
4. Respond to emergencies	4.1. Responded to alarms and warning devices.		√	
	4.2. Emergency response plans and procedures are followed as appropriate to the nature of the emergency and according to workplace procedures.			√
	4.3. First aid procedures for dealing with accidents, fires and emergencies are followed whenever necessary within scope of responsibilities.		√	

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Operate in a self-directed team					
Unit Code:	GN2004A1					
Assessment Method:	P	O	W			
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)			
Element	Performance Criteria			P	O	W
1. Identify team goals and processes	1.1. Team goals and processes are identified.					√
	1.2. Roles and responsibilities of team members are identified.			√		
	1.3. Relationships within team and with other work areas are identified.			√		
2. Communicate and cooperate with team members	2.1. Effective interpersonal skills are used to interact with team members and to contribute to activities and objectives.	√				√
	2.2. Formal and informal forms of communication are used effectively to support team achievement.	√				√

	2.3. Diversity is respected and valued in team functioning.	√	√	
	2.4. Views and opinions of other team members are understood and reflected accurately.	√	√	
	2.5. Workplace staff regulation is used correctly to assist communication.			√
3. Work as a team member	3.1. Duties, responsibilities, authorities, objectives and task requirements are identified and clarified with team.			√
	3.2. Tasks are performed in accordance with organisational and team requirements, specifications and workplace procedures.	√		√
	3.3. Team member's support other members as required to ensure team achieves goals and requirements.	√	√	
	3.4. Agreed reporting lines are followed using standard operating procedure.			√
4. Solve problems as team member	4.1. Current and potential problems faced by team are identified.			√
	4.2. Procedures for avoiding and managing problems are identified.		√	
	4.3. Problems are solved effectively and in a manner that supports the team.		√	

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Interpret drawings and specifications					
Unit Code:	LG-EIM					
Assessment Method:	P	O	W			
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)			
Element	Performance Criteria			P	O	W
1. Identify information from manuals	1.1. Appropriate manuals are identified and accessed.					√
	1.2. Version and date of manual are checked to ensure up-to-date specifications of tools, equipment, materials and procedures.					√
2. Identify drawings and specifications	2.1. Relevant drawings and specification are identified.			√		
	2.2. Terms and abbreviations are identified.					√
	2.3. Signs and symbols are identified.				√	
	3.1. Drawings and specifications are interpreted.				√	

3. Interpret drawings and specifications	3.2. Schedules, dimensions and specifications contained in the drawings are interpreted.		√	
4. Store manuals	4.1. Manuals and documents are collected and packed.			√
	4.2. Manuals and documents are stored appropriately to prevent damage, ready access and updating of information where required.			√

Occupation:	Electrical Installation and Maintenance				
Unit Name:	Use hand and power tools for electrical works				
Unit Code:	SEIP-LIG-ELE-02-S				
Assessment Method:	P	O	W		
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)		
Element	Performance Criteria	P	O	W	
1. Inspect hand tools and power tools for usability	1.1. Hand tools are identified.	√			
	1.2. Application of tools to job requirement is interpreted.	√			
	1.3. Usability of tools are checked and verified.	√		√	
	1.4. Hand tools and power tools are prepared.	√			
	1.5. Sources of power supply for power tools identified.	√			
2. Use hand tools	2.1. Appropriate hand tool for the job is used.	√			
	2.2. Proper and safe use and operation of hand tools are applied.	√			
	2.3. Safety precautions is observed when using hand tools.	√		√	
	2.4. Unsafe or faulty tools are identified and marked for repair.	√	√		
3. Operate power tools	3.1. Power supply outlet and electrical cord are inspected and confirmed safe for use in accordance with established workplace safety requirements.	√		√	
	3.2. Proper sequence of operation is applied in using power tools.	√	√		
	3.3. Power tools are used safely in accordance to manufacturer's operating specification.	√			
4. Clean and maintain hand tools and power tools after use	4.1. Dust and foreign matters are removed from power tools in accordance to workplace standard.	√			
	4.2. Condition of tools is checked after use.	√			

	4.3. Appropriate lubricant is applied after use and prior to storage.	√		
	4.4. Measuring tools are checked and calibrated.	√		
	4.5. Defective tools, instruments, power tools and accessories are inspected and corrected or replaced.	√		

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Work with industrial electrical sector					
Unit Code:	LG-EIM					
Assessment Method:	P	O	W			
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)			
Element	Performance Criteria			P	O	W
1. Comprehend structure of electrical sector within the industry	1.1. Scope, nature and major fields of electrical sector in the industry are comprehended.			√		
	1.2. Profile of electrical sector in the industry in relation to Bangladesh employment conditions is comprehended.					√
	1.3. Trends and technologies relevant to the sector are outlined.					√
	1.4. Relevant policies and guidelines are identified and interpreted.			√		
	1.5. Instructions as to procedures in achieving quality are obtained and clarified.					
2. Identify job roles and responsibilities	2.1. Job roles and responsibilities in the industrial electrical sector are identified.					√
	2.2. Employee relationships within the industrial electrical sector are identified.					√
3. Plan work activities	3.1. Common goals, objectives and tasks are identified and clarified with appropriate persons.					√
	3.2. Individual tasks are determined and agreed on according to workplace environment.				√	
4. Clean and maintain measuring instruments	4.1. Workplace requirements are identified and clarified.			√		
	4.2. Workplace practices are interpreted.			√		
	4.3. Problem-solving strategies are used to address bottlenecks, inconsistencies and other concerns.			√		
5. Organize own workload	5.1. Own work activities are planned and progress of work is communicated to relevant staff.				√	

	5.2. Work activities are completed based on workplace standards.	√		
	5.3. Difficulties and bottlenecks are identified, and solutions are put forward.	√		
	5.4. Own work is monitored against workplace standards and areas for improvement are identified and acted upon.	√		
6. Work with others	6.1. Effective interpersonal skills are applied to interact with others and to contribute activities and objectives.		√	
	6.2. Assigned tasks are performed in accordance with job requirements, specifications and workplace environment.		√	
	6.3. Work requirements are confirmed with colleagues	√		
7. Identify and observe OHS in the industrial electrical sector	7.1. Personal protective equipment (OHS) in the industry is identified and observed.	√		
	7.2. Industry hazards are identified.	√		
	7.3. Safe work practices are followed when using equipment in the work environment.	√		

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Perform channel wiring					
Unit Code:	SEIP-LIG-ELE-03-0					
Assessment Method:	P	O	W			
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)			
Element	Performance Criteria			P	O	W
1. Interpret drawings and specifications	1.1. Drawings are collected and interpreted.			√		
	1.2. Sign and symbols are identified.			√		
	1.3. Terms and symbols are identified.			√		
	1.4. Specifications are interpreted.			√		
2. Collect tools, equipment and materials	2.1. Tools, equipment and materials are collected.			√		√
	2.2. Tools, equipment and materials are checked for usability.			√	√	
3. Draw the layout and set channels and cables	3.1. PPE is collected and used.			√		
	3.2. Wiring layout is drawn according to supplied drawing.			√		

	3.3. Rowel plug points are located, drilled and inserted as per procedure.	√		
	3.4. Bottom part of channels are installed and screwed.	√		
	3.5. Cables with ECC are laid on the bottom part of the channel.	√		
4. Install boards and set all others accessories of wiring	4.1. Boards are collected and fitted as per drawing diagram.	√		
	4.2. Switches, sockets, fan regulator and ballast are fitted on the board with screw.	√		
	4.3. Switches, sockets and fan regulator are connected to the circuits.	√		
	4.4. Ceiling rose and different types of holders are fitted on the board.	√		
	4.5. Those fixtures are connected to the circuit.	√	√	
	4.6. MCB and MCBB are connected and fitted on the board.	√		
5. Perform circuit operation as per diagram and layout	5.1. Bottom parts of the channels are placed and set according to drawing on the board.	√		
	5.2. Cables are drawn through the bottom part of the channels.	√		
	5.3. Circuit materials required for the specified circuit are placed on the board.	√		
	5.4. Other accessories are connected and fitted.	√		
	5.5. The bottom parts of the channels are covered with upper part of the channel.	√		
6. Clean the work place	6.1. Tools and equipment are prepared for cleaning.	√		
	6.2. Tools and equipment are stored as per standard.	√		
	6.3. Waste materials are disposed as per workplace standard.	√		

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Perform conduit wiring					
Unit Code:	SEIP-LIG-EIM-2001A1					
Assessment Method:	P	O	W			
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)			
Element	Performance Criteria			P	O	W

1. Collect tools, equipment and materials	1.1. Tools, equipment and materials are checked for usability.	√		
	1.2. PPE's are collected and used.	√	√	
	1.3. Drawings are collected and interpreted.	√		
2. Install conduits and set cables	2.1. Layout is drawn on the wall as per drawing.	√		
	2.2. Wall is cut and grooved.	√		
	2.3. Collected conduits are cut and set.	√		
	2.4. Conduits are installed on the wall and clamped.	√		
	2.5. Fish wires are measured and cut.	√		
	2.6. Fish wire is inserted.	√		
	2.7. Collected cables are cut.	√		
	2.8. Cables are tied with fish and insert into the conduit.	√		
3. Install boards and other accessories of wiring	3.1. Boards are collected and fitted.	√		
	3.2. Switches, sockets, fan regulator and ballast are fitted on the board with screw.	√		
	3.3. Switches, sockets and fan regulator are connected to the circuits.	√		
	3.4. Ceiling rose and different types of holders are fitted on the circuits.	√		
	3.5. Those fixtures are connected to the circuit.	√	√	
	3.6. MCB and MCCB are connected and fitted on the board.	√		
4. Test the wiring	4.1. Polarity of wiring is checked by megger as per procedure.	√		
	4.2. Polarity is justified and checked each of the switches, fuses and circuit breakers.	√		
	4.3. The main switches and circuit breakers are disconnected.	√		
	4.4. All loads are connected and checked the continuity each of the switches and circuit breakers.	√		
	4.5. By observing the zero positions of the megger continuity is tested and insulation resistance is measured.	√		
5. Measure the earth resistance	5.1. The earth terminals are connected as per appropriate measurements and positions.	√		
	5.2. By observing the positions of the pointer of the megger earth resistance is measured.	√		
6. Clean the workplace	6.1. Cleaning tools and equipment are selected and collected.	√		

	6.2. Cleaning tools and equipment are prepared for cleaning and waste materials are disposed.	√		
	6.3. Cleaning is completed.	√		

Occupation:	Electrical Installation and Maintenance			
Unit Name:	Install earthing and atmospheric lightning protection system			
Unit Code:	SEIP-LIG-ELE-05-0			
Assessment Method:	P	O	W	
	Performance <i>(including demonstration and observation)</i>	Oral questioning	Written examination <i>(including short-answer, multiple choice, and true or false questions)</i>	
Element	Performance Criteria	P	O	W
1. Identify the type of earthing to be used	1.1. Types and method of earthing is identified in accordance to electrical plan/design.	√		
	1.2. Types and sizes of earthing materials are identified in accordance to electrical plan/design.	√		
2. Identify the type of lightning protection system to be used	2.1. Types of lightning protection system is identified in accordance to electrical plan/design.	√		
	2.2. Types and sizes of lightning protection system materials are identified in accordance to electrical plan/design.	√		
3. Select and collect tools, equipment and materials	3.1. Tools and equipment are selected and collected.	√		
	3.2. Tools and equipment are checked for usability.	√		
	3.3. Earthing materials are collected and checked for conformance in accordance to specification.	√		
	3.4. Lightning protection materials are collected and checked for conformance in accordance to specification.	√		
4. Excavate the hole for earthing element installation	4.1. PPE is collected and used in accordance to OHS requirements.	√	√	
	4.2. Hole is dug following with safety requirements.	√		
	4.3. Hole is shaped and sized in accordance to electrical plan/design specification.	√		
5. Install earthing components	5.1. Earthing element is fitted in the bottom of the excavated hole following standard earthing procedure.	√		
	5.2. Earth lead is connected to the earth element tightly and brought up the meter board through the conduit.	√		

	5.3. Powdered charcoal and salt are laid around the earthing element in accordance to workplace procedure.	√		
	5.4. A proper sized and length of GI pipe is fitted from top of the earth element to the bottom of the earth pit chamber.	√		
	5.5. Rest of the excavated hole is filled with earth.	√		
6. Finish earth pit chamber for pipe earthing method	6.1. Earth pit chamber is constructed with brick chips, cements sand and water mixture in accordance with standard/specification.	√		
	6.2. Pit chamber cover is made with G.I. sheet in accordance with electrical plan/design.	√		
	6.3. Pit cover is fitted/installed on the pit chamber.	√		
	6.4. Check earth resistance in accordance with electrical plan/specification.	√		
7. Install lightning protection system	7.1. Lightning rod is installed at specified location.	√		
	7.2. Earth down conductor is connected as per diagram.	√		
	7.3. Performance of lightning protection system (LPS) is tested as per standard.	√		
8. Clean/maintain the work area	8.1. Electrical tools/instruments are cleaned and checked for operability.	√		
	8.2. Work area is cleaned as waste materials are disposed in accordance with workplace requirements.	√		

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Perform a service connection					
Unit Code:	SEIP-LIG-EIM-2002A1					
Assessment Method:	P	O	W			
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)			
Element	Performance Criteria			P	O	W
1. Interpreted drawings and specifications	1.1. Drawings are collected and interpreted.			√		
	1.2. Sign and symbols are identified.			√		
	1.3. Terms and abbreviations are identified.			√		
	1.4. Specifications are interpreted.			√		
	2.1. Usability of tools and equipment are checked and			√		

2. Collect tools, equipment and materials	verified.			
	2.2. Materials are collected.	√		
3. Measure the distance of service line	3.1. PPE's are collected between distribution pole and meter are checked and measured.	√		
	3.2. Distance between distribution pole and meter are checked and measured.	√		
	3.3. Distance between main switch and meter are checked and measured.	√		
4. Install cables for service connection	4.1. Sizes of cables are selected as per load.	√		
	4.2. Quality cables are selected and collected for service connection.	√		
	4.3. Collected cables are cut and set.	√		
	4.4. Cables are held on and clamped properly with distribution pole.	√		
	4.5. Cables are joined and connected with pole and energy metre.	√		
5. Install energy meter	5.1. Energy meter is collected and set on the board.	√		
	5.2. Energy meter is connected with service line.	√		
6. Connect energy meter and main switch	6.1. Cables are measured and sized.	√		
	6.2. Cables are laid into the conduit.	√		
	6.3. Connection between energy meter and main switches is performed.	√		
7. Clean the workplace	7.1. Tools and equipment are cleaned as per standard.	√		
	7.2. Cleaning tools and equipment are prepared for cleaning.	√		
	7.3. Waste materials are disposed.	√		
	7.4. Tools and equipment are stored as per standard.	√		

Occupation:	Electrical Installation and Maintenance					
Unit Name:	Perform motor connection with protective and controlling devices					
Unit Code:	SEIP-LIG-EIM-3001A1					
Assessment Method:	P	O	W			
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)			
Element	Performance Criteria			P	O	W

1. Identify and select controlling and protective devices for motor connection	1.1. Manuals and documents of controlling and protective devices are collected.	√		
	1.2. Drawings and symbols of controlling and protective devices are sorted.	√		
	1.3. Types of controlling and protective devices are listed.	√		
2. Collect tools, equipment and materials	2.1. Tools, equipment and materials are identified and collected.	√		
	2.2. Tools, equipment and materials are checked for usability.	√		
	2.3. PPE is collected and used.	√		
3. Install, controlling and protective devices	3.1. Controlling and protective devices are selected and collected according to the need of the operations.	√		
	3.2. Controlling and protective devices are installed according to the layout plan.	√		
	3.3. Controlling and protective devices are set and connected to the motor.	√		
4. Perform motor connection	4.1. Direct on-line starter is collected and its diagram interpreted.	√		
	4.2. Direct on line starter is connected with the motor.	√		
	4.3. Star-delta starter is collected and its diagram interpreted.	√		
	4.4. Star-delta starter is connected with the motor.	√		
	4.5. Auto-transformer starter is collected and its diagram interpreted.	√		
	4.6. Auto-transformer starter is connected with motor.	√		
5. Check and test circuit	5.1. All the connections of each starter is checked and justified.	√		
	5.2. Connection between motor and starter is checked and tested.	√		
6. Clean the workplace	6.1. Cleaning tools and equipment are selected & collected.	√		
	6.2. Cleaning tools and equipment are prepared for cleaning.	√		
	6.3. Waste materials are disposed.	√		
	6.4. Cleaning is completed.	√		

Occupation:	Electrical Installation and Maintenance
Unit Name:	Install and maintain electric motor with control system

Unit Code:	SEIP-LIG-ELE-1-O					
Assessment Method:	P	O	W			
	Performance (including demonstration and observation)	Oral questioning	Written examination (including short-answer, multiple choice, and true or false questions)			
Element	Performance Criteria			P	O	W
1. Identify and select controlling devices for motors	1.1.	Manuals and documents of motors with controlling devices are collected.	√			
	1.2.	Drawings and symbols of controlling devices are sorted.	√			
	1.3.	Tools, equipment and materials are collected for required job.	√			
	1.4.	Necessary controlling devices for motor are selected and collected.	√			
2. Connect starter with the motors	2.1.	PPE is collected and used.	√			
	2.2.	Starter is collected and its diagram is interpreted.	√			
	2.3.	Wire up control and power circuits as per job requirement.	√			
	2.4.	Starter is connected with motors.	√			
	2.5.	Test and commission the motors as per job requirement.		√		
3. Monitor and test conditions of motor	3.1.	Mechanical defects are checked visually in accordance with standard practices.	√			
	3.2.	Electrical defects of motors are checked such as loose or burned electrical connections.	√			
	3.3.	Motors are tested by using specified instruments.	√			
	3.4.	Motors are tested under running conditions for detecting faults.	√			
4. Service motors	4.1.	Work order for maintenance is obtained from concern personnel.	√			
	4.2.	Motor mains are disconnected before inspection and testing in accordance with standard procedure.	√			
	4.3.	Motor is dismantled for replacing bearings and greasing, repairing windings, varnishings heating or any other tests if required as per standard procedures following safety precautions.	√			
	4.4.	Service parts of the motor are cleaned by using specified cleaning agent and tools in accordance with manufacturer's specification.	√			
	4.5.	Check winding insulation of motors with magger/insulation resistance tester if necessary in accordance with standards.	√			

	4.6. Motors are assembled according to manufacturer's specification.	√		
	4.7. No load and load test are conducted and noted down results in accordance with specification.	√		
5. Maintain tools, equipment, materials and workplace	5.1. Tools, equipment and materials are cleaned as per manufacturer instructions.	√		
	5.2. Tools, equipment and materials are restored as per workplace procedures.	√		
	5.3. Defective tools and equipment are identified, separated/removed, and reported to the designated person.	√		
	5.4. Workplace is cleaned as per company procedure.	√		
	5.5. Waste materials are disposed in the designated place.	√		

PART B – THE CANDIDATE

Instructions to Candidate

To be assessed as competent, you must provide evidence which demonstrates that you can perform to the necessary standard the various elements of these units of competency that comprise of the Certificate in **Electrical Installation and Maintenance**. Assessment of competency requires you to consistently demonstrate skill, knowledge and aptitude (through a variety of assessment tools such as multiple choice, short-answer questions, oral questioning, workplace observation, and practical demonstration) that enables confident completion of workplace tasks in a variety of situations.

In judging the evidence, your assessor must ensure that the evidence is:

- authentic (your own work)
- valid (directly related to the current version of the units of competency)
- reliable (consistently demonstrates of your knowledge and skill)
- current (shows your current capacity to perform the work)
- sufficient (covers the full range of elements comprised within the units of competency)

Furthermore, the assessment process must:

- provide for valid, reliable, flexible and fair assessment
- provide for judgment to be made on the basis of sufficient evidence
- offer valid, authentic and current evidence
- include workplace requirements

There are two types of assessment:

1. Knowledge Assessment - is designed to enable assessment against the various *elements* contained within the units of competency through a variety of activities such as multiple choice, short-answer questions, oral questioning. It is essentially examining your theoretical knowledge.

This provides the assessor with substantial evidence of your knowledge and aptitude to perform the work relating to the specific unit of competency, in conjunction with other assessment tools such as workplace observation.

You should complete the knowledge assessment as directed by the assessor and follow all instructions as and when given. If you are unable to complete the knowledge assessment, please speak to the assessor about alternative assessment solutions.

2. Skill Assessment - is designed to enable assessment against the various *performance criteria* contained within the units of competency through, for example, demonstration of skill in a simulated or actual work environment. In essence, it is an examination of your practical ability.

This provides the assessor with substantial evidence of your ability to perform the work relating to the specific unit of competency to the standard expected by industry (the benchmark).

You should complete the skill assessment as directed by the assessor and follow all instructions as and when given, ensuring your own health and safety.

Once you have been assessed as competent against all of the units of competency comprising of the qualification being undertaken, you will be awarded your certificate.

Your assessor will discuss in more detail the requirements for assessment for each unit of competency at the appropriate time.

And please do not panic if you are not assessed as competent on any part of your qualification at your first attempt. Your assessor will discuss with you any identified skill and knowledge gaps, work through those with you and assist you as much as possible in attaining competency.

Self-Assessment Guide

Before undertaking any assessment, you should review the list of skills, knowledge and aptitudes relating to the assessment (drawn from the units of competency, its various elements and performance criteria) to determine whether you have current competency in these areas.

If you believe you can demonstrate the skills and knowledge required and can successfully complete the various assessment activities, you should then proceed to discuss your assessment with the assessor and complete Assessment Agreement.

However, should you not believe, for whatever reason, that you are not able to successfully complete the various assessment activities, then speak with the assessor. The assessor will assist you in identifying any skill and knowledge gaps, work through those with you and assist you as much as possible in attaining competency.

Please complete the self-assessment checklist below and discuss with the assessor.

Qualification:	Electrical Installation and Maintenance	
Units of competency:	<p>Generic units:</p> <p>Use basic mathematical concepts</p> <p>Communicate in the workplace</p> <p>Apply occupational health and safety (OH&S) practices in the workplace</p> <p>Operate in a self-directed team</p> <p>Sector-specific units:</p> <p>Interpret drawings and specifications in electrical installation</p> <p>Use hand and power tools for electrical works</p> <p>Work with industrial electrical sector</p> <p>Occupation-specific units:</p> <p>Perform channel wiring</p> <p>Perform conduit wiring</p> <p>Install earthing and atmospheric lightning protection system</p> <p>Perform a service connection</p> <p>Perform motor connection with protective and controlling devices</p> <p>Install and maintain of electric motor with control system</p>	
Instructions:		
<ul style="list-style-type: none"> ▪ Read each of the questions in the left-hand column of the chart ▪ Place a tick (√) in the appropriate box opposite each question to indicate your answer 		
Can I?	YES	NO
▪ Identify calculation requirements from workplace information		
▪ Select appropriate mathematical method to carry out calculation		
▪ Determine system and units of measurement to be followed		
▪ Complete calculations using appropriate methods such as addition, subtraction, multiplication and division		

▪ Apply to workplace calculation systems and units of measurement for the task		
▪ Access and interpret instructions		
▪ Ask questions to clarify understanding or gain more information		
▪ Record information/instruction properly		
▪ Interpret written instructions		
▪ Respond to work signage		
▪ Follow routine written instructions in sequence		
▪ Give feedback to the workplace supervisor		
▪ Use relevant communication methods to transmit instructions		
▪ Use appropriate non-verbal communication		
▪ Identify and follow channels of communication		
▪ Operate communication tools and equipment and identify and report faults		
▪ Convey information using appropriate forms		
▪ Complete all required documentation accurately and on time		
▪ Record workplace data using approved formats or templates		
▪ Pass written information/instruction to appropriate personnel		
▪ Attend meetings regularly and on time following well-disseminated agenda		
▪ Ensure meeting inputs are consistent with meeting purpose and established protocols		
▪ Express opinions without interruption		
▪ Process and implement meeting outputs		
▪ Interpret OHS policies and safe operating procedures		
▪ Identify and use personal protective equipment (PPE)		
▪ Identify and follow safety signs and symbols		
▪ Interpret response, evacuation procedures and other contingency as per standard		
▪ Apply OHS policies and procedures in the workplace		
▪ Recognise common health issues		
▪ Identify and follow common safety issues		
▪ Identify hazards and risks		
▪ Interpret hazards and risks assessment and controls		
▪ Respond to alarms and warning devices		
▪ Follow emergency response plans and procedures as appropriate to the nature of the emergency and according to workplace procedures		

▪ Follow first aid procedures for dealing with accidents, fires and emergencies whenever necessary within scope of responsibilities		
▪ Identify team goals and processes		
▪ Identify roles and responsibilities of team members		
▪ Identify relationships within team and with other work areas		
▪ Used effective interpersonal skills to interact with team members and to contribute to activities and objectives		
▪ Use formal and informal forms of communication effectively to support team achievement		
▪ Respect and value diversity in team functioning		
▪ Understand views and opinions of other team members and reflect accurately		
▪ Use workplace staff regulation correctly to assist communication		
▪ Identify and clarify duties, responsibilities, authorities, objectives and task requirements with team		
▪ Perform task in accordance with organizational and team requirements, specifications and workplace procedures		
▪ Support other members as required to ensure team achieves goals and requirements		
▪ Follow agreed reporting lines using standard operating procedures		
▪ Identify current and potential problems faced by team		
▪ Identify procedures for avoiding and managing problems		
▪ Solve problems effectively and in a manner that supports the team		
▪ Identify and access appropriate manuals		
▪ Check version and date of manual to ensure up-to-date specifications of tools, equipment, materials and procedures		
▪ Identify relevant drawings and specifications		
▪ Identify terms and abbreviations		
▪ Identify signs and symbols		
▪ Interpret drawings and specifications		
▪ Interpret schedules, dimensions and specifications contained in the drawings		
▪ Collect and pack manuals and documents		
▪ Store manuals and documents appropriately to prevent damage, ready access and updating of information where required		
▪ Identify hand tools		
▪ Interpret application of tools to job requirements		
▪ Check and verify usability of tools		

▪ Prepare hand tools and power tools		
▪ Identify sources of power supply for power tools		
▪ Use appropriate hand tools for the job		
▪ Apply proper and safe use and operation of hand tools		
▪ Observe safety precaution when using hand tools		
▪ Identify unsafe or faulty tools and mark for repair		
▪ Inspect power supply outlet and electrical cord and confirm safe for use in accordance with established workplace safety requirements		
▪ Apply proper sequence of operation in using power tools		
▪ Use power tools safely in accordance to manufacturer's operating specification		
▪ Remove dust and foreign matters from power tools in accordance to workplace standard		
▪ Check condition of tools after use		
▪ Apply appropriate lubricant after use and prior to storage		
▪ Check and calibrate measuring tools		
▪ Inspect and correct or replace defective tools, instruments, power tools and accessories		
▪ Comprehend scope, nature and major fields of electrical sector in the industry		
▪ Comprehend profile of electrical sector in the industry in relation to Bangladesh employment condition		
▪ Outline trends and technologies relevant to the sector		
▪ Identify and interpret relevant policies and guidelines		
▪ Obtain and clarify instructions as to procedures in achieving quality		
▪ Identify job roles and responsibilities in the industrial electrical sector		
▪ Identify employee relationships within the electrical sector		
▪ Identify common goals, objectives and tasks and clarify with appropriate persons		
▪ Determine individual tasks and agree on according to workplace environment		
▪ Identify and clarify workplace requirements		
▪ Interpret workplace practices		
▪ Use problem-solving strategies to address bottlenecks, inconsistencies and other concerns		

<ul style="list-style-type: none"> ▪ Plan own work activities and communicate progress of work to relevant staff 		
<ul style="list-style-type: none"> ▪ Complete work activities based on workplace standards 		
<ul style="list-style-type: none"> ▪ Identify difficulties and bottlenecks and put forward solutions 		
<ul style="list-style-type: none"> ▪ Monitor own work against workplace standards and identify and act on areas for improvement 		
<ul style="list-style-type: none"> ▪ Apply effective interpersonal skills to interact with others and to contribute activities and objectives 		
<ul style="list-style-type: none"> ▪ Perform assigned tasks in accordance with job requirements, specifications and workplace environment 		
<ul style="list-style-type: none"> ▪ Confirm work requirements with colleagues 		
<ul style="list-style-type: none"> ▪ Draw wiring layout according to supplied drawing 		
<ul style="list-style-type: none"> ▪ Locate rowel plug points, drill and insert as per procedure 		
<ul style="list-style-type: none"> ▪ Install and screw bottom part of the channels 		
<ul style="list-style-type: none"> ▪ Lay cables with ECC on the bottom part of the channel 		
<ul style="list-style-type: none"> ▪ Collect and fit boards as per wiring diagram 		
<ul style="list-style-type: none"> ▪ Fit switches, sockets, fan regulator and ballast on the board with screw 		
<ul style="list-style-type: none"> ▪ Connect switches, sockets and fan regulator to the circuits 		
<ul style="list-style-type: none"> ▪ Fit ceiling rose and different types of holders on the board 		
<ul style="list-style-type: none"> ▪ Connect those fixtures to the circuit 		
<ul style="list-style-type: none"> ▪ Connect and fit MCB and MCCB on the board 		
<ul style="list-style-type: none"> ▪ Place and set bottom parts of the channels according to drawing on the board 		
<ul style="list-style-type: none"> ▪ Draw cables through the bottom part of the channels 		
<ul style="list-style-type: none"> ▪ Place circuit materials required for the specified circuit placed on the board 		
<ul style="list-style-type: none"> ▪ Connect and fit other accessories 		
<ul style="list-style-type: none"> ▪ Cover bottom part of the channels with upper part of the channel 		
<ul style="list-style-type: none"> ▪ Draw layout on the wall as per drawing 		
<ul style="list-style-type: none"> ▪ Cut and groove wall 		

▪ Cut and set collected conduits		
▪ Install conduits on the wall and clamp		
▪ Measure and cut fish wires		
▪ Insert fish wire		
▪ Check polarity of wiring by megger as per procedure		
▪ Justify and check polarity of the switches, fuses and circuit breakers		
▪ Disconnect the main switches and circuit breakers		
▪ Connect all loads and check the continuity of each of the switches and circuit breakers		
▪ Test continuity by observing the zero positions of the megger and measure insulation resistance		
▪ Connect the earth terminals as per the appropriate measurement and positions		
▪ Measure earth resistance by observing the positions of the pointer of the megger		
▪ Identify types and method of earthing in accordance to electrical plan/design		
▪ Identify types and sizes of earthing materials in accordance to electrical plan/design		
▪ Identify types of lightning protection system in accordance to electrical plan/design		
▪ Identify types and sizes of lightning protection system materials in accordance to electrical plan/design		
▪ Dug hole following with safety requirements		
▪ Shape and size hole in accordance to electrical plan/design		
▪ Fit earthing element in the bottom of the excavated hole following standard earthing procedure		
▪ Connect earth lead to the earth element tightly and brought up the meter board through the conduit		
▪ Lay powder charcoal and salt around the earthing element in accordance to workplace procedure		
▪ Fit a proper size and length of GI pipe from top of the earth element to the bottom of the earth pit chamber		
▪ Fill rest of the excavated hole with earth		
▪ Construct earth pit chamber with brick chips, cement sand and water mixture in accordance with standard/specification		
▪ Make pit chamber cover with GI sheet in accordance with electrical plan/design		

▪ Fit/install pit cover on the pit chamber		
▪ Check earth resistance in accordance with electrical plan/specification		
▪ Install lightning rod at specified location		
▪ Connect earth down conductor as per diagram		
▪ Test performance of lightning protection system (LPS) as per standard		
▪ Check and measure distance between distribution pole and meter		
▪ Check and measure distance between main switch and meter		
▪ Select size of cables as per load		
▪ Select and collect quality cables for service connection		
▪ Cut and set collected cables		
▪ Hold on cables and properly clamp with distribution pole		
▪ Join and connect cables with pole and energy meter		
▪ Collect and set energy meter on the board		
▪ Connect energy meter with service line		
▪ Measure and sized cable		
▪ Lay cables into the conduit		
▪ Perform connection between energy meter and main switches		
▪ List types of controlling and protective devices		
▪ Select and collect controlling and protective devices according to the need of the operations		
▪ Install controlling and protective devices according to the layout plan		
▪ Set and connect controlling and protective devices to the motor		
▪ Collect direct on-line starter and interpret its diagram		
▪ Connect direct on-line starter with the motor		
▪ Collect star-delta starter and interpret its diagram		

▪ Connect star-delta starter with the motor		
▪ Collect auto-transformer starter and interpret its diagram		
▪ Connect auto-transformer starter with motor		
▪ Check and justify all connections of each starter		
▪ Check and test connection between motor and starter		
▪ Check mechanical defects visually in accordance with standard practices		
▪ Check electrical of motors such as loose or burned electrical connections		
▪ Test motors by using specified instruments		
▪ Test motors under running conditions for detecting faults		
▪ Obtain work order for maintenance from concern personnel according to established procedure		
▪ Disconnect motor mains before inspection and testing in accordance with standard procedure		
▪ Dismantle motor for replacing bearings and greasing, repairing windings, varnishing, heating or any other tests if required as per standard procedures following safety precautions		
▪ Clean service parts of the motor by using specified cleaning agent and tools in accordance with manufacturer's specification		
▪ Check winding insulation of motors with magger/insulation resistance tester if necessary in accordance with standards		
▪ Assemble motors according to the manufacturer's specification		
▪ Conduct no load and load test and note down results in accordance with specification		
▪ Clean tools and equipment as per standard		
▪ Prepare cleaning tools and equipment for cleaning		
▪ Dispose waste materials		
▪ Store tools and equipment as per standard		
I agree to undertake assessment in the knowledge that the information gathered will only be used for educational and professional development purposes, and can only be accessed by concerned assessment personnel and my manager/supervisor.		
Candidate's signature:		Date:

PART C – THE ASSESSMENT

Assessment Agreement – Electrical Installation and Maintenance

The purpose of assessment is to confirm that you can perform to the standards expected in the workplace of an occupation, as expressed in the competency standards (after completion of self-assessment and in agreement with assessor).

To help achieve this, an assessment agreement is required to navigate both you and the assessor through the assessment process.

The assessment agreement is designed to provide a clear understanding of what and how you will be assessed and to nominate the tools that may be used to collect the assessment evidence.

You, the assessor and/or workplace supervisor should agree on the assessment requirements, dates and deadlines.

Therefore, to attain the Certificate of **Electrical Installation and Maintenance**, you must demonstrate competence in the following units, as established in the assessment agreement:

CODE	UNIT OF COMPETENCY
Generic Competencies	
GN1001A1	Use basic mathematical concepts
GN100112A	Communicate in the workplace
GN2003A1	Apply occupational health and safety (OH&S) practices in the workplace
GN2004A1	Operate in a self-directed team
Sector-specific Competencies	
LG-EIM	Interpret drawings and specifications in electrical installation
SEIP-LIG-ELE-2-S	Use hand and power tools for electrical works
LG-EIM-	Work with industrial electrical sector
Occupation-specific Competencies	
SEIP-LIG-ELE-3-O	Perform channel wiring
SEIP-LIG-EIM-2001A1	Perform conduit wiring
SEIP-LIG-ELE-5-O	Install earthing and atmospheric lightning protection system
SEIP-LIG-EIM-2002A1	Perform service connection
SEIP-LIG-EIM-3001A1	Perform motor connection with protective and controlling devices
SEIP-LIG-EIM-3003A1	Install and maintain of electric motor with control system

After successful completion of learning and assessment, you shall be awarded with a certificate.

Assessment Agreement	
Occupation:	Electrical Installation and Maintenance
Assessment Centre:	
Candidate Name:	
Assessor Name:	
Unit of Competency	
Generic Competencies	
GN1001A1	Use basic mathematical concepts
GN100112A	Communicate in the workplace
GN2003A1	Apply occupational health and safety (OH&S) practices in the workplace
GN2004A1	Operate in a self-directed team
Sector-specific Competencies	
LG-EIM-	Interpret drawings and specifications in electrical installation
SEIP-LIG-ELE-2-S	Use hand and power tools for electrical works
LG-EIM	Work with industrial electrical sector
Occupation-specific Competencies	
SEIP-LIG-ELE-3-O	Perform channel wiring
SEIP-LIG-EIM-2001A1	Perform conduit wiring
SEIP-LIG-ELE-5-O	Install earthing and atmospheric lightning protection system
SEIP-LIG-EIM-2002A1	Perform service connection
SEIP-LIG-EIM-3001A1	Perform motor connection with protective and controlling devices
SEIP-LIG-EIM-3003A1	Install and maintain of electric motor with control system
Resources Required for Assessment	
<p>Candidates must have access to the following:</p> <ul style="list-style-type: none"> ▪ copies of activities, questions, projects nominated by the assessor ▪ relevant organisational policies, protocols and procedural documents (if required) ▪ devices or tools to record answers ▪ appropriate actual or simulated workplace ▪ all necessary tools and equipment used in performance of the work-based task ▪ any other resources normally used in the workplace 	
Assessment Instructions	
<p>Candidates should respond to the formative and summative assessments either verbally or in writing as agreed with the assessor. Written responses can be recorded in the spaces provided (if more space is required attach additional pages) or submitted in a word-processed document.</p> <p>If candidates answer verbally, the assessor should record their answers in detail.</p> <p>Candidates should also undertake observable tasks that provide evidence of performance. The assessor must provide instruction to candidates on what is expected during observation, and arrange a suitable time and location for demonstration of these skills.</p> <p>Candidates must fully understand what they are required to do to complete these assessment tasks successfully, then sign the declaration.</p>	

Performance Standards

To receive a **satisfactory** result for the assessments, candidates must complete all activities, questions, projects, and tasks nominated by the assessor, to the required standard.

Completion of all tasks for a unit of competency, to a satisfactory level, will contribute to an assessment of competence for that specific individual unit (or units if holistic assessment approach is taken).

Successful completion of all the units of competency that comprise of the qualification **Electrical Installation and Maintenance**, will result in the candidate being issued with the relevant, nationally recognised certificate.

Assessors must clearly explain the required performance standards.

Declaration

I declare that:

- the assessment requirements have been clearly explained to me
- all the work completed towards assessment will be my own
- cheating and plagiarism are unacceptable

Candidate Signature:		Date:	
Assessor Signature:		Date:	

PART D – ASSESSMENT TOOLS

Specific Instructions to Assessor

Please read carefully and prepare as necessary:

1. The assessor shall (practical demonstration assessment activities):
 - provide the candidate with the necessary tools, equipment, machinery and materials for completion of one (1) set of the following practical demonstration activities:
 - Set A:
 - installation of electrical distribution board and motor control panel box using cable tray and metal conduit
 - installation of electrical wiring connection for lamp, switch, power outlet and motor control circuit (Stop-Start Star-Delta Starter Motor Controller) and earth/ground system
 - Set B:
 - installation and mounting of electrical device and circuit wiring connection for Direct On-Line Motor Starter using channel/cable trunking, PVC and metal conduit with energy meter, lamp and switch and earth/grounding system
 - Set C:
 - installation of raceways for industrial motor controller using PVC, metal conduit, channel/cable trunking and wiring connection of lighting circuit controlled in three (3) different locations
 - wiring installation, testing and commissioning of motor control circuit (Star-Delta Motor Starter) and lighting circuit controlled in three (3) different locations with earth/grounding connection
 - provide the candidate with the copy of the specific instruction to candidate
 - allow practical demonstration to be performed within seven (7) hours including preparation of the materials
 - ensure that the candidate **FULLY** understands the instructions before proceeding to the performance of the assessment activity
 - allow fifteen (15) minutes for the candidate to familiarise themselves with the resources to be used during the practical demonstrations
 - ensure that the candidate is wearing appropriate personal protective equipment (PPE) before allowing them to proceed with the assessment activity
2. Assessment shall be based on the performance criteria in each of the units of competency. The evidence gathering method shall be comprised of:
 - (a) Written Test (1 hour) – **knowledge evidence**
 - (b) Practical Demonstration (maximum 7 hours) – **performance evidence**

The practical demonstration activities will be divided into two (2) tasks (contained in one set except for Set B):

- (i) Practical Demonstration 1 (maximum 4 hours except for Set B)
- (ii) Practical Demonstration 2 (maximum 3 hours)

NOTE: assessment venue must be readily available prior to assessment and adhere to the following specifications:

- a. concrete room finished with smooth plaster wall and ceiling, with slab roofing suitable for the task that can handle the work activity process of electrical installation and maintenance
 - b. interior dimensions: height of 3000mm; width of 2500mm; length of 2000mm
 - c. earth rod and cooper earthing plate are pre-installed
3. Final assessment is your responsibility as the accredit/certified assessor.
 4. At the conclusion of each assessment activity, you will provide feedback to the candidate of the assessment result. The feedback will indicate whether the candidate is:

COMPETENT

NOT YET COMPETENT

5. The list of tools, equipment, machinery and materials to be provided for completion of the practical demonstration assessment activities can be found at:
 - Set A – Practical Demonstration 1 page 46
 - Set A – Practical Demonstration 2: page 52
 - Set B – Practical Demonstration 1: page 60
 - Set C – Practical Demonstration 1: page 68
 - Set C – Practical Demonstration 2: page 74

Specific Instructions to Candidate

You should respond to the assessment either in writing or verbally as agreed with the assessor. Written responses can be recorded in the spaces provided; if more space is required attach additional pages or submit a word-processed document.

If you answer verbally, the assessor should record your answers in detail. Please check your recorded answers carefully and thoroughly to ensure that they are accurate.

You may also be undertaking observable activities (i.e. practical demonstration) that provide evidence of performance. The assessor must provide you with clear instructions on what is expected during this type of assessment, and arrange a suitable time and location for demonstration of these skills.

To receive a satisfactory result for the assessments, you must complete all of the assessment activities; including questions, projects and tasks nominated by the assessor, to the required standard.

This assessment is based upon the units of competency in Electrical Installation and Maintenance. Using the performance criteria as a benchmark, evidence will be gathered through:

1. Written Test (1 hour) – a variety of multiple-choice, true or false and short answer theory questions to support your competence with regard to the required knowledge (**knowledge evidence**).
2. Practical Demonstration (maximum 7 hours) – observable tasks outlined in the elements and performance criteria of the units of competency, completed to support a judgement of satisfactory performance to the required standard (**performance evidence**).

There will be one (1) set of practical demonstration activities to complete. The assessor will direct you as to which 'set' you will be required to complete out of the following:

- Set A:
 - installation of electrical distribution board and motor control panel box using cable tray and metal conduit (4 hours)
 - installation of electrical wiring connection for lamp, switch, power outlet and motor control circuit (Stop-Start Star-Delta Starter Motor Controller) and earth/ground system (3 hours)
 - Set B:
 - installation and mounting of electrical device and circuit wiring connection for Direct On-Line Motor Starter using channel/cable trunking, PVC and metal conduit with energy meter, lamp and switch and earth/grounding system (7 hours)
 - Set C:
 - installation of raceways for industrial motor controller using PVC, metal conduit, channel/cable trunking and wiring connection of lighting circuit controlled in three (3) different locations (4 hours)
 - wiring installation, testing and commissioning of motor control circuit (Star-Delta Motor Starter) and lighting circuit controlled in three (3) different locations with earth/grounding connection (3 hours)
3. The assessor will provide all necessary tools, equipment, machinery and materials required to complete each assessment activity.
 4. These assessments cover all units of competency for Electrical Installation and Maintenance.
 5. The assessor will provide you with feedback of your performance after completion of each assessment activity. This feedback shall indicate whether you are:

COMPETENT

 **NOT YET COMPETENT**

6. Complete of all assessment activities, to a satisfactory level, will contribute to a final assessment of competence.

Written Test

WRITTEN TEST - INSTRUCTIONS	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Electrical Installation and Maintenance
Unit of Competency	
Generic Competencies	
GN1001A1	Use basic mathematical concepts
GN100112A	Communicate in the workplace
GN2003A1	Apply occupational health and safety (OHS) practices in the workplace
GN2004A1	Operate in a self-directed team
Sector-specific Competencies	
LG-EIM-	Interpret drawings and specifications in electrical installation
SEIP-LIG-ELE-2-S	Use hand and power tools for electrical works
LG-EIM	Work with industrial electrical sector
Occupation-specific Competencies	
SEIP-LIG-ELE-3-O	Perform channel wiring
SEIP-LIG-EIM-2001A1	Perform conduit wiring
SEIP-LIG-ELE-5-O	Install earthing and atmospheric lightning protection system
SEIP-LIG-EIM-2002A1	Perform service connection
SEIP-LIG-EIM-3001A1	Perform motor connection with protective and controlling devices
SEIP-LIG-EIM-3003A1	Install and maintain of electric motor with control system
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	
Instructions:	
<p>Read and understand the directions carefully:</p> <ul style="list-style-type: none"> ▪ this written examination is based on the performance criteria from all the units of competency in Electrical installation and maintenance ▪ this assessment activity will be used to measure your underpinning knowledge ▪ write your answers on the paper provided ▪ answer all the questions as best as possible ▪ you have 1 (one) hour to complete this test 	

WRITTEN TEST		
Multiple Choice		
This is a multiple-choice of test. Choose the appropriate answer and circle the letter that corresponds with your answer.		
1.	Which is the 25% of 300?	a. 7.5 b. 37.5 c. 62.5 d. 75
2.	Which is not a testing instrument?	a. Volt meter b. Ammeter c. Multi meter d. Energy meter
3.	The distance on the centre that should be provided for setting channel rowel plugs:	a. 15cm to 30cm b. 30 cm to 50 cm c. 50 cm to 75 cm d. 75 cm to 100 cm
4.	A self-sacrificial device used to interrupt a circuit under short circuit condition is known as:	a. Switch b. Regulator c. Fuse d. Ballast
5.	What is the acceptable value of earth resistance?	a. 50 Ohms or less b. 50 Ohms or more c. 100 Ohms or more d. 220 Ohms or more
6.	The most common materials used in lightning protection:	a. stainless steel b. copper and its alloys c. aluminium d. silver and gold
7.	It controls one electrical circuit by opening and closing contacts in another circuit:	a. fuse b. cable c. relays d. wire
True or False Quiz		

Tick (✓) the box corresponding to the correct answer.

8.	Three phases motors are self-starting	True <input type="checkbox"/> False <input type="checkbox"/>
9.	Ohm's law can be written as $I=V \times R$	True <input type="checkbox"/> False <input type="checkbox"/>

Fill in the Missing Blanks

Write the word or group of words needed to complete the following sentences.

10.	_____ is used to catch a person to avoid from falling while working at height.
11.	A simple hand tool which is used to measure thickness or diameter of electrical wire is known as _____.

Short Answer

Write a short answer in the space provided (not to exceed more than approximately sixty (60) words).

12.	What is an electrical circuit?	
13.	How do you make a rat tail joint, where do you use such joint?	
14.	What is the function of power inverter?	

Feedback to candidate:

Assessment decision for this assessment activity:

Competent

Not Yet Competent

Candidate's Signature:		Date:	
Assessor' Signature:		Date:	

Written Test - Answers

Answers are highlighted in **bold** and *italics*.

Multiple Choice		
1.	Which is the 25% of 300?	a. 7.5 b. 37.5 c. 62.5 d. 75
2.	Which is not a testing instrument?	a. Volt meter b. Ammeter c. Multi meter d. Energy meter
3.	The distance on the centre that should be provided for setting channel rowel plugs:	a. 15cm to 30cm b. 30 cm to 50 cm c. 50 cm to 75 cm d. 75 cm to 100 cm
4.	A self-sacrificial device used to interrupt a circuit under short circuit condition is known as:	a. Switch b. Regulator c. Fuse d. Ballast
5.	What is the acceptable value of earth resistance?	a. 50 Ohms or less b. 50 Ohms or more c. 100 Ohms or more d. 220 Ohms or more
6.	The most common materials used in lightning protection:	a. stainless steel b. copper and its alloys c. aluminium d. silver and gold
7.	It controls one electrical circuit by opening and closing contacts in another circuit:	a. fuse b. cable c. relays d. wire
True or False Quiz		
8.	Three phases motors are self-starting	True <input type="checkbox"/> False <input checked="" type="checkbox"/>

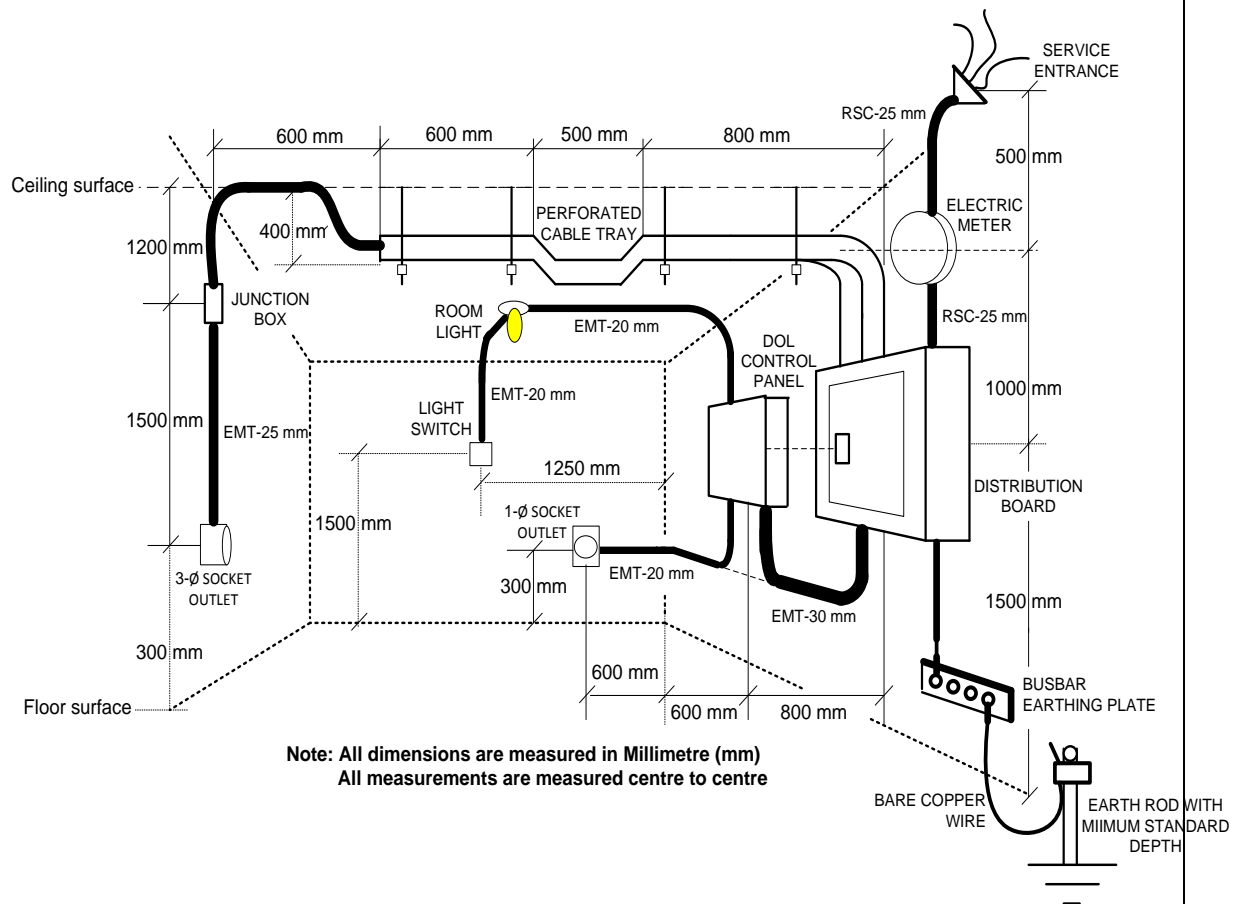
9.	Ohm's law can be written as $I=V \times R$	True <input checked="" type="checkbox"/> False <input type="checkbox"/>
Fill in the Missing Blanks		
10.	<u>Safety belt/harness</u> is used to catch a person to avoid from falling while working at height.	
11.	A simple hand tool which is used to measure thickness or diameter of electrical wire is known as <u>Standard wire gauge</u> .	
Short Answer		
12.	What is an electrical circuit?	<i>An electrical circuit is a complete and closed path around which a circulating electric current flow.</i>
13.	How do you make a rat tail joint, where do you use such joint?	<i>After removing insulation, twist the ends of the cables to create the rat tail joint which is usually used in junction boxes.</i>
14.	What is the function of power inverter?	<i>The function of a power inverter is to change the direct current (DC) to alternating current (AC).</i>

Set A: Practical Demonstration 1

PRACTICAL DEMONSTRATION 1	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Electrical Installation and Maintenance
Task:	Installation of electrical distribution board and motor control panel box using cable tray and metal conduit
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	
Instructions:	
Read and understand the directions carefully:	
<ul style="list-style-type: none">▪ this practical demonstration is based on the performance criteria from all or some of the units of competency in Electrical Installation and Maintenance▪ this assessment activity will be used to measure your underpinning skills▪ you will have fifteen (15) minutes to familiarise yourself with the resources to be used▪ you have four (4) hours to complete this demonstration	
Procedure:	
<ul style="list-style-type: none">▪ observe and wear personal protective equipment (PPE) as required for the task to be performed▪ read the specification information provided▪ collect all materials needed to complete the task▪ perform the task within the given time▪ observe and follow all health and safety (OHS) requirements at all times	
Job Specification Information:	
<ol style="list-style-type: none">1. Collect required tools, equipment, machinery and materials required for the task (refer to the list provided to you by the assessor).2. Perform layout and bench work fabrication on cable tray as measured.3. Perform layout, bending/offsetting, angles, threading and cutting on conduit as required.4. Install the hanger rods, supports and brackets.5. Install the Electrical distribution board on the wall surface.6. Install the cable tray, conduit and according to the project requirement.7. Install the electrical meter using appropriate procedures and materials.8. Fix all the fittings, accessories and support and ensure safety and durability.9. Report to the assessor for evaluation.10. Clean tools, equipment, machinery and work area.11. Dispose of waste materials and excess materials.	
Drawing, Plan, Diagram or Sketch:	
The project drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:	
<ul style="list-style-type: none">▪ Proper use of tools and fabrication technique▪ Measurements according to project drawing	

- Levelling and straightness
- Correct bending angle and offsetting without crumple and kinks
- No burrs and sharp edges
- Stability of all installed components

Always observe safety practices when working for this job.



Resources Required:

Tools:

Measuring tape
 Marker or mechanical chalk
 Try square
 Ball pin hammer
 Tin snip
 Hacksaw
 Spirit level
 Portable drill
 Concrete drill set
 Metal drill set
 Metal file
 Portable disc cutter
 Hole saw drill or knockout puncher, 25 mm Ø
 Hole saw drill or knockout puncher, 20 mm Ø
 Mechanical pliers set
 Combination wrench set

Equipment:	N/A
Machinery:	N/A
Materials:	<ol style="list-style-type: none"> 1. Perforated cable tray – 100 mm x 100 mm x 3000 mm, with cover = 2 lengths 2. Perforated Vertical outside – 90 degrees, 100 mm x 100 mm = 1 pc 3. Perforated Horizontal bends 45 degrees – 100 mm x 100 mm = 4 pcs 4. Side splice plates = 14 pcs 5. Bolts and nuts – 10 mm = 50 pcs 6. Cable tray hanger and supports assembly = 4 sets 7. DYNA Bolts, 10 mm x 40 mm = 8 pcs 8. Threaded rod (Full thread, 10 mm x 500 mm = 8 pcs 9. Blind rivets, Aluminium, 4 mm x 10 mm – 20 pcs 10. Rigid Steel Conduit (RSC) 25 mm Ø = 1 length 11. RSC Threaded coupling connector = 1 12. EMT bracket/clamp, 20 mm Ø = 12 pcs 13. EMT bracket/clamp, 25 mm Ø = 10 pcs 14. EMT connector, 20 mm Ø = 8 pcs 15. EMT connector, 25 mm Ø = 4 pcs 16. RSC threaded connector, 25 mm Ø = 3 pcs 17. Service entrance cap, 3 Ø = 1 pc 18. Distribution Box set with, 1 pc 60 Amp. Main CB/ Branches with 1 pc. 30 Amp. CB, 1 pc. 20 Amp. CB and 1 pc. 15 Amp. CB, Clip-On Type, Surface mounted, Bottom & Top Entry (standard size for the project) 19. Panel box with Stop-Start button, Wye-Delta starter controller set for 3 phase Power Circuit voltage & low voltage control circuit in Bangladesh setting.
PPE:	<p>Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes</p>

Set A: Practical Demonstration 1 – Observation Checklist

PRACTICAL DEMONSTRATION 1 – OBSERVATION CHECKLIST		
Candidate Name:		
Assessor Name:		
Qualification:	Certificate in Electrical Installation and Maintenance	
Task:	Installation of electrical distribution board and motor control panel box using cable tray and metal conduit	
Assessment Centre:		
Date of Assessment:		
Instructions:	<p>The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate.</p> <p>Performance can be observed in an actual workplace or in a simulated working environment.</p> <p>If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject.</p> <p>The assessment activity (practical demonstration) should:</p> <ul style="list-style-type: none"> ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate 	
OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	No
Responded to work signage	<input type="checkbox"/>	<input type="checkbox"/>
Identified and used personal protective equipment (PPE)	<input type="checkbox"/>	<input type="checkbox"/>
Identified and followed safety signs and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Applied OSH policies and procedures in the workplace	<input type="checkbox"/>	<input type="checkbox"/>
Identified hazards and risks	<input type="checkbox"/>	<input type="checkbox"/>
Identified relevant drawings and specification	<input type="checkbox"/>	<input type="checkbox"/>
Identified hand tools	<input type="checkbox"/>	<input type="checkbox"/>
Interpreted application of tools to job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Prepared hand and power tools	<input type="checkbox"/>	<input type="checkbox"/>
Identified sources of power supply for power tools	<input type="checkbox"/>	<input type="checkbox"/>
Applied proper and safe use and operation of hand tools	<input type="checkbox"/>	<input type="checkbox"/>
Used power tools safely in accordance to manufacturer's operating specification	<input type="checkbox"/>	<input type="checkbox"/>

Comprehended scope, nature and major fields of electrical sector in the industry	<input type="checkbox"/>	<input type="checkbox"/>
Identified and interpreted relevant policies and guidelines	<input type="checkbox"/>	<input type="checkbox"/>
Completed work activities based on workplace standards	<input type="checkbox"/>	<input type="checkbox"/>
Identified difficulties and bottlenecks and put forward solutions	<input type="checkbox"/>	<input type="checkbox"/>
Monitored own work against workplace standards and identified and acted upon areas for improvement	<input type="checkbox"/>	<input type="checkbox"/>
Confirmed work requirements with colleagues	<input type="checkbox"/>	<input type="checkbox"/>
Collected and interpreted drawings	<input type="checkbox"/>	<input type="checkbox"/>
Identified signs and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Identified terms and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Interpreted specifications	<input type="checkbox"/>	<input type="checkbox"/>
Drawn wiring layout according to supplied drawing	<input type="checkbox"/>	<input type="checkbox"/>
Located, drilled and inserted rowel plug points as per procedure	<input type="checkbox"/>	<input type="checkbox"/>
Installed and screwed bottom parts of channels	<input type="checkbox"/>	<input type="checkbox"/>
Collected and fitted boards as per drawing diagram	<input type="checkbox"/>	<input type="checkbox"/>
Fitted switches, sockets, fan regulator and ballast on the board with screw	<input type="checkbox"/>	<input type="checkbox"/>
Connected switches, sockets and fan regulator to the circuits	<input type="checkbox"/>	<input type="checkbox"/>
Fitted ceiling rose and different types of holders on the board	<input type="checkbox"/>	<input type="checkbox"/>
Connected and fitted MCB and MCBB on the board	<input type="checkbox"/>	<input type="checkbox"/>
Placed and set bottom parts of the channels according to drawing on the board	<input type="checkbox"/>	<input type="checkbox"/>
Drawn cables through the bottom part of the channels	<input type="checkbox"/>	<input type="checkbox"/>
Placed circuit materials required for the specified circuit on the board	<input type="checkbox"/>	<input type="checkbox"/>
Connected and fitted other accessories	<input type="checkbox"/>	<input type="checkbox"/>
Covered the bottom parts of the channels with upper part of the channel	<input type="checkbox"/>	<input type="checkbox"/>
Cut and grooved wall	<input type="checkbox"/>	<input type="checkbox"/>
Cut and set collected conduits	<input type="checkbox"/>	<input type="checkbox"/>
Installed and clamped conduits on the wall	<input type="checkbox"/>	<input type="checkbox"/>
Measured and cut fish wires	<input type="checkbox"/>	<input type="checkbox"/>
Inserted fish wire	<input type="checkbox"/>	<input type="checkbox"/>
Cut collected cables	<input type="checkbox"/>	<input type="checkbox"/>
Tied cables with fish and inserted into the conduit	<input type="checkbox"/>	<input type="checkbox"/>
Checked polarity of wiring by megger as per procedure	<input type="checkbox"/>	<input type="checkbox"/>
Justified and checked each of the switches, fuses and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected the main switches and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>

Connected and checked all loads for the continuity each of the switches and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected the main switches and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Tested continuity by observing the zero positions of the megger and measured insulation resistance	<input type="checkbox"/>	<input type="checkbox"/>
Connected earth terminals as per appropriate measurements and positions	<input type="checkbox"/>	<input type="checkbox"/>
Measured earth resistance by observing the positions of the pointer of the megger	<input type="checkbox"/>	<input type="checkbox"/>
Checked and measured distance between distribution pole and meter	<input type="checkbox"/>	<input type="checkbox"/>
Checked and measured distance between main switch and meter	<input type="checkbox"/>	<input type="checkbox"/>
Selected and collected quality of cables for service connection	<input type="checkbox"/>	<input type="checkbox"/>
Cut and set collected cables	<input type="checkbox"/>	<input type="checkbox"/>
Held on and clamped cables properly with distribution pole	<input type="checkbox"/>	<input type="checkbox"/>
Joined and connected cables with pole and energy meter	<input type="checkbox"/>	<input type="checkbox"/>
Collected energy meter and set on the board	<input type="checkbox"/>	<input type="checkbox"/>
Connected energy meter with service line	<input type="checkbox"/>	<input type="checkbox"/>
Measured and sized energy meter	<input type="checkbox"/>	<input type="checkbox"/>
Laid cables into the conduit	<input type="checkbox"/>	<input type="checkbox"/>
Performed connection between energy meter and main switches	<input type="checkbox"/>	<input type="checkbox"/>
Cleaned tools and equipment as per standard	<input type="checkbox"/>	<input type="checkbox"/>
Prepared cleaning tools and equipment for cleaning	<input type="checkbox"/>	<input type="checkbox"/>
Disposed waste materials	<input type="checkbox"/>	<input type="checkbox"/>
Stored tools and equipment as per standard	<input type="checkbox"/>	<input type="checkbox"/>
Feedback to candidate:		
Assessment decision for this assessment activity:		
<input type="checkbox"/> Competent <input type="checkbox"/> Not Yet Competent		
Candidate's Signature:		Date:
Assessor' Signature:		Date:

Set A: Practical Demonstration 2

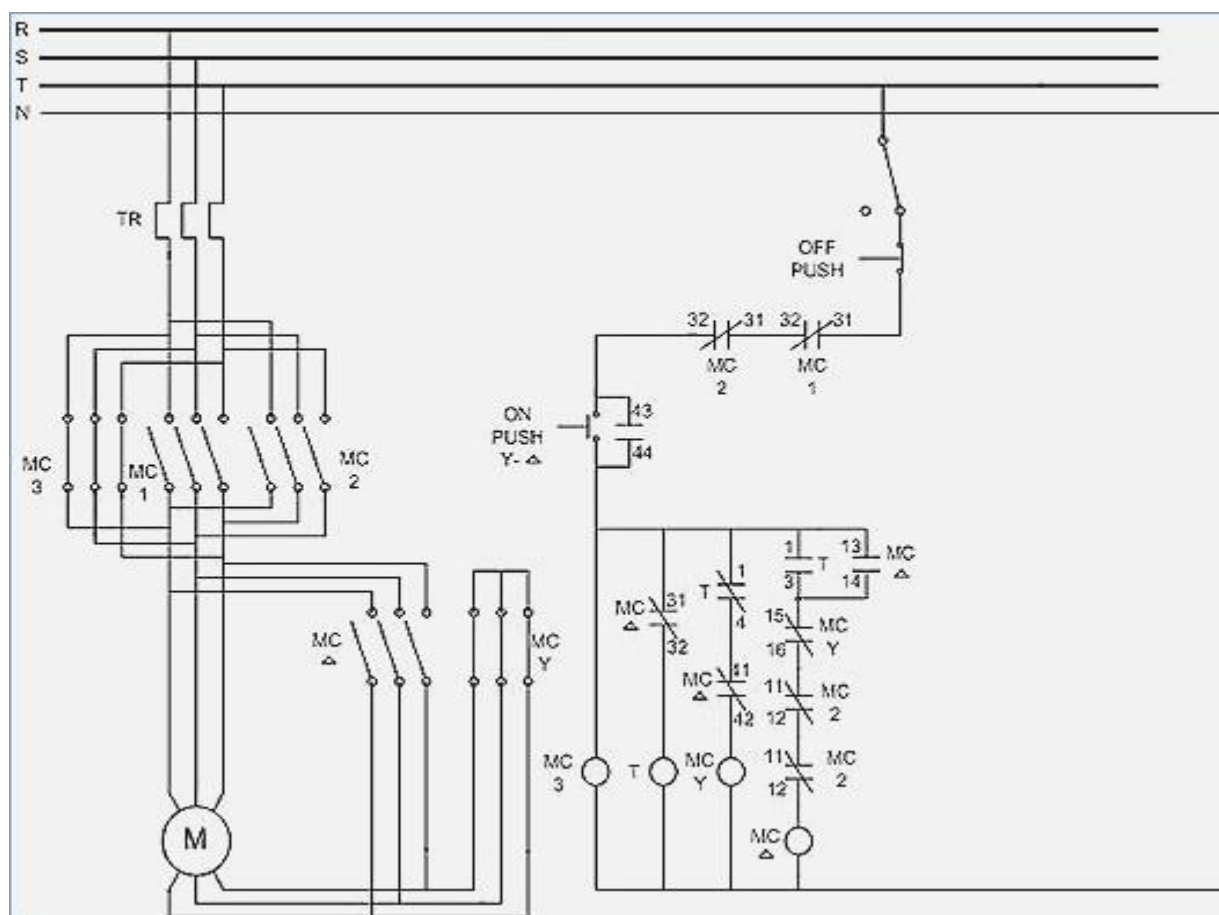
PRACTICAL DEMONSTRATION 2	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Electrical Installation and Maintenance
Task:	Installation of electrical wiring connection for lamp, switch, power outlet and motor control circuit (Stop-Start Star-Delta Starter Motor Controller) and earth/ground system
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	
Instructions:	
Read and understand the directions carefully:	
<ul style="list-style-type: none">▪ this practical demonstration is based on the performance criteria from all or some of the units of competency in Electrical Installation and Maintenance▪ this assessment activity will be used to measure your underpinning skills▪ you will have fifteen (15) minutes to familiarise yourself with the resources to be used▪ you have three (3) hours to complete this demonstration	
Procedure:	
<ul style="list-style-type: none">▪ observe and wear personal protective equipment (PPE) as required for the task to be performed▪ read the specification information provided▪ collect all materials needed to complete the task▪ perform the task within the given time▪ observe and follow all health and safety (OHS) requirements at all times	
Specification Information:	
<ol style="list-style-type: none">1. Collect required tools, equipment, machinery and materials required for the task (refer to the list provided to you by the assessor).2. Install the bare copper wire and its accessories pertaining to earth/grounding system.3. Perform cable pulling, measure the required size and length of wires needed for each circuit.4. Perform splicing and wiring termination.5. Install the electrical devices; electric meter, circuit breaker, lamp, switch and power outlet.6. Install the Main Circuit Breaker and CB on its branches.7. Terminate the power cables to the line side and load side of the main CB.8. Terminate the load side cable of the CB connected to the branches.9. Install the wiring connection and electrical devices for the WYE-DELTA starter controller.10. Install the electrical devices for light, switch, socket outlet and wiring connection.11. Fix all the fittings, accessories, support and ensure safety and durability.12. Test for the continuity, grounding and short circuit of the electrical system.13. Report to the assessor for evaluation.14. Clean tools, equipment, machinery and work area.15. Dispose of waste materials and excess materials.	

Drawing, Plan, Diagram or Sketch:

The project drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:

- Proper use of tools and wiring technique
- Compliance in Building Electrical Code of Bangladesh
 - Colour coding of wires
 - Acceptable clearance on heights and distance
 - Specification of wires and circuit protection
- Correct connection for Main Circuit
- Correct connection for Control Circuit
- Correct connection for lighting and power outlet
- Correct connection for Electric/Energy Meter
- Proper splicing and termination
- Proper fixing and tightness of all wiring termination including the grounding/earth
- Safety and integrity of installed electrical equipment

WYE – DELTA CIRCUIT DIAGRAM (Main Circuit and Control Circuit)



Resources Required:

Tools:

Measuring tape
Marker
Spirit level
Portable drill
Electrical pliers set

	Combination wrench set Screw driver set Wire stripper Multi tester Clamp meter/ optional if load is available
Equipment:	3 Ø Squirrel cage motor, 2 Hp, (Specification upon discretion of the Assessor)
Machinery:	N/A
Materials:	<ol style="list-style-type: none"> 1. Distribution Box set with, 1 pc 60 Amp. Main CB/ Branches with 1 pc. 30 Amp. CB, 1 pc. 20 Amp. CB and 1 pc. 15 Amp. CB, Clip-On Type, Surface mounted, Bottom & Top Entry (standard size for the project) 2. Panel box with Stop-Start button, Wye-Delta starter controller set for 3 phase Power Circuit voltage & Low voltage control circuit in Bangladesh setting. (complete set for Star-Delta Requirement) 3. SPST switch = 1 pc 4. Incandescent lamp = 1 pc 5. 1 socket outlet, 1 Ø 6. 1 socket outlet, 3 Ø 7. Electric/Energy Meter 8. Plastic expansion screw set 5 mm = 20 pcs 9. # 10 AWG stranded wire, black, Brown, Red, Blue, Yellow = 1 roll 10. # 12 AWG stranded wire, black, Brown, Red, Blue, Yellow = 1 roll 11. # 14 AWG stranded wire, black, Brown, Red, Blue, Yellow = 1 roll 12. Electrical tape 13. 8 mm bare copper wire, 300 mm 14. Copper terminal lugs, with bolt & nut set, 8 mm Ø = 3 pcs 15. Copper clamp, 15 mm Ø = 1 pc 16. Earth rod, 3000 mm x 15 mm Ø = 1 pc 17. Copper Earthling plate, with 4 holes of 8 mm Ø 18. G.I. wire, 1/16" for cable pulling, 1 roll
PPE:	Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes

Set A: Practical Demonstration 2 – Observation Checklist

PRACTICAL DEMONSTRATION 2 – OBSERVATION CHECKLIST		
Candidate Name:		
Assessor Name:		
Qualification:	Certificate in Electrical Installation and Maintenance	
Task:	Installation of electrical wiring connection for lamp, switch, power outlet and motor control circuit (Stop-Start Star-Delta Starter Motor Controller) and earth/grounding system	
Assessment Centre:		
Date of Assessment:		
Instructions:	<p>The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate.</p> <p>Performance can be observed in an actual workplace or in a simulated working environment.</p> <p>If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject.</p> <p>The assessment activity (practical demonstration) should:</p> <ul style="list-style-type: none"> ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate 	
OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	No
Responded to work signage	<input type="checkbox"/>	<input type="checkbox"/>
Identified and used personal protective equipment (PPE)	<input type="checkbox"/>	<input type="checkbox"/>
Identified and followed safety signs and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Applied OSH policies and procedures in the workplace	<input type="checkbox"/>	<input type="checkbox"/>
Identified hazards and risks	<input type="checkbox"/>	<input type="checkbox"/>
Identified relevant drawings and specification	<input type="checkbox"/>	<input type="checkbox"/>
Identified hand tools	<input type="checkbox"/>	<input type="checkbox"/>
Interpreted application of tools to job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Prepared hand and power tools	<input type="checkbox"/>	<input type="checkbox"/>
Identified sources of power supply for power tools	<input type="checkbox"/>	<input type="checkbox"/>
Applied proper and safe use and operation of hand tools	<input type="checkbox"/>	<input type="checkbox"/>

Used power tools safely in accordance to manufacturer's operating specification	<input type="checkbox"/>	<input type="checkbox"/>
Comprehended scope, nature and major fields of electrical sector in the industry	<input type="checkbox"/>	<input type="checkbox"/>
Identified and interpreted relevant policies and guidelines	<input type="checkbox"/>	<input type="checkbox"/>
Completed work activities based on workplace standards	<input type="checkbox"/>	<input type="checkbox"/>
Identified difficulties and bottlenecks and put forward solutions	<input type="checkbox"/>	<input type="checkbox"/>
Monitored own work against workplace standards and identified and acted upon areas for improvement	<input type="checkbox"/>	<input type="checkbox"/>
Confirmed work requirements with colleagues	<input type="checkbox"/>	<input type="checkbox"/>
Collected manuals and documents of controlling and protective devices	<input type="checkbox"/>	<input type="checkbox"/>
Sorted drawings and symbols of controlling and protective devices	<input type="checkbox"/>	<input type="checkbox"/>
Listed types of controlling and protective devices	<input type="checkbox"/>	<input type="checkbox"/>
Selected and collected controlling and protective devices according to the need of the operations	<input type="checkbox"/>	<input type="checkbox"/>
Installed controlling and protective devices according to the layout plan	<input type="checkbox"/>	<input type="checkbox"/>
Controlling and protective devices are set and connected to the motor	<input type="checkbox"/>	<input type="checkbox"/>
Collected direct on line starter and interpreted its diagram	<input type="checkbox"/>	<input type="checkbox"/>
Connected direct on line starter with the motor	<input type="checkbox"/>	<input type="checkbox"/>
Collected star-delta starter and interpreted its diagram	<input type="checkbox"/>	<input type="checkbox"/>
Connected star-delta starter with the motor	<input type="checkbox"/>	<input type="checkbox"/>
Collected auto-transformer starter and interpreted its diagram	<input type="checkbox"/>	<input type="checkbox"/>
Connected auto-transformer starter with motor	<input type="checkbox"/>	<input type="checkbox"/>
Checked and justified all the connections of each starter	<input type="checkbox"/>	<input type="checkbox"/>
Checked and tested connection between motor and starter	<input type="checkbox"/>	<input type="checkbox"/>
Wired up control and power circuits as per job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Connected starter with motors	<input type="checkbox"/>	<input type="checkbox"/>
Tested and commissioned the motors as per job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Checked visually mechanical defects in accordance with standard practices	<input type="checkbox"/>	<input type="checkbox"/>
Checked electrical defects of motors such as loose or burned electrical connections	<input type="checkbox"/>	<input type="checkbox"/>
Tested motors by using specified instruments	<input type="checkbox"/>	<input type="checkbox"/>
Tested motors under running conditions for detecting faults	<input type="checkbox"/>	<input type="checkbox"/>
Obtained work order for maintenance from concern personnel	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected motor mains before inspection and testing in accordance with standard procedure	<input type="checkbox"/>	<input type="checkbox"/>

Dismantled motor for replacing bearings and greasing, repairing windings, varnishings, heating or any other tests if required as per standard procedures following safety precautions	<input type="checkbox"/>	<input type="checkbox"/>
Cleaned service parts of the motor using specified cleaning agent and tools in accordance with manufacturer's specification	<input type="checkbox"/>	<input type="checkbox"/>
Checked winding insulation of motors with megger/insulation resistance tester if necessary in accordance with standards	<input type="checkbox"/>	<input type="checkbox"/>
Assembled motors according to manufacturer's specification	<input type="checkbox"/>	<input type="checkbox"/>
Conducted no load and load test and noted down results in accordance with specification	<input type="checkbox"/>	<input type="checkbox"/>
Identified types and method of earthing in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Identified types and sizes of earthing materials in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Identified types of lightning protection system in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Identified types and sizes of lightning protection system in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Collected and checked earthing materials for conformance in accordance to specification	<input type="checkbox"/>	<input type="checkbox"/>
Collected and checked for conformance lightning protection materials in accordance to specification	<input type="checkbox"/>	<input type="checkbox"/>
Dug hole following with safety requirements	<input type="checkbox"/>	<input type="checkbox"/>
Shaped and sized hole in accordance to electrical plan/design specification	<input type="checkbox"/>	<input type="checkbox"/>
Fitted earthing element in the bottom of the excavated hole following standard earthing procedure	<input type="checkbox"/>	<input type="checkbox"/>
Connected earth lead to the earth element tightly and brought up the meter board through the conduit	<input type="checkbox"/>	<input type="checkbox"/>
Laid powdered charcoal and salt around the earthing element in accordance to workplace procedure	<input type="checkbox"/>	<input type="checkbox"/>
Fitted a proper size and length of GI pipe from top of the earth element to the bottom of the earth pit chamber	<input type="checkbox"/>	<input type="checkbox"/>
Filled rest of the excavated hole with earth	<input type="checkbox"/>	<input type="checkbox"/>
Constructed earth pit chamber with brick chips, cements sand and water mixture in accordance with standard/specification	<input type="checkbox"/>	<input type="checkbox"/>
Made pit chamber cover with G.I. sheet in accordance with electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Fitted/installed pit cover on the pit chamber	<input type="checkbox"/>	<input type="checkbox"/>
Checked earth resistance in accordance with electrical plan/specification	<input type="checkbox"/>	<input type="checkbox"/>
Installed lightning rod at specified location	<input type="checkbox"/>	<input type="checkbox"/>
Connected earth down conductor as per diagram	<input type="checkbox"/>	<input type="checkbox"/>
Tested performance of lightning protection system (LPS) as per standard	<input type="checkbox"/>	<input type="checkbox"/>

Cleaned and checked electrical tools/instruments for operability	<input type="checkbox"/>	<input type="checkbox"/>
Cleaned work area as waste materials are disposed in accordance with workplace requirements	<input type="checkbox"/>	<input type="checkbox"/>
Feedback to candidate:		
Assessment decision for this assessment activity:		
<input type="checkbox"/> Competent <input type="checkbox"/> Not Yet Competent		
Candidate's Signature:		Date:
Assessor' Signature:		Date:

Set B: Practical Demonstration 1

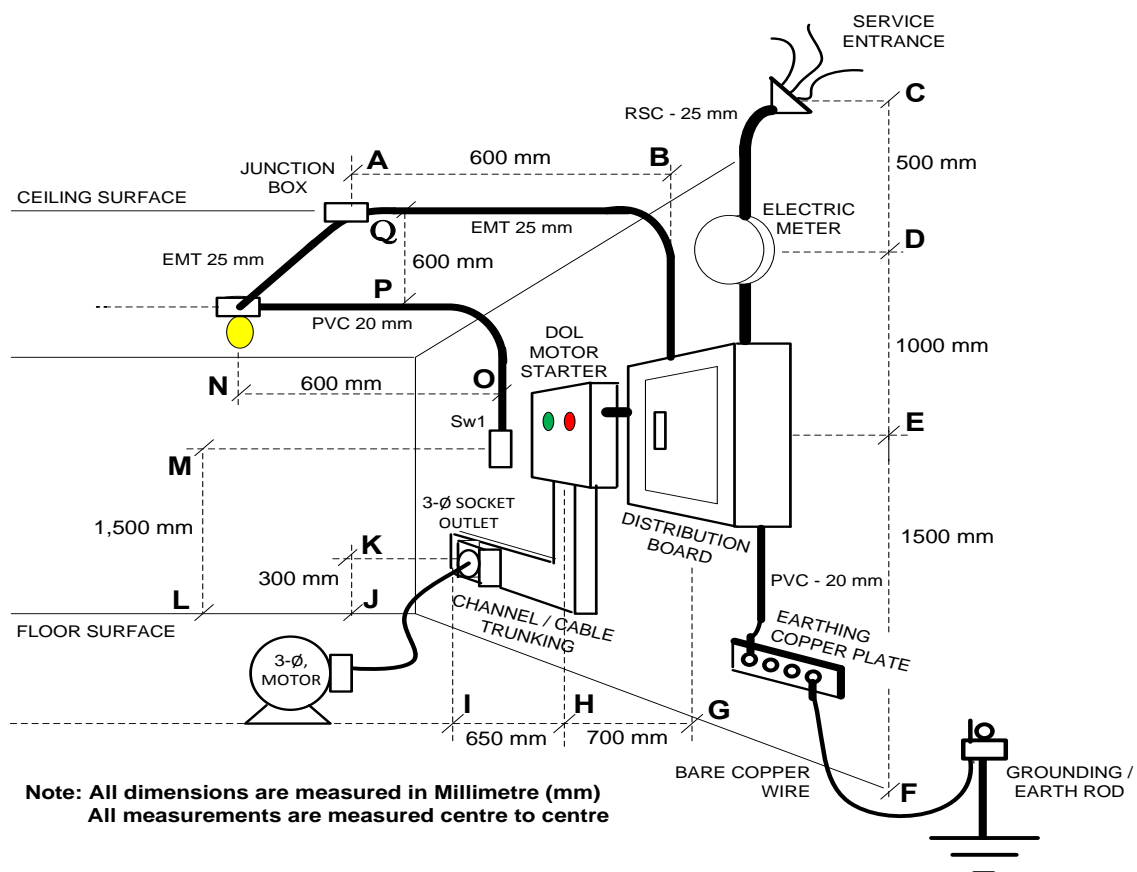
PRACTICAL DEMONSTRATION 1	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Electrical Installation and Maintenance
Task:	Installation and mounting of electrical devices and circuit wiring connections for Direct On-Line Motor Starter using channel/cable trunking, PVC and metal conduit with energy meter, lamp and switch and earth/grounding system
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	
Instructions:	
Read and understand the directions carefully:	
<ul style="list-style-type: none">▪ this practical demonstration is based on the performance criteria from all or some of the units of competency in Electrical Installation and Maintenance▪ this assessment activity will be used to measure your underpinning skills▪ you will have fifteen (15) minutes to familiarise yourself with the resources to be used▪ you have five (5) hours to complete this demonstration	
Procedure:	
<ul style="list-style-type: none">▪ observe and wear personal protective equipment (PPE) as required for the task to be performed▪ read the specification information provided▪ collect all materials needed to complete the task▪ perform the task within the given time▪ observe and follow all health and safety (OHS) requirements at all times	
Job Specification Information:	
<ol style="list-style-type: none">1. Collect required tools, equipment, machinery and materials required for the task (refer to the list provided to you by the assessor).2. Perform layout and bench work fabrication on channel/cable trunking.3. Perform layout, bending/offsetting, angles, threading and cutting on conduit.4. Install the electrical panel board and its accessories.5. Install the channel/cable trunking, PVC and metal conduit.6. Fix all the fittings, accessories, support and ensure safety and durability.7. Install and terminate electrical wiring connections of control circuit.8. Install and terminate electrical wiring connections of lighting circuit.9. Install and terminate electrical wiring connections of energy meter.10. Test and commission the electrical circuit connection.11. Report to the assessor for evaluation.12. Clean tools, equipment, machinery and work area.13. Dispose of waste materials and excess materials.	
Drawing, Plan, Diagram or Sketch:	

The project drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:

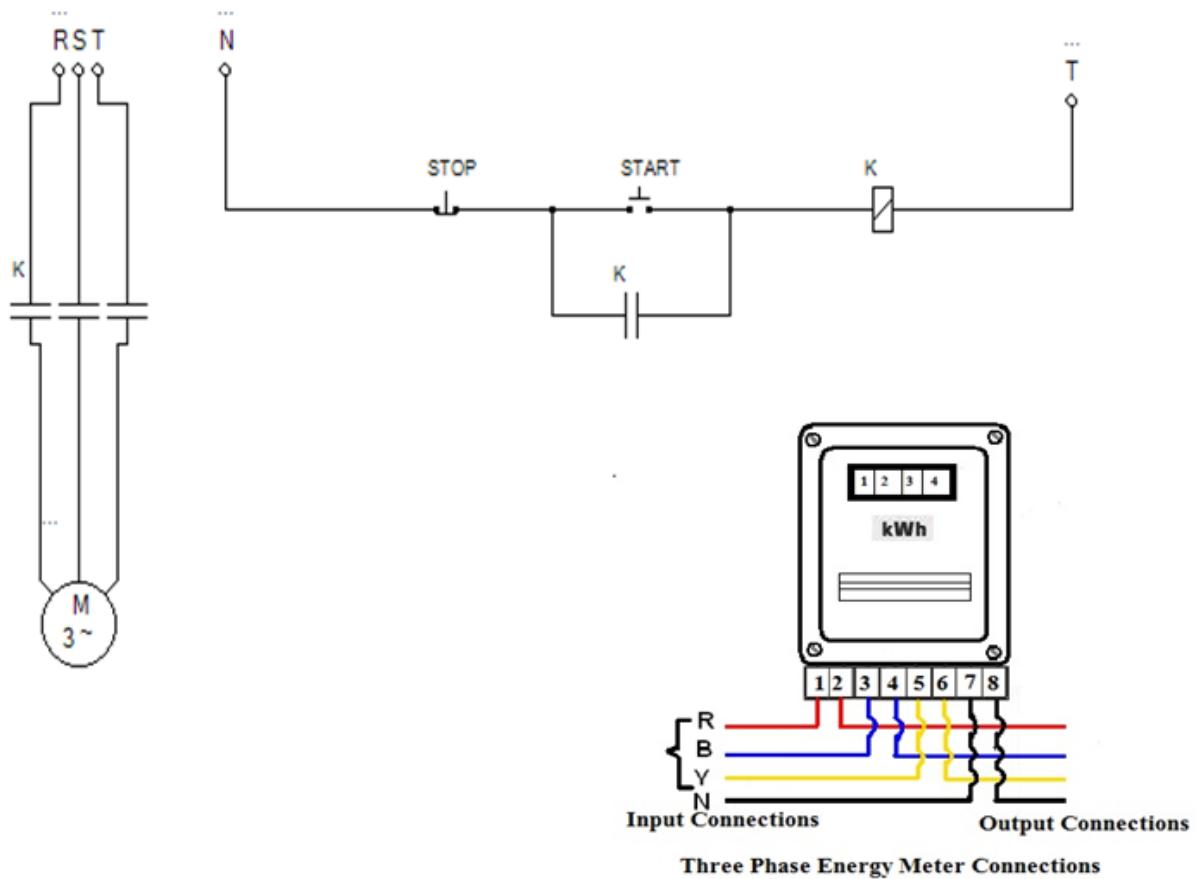
- Proper use of tools and fabrication technique
- Measurements according to project drawing
- Levelling and straightness
- Correct bending angle and offsetting without crumple and kinks
- No burrs and sharp edges
- Compliance in Building Electrical Code of Bangladesh
 - Colour coding of wires
 - Acceptable clearance on heights and distance
 - Specification of wires and circuit protection
- Correct connection for Main and Control Circuit
- Correct connection for the energy meter
- Correct connection for lighting and power outlet
- Proper splicing and termination
- Proper fixing and tightness of all wiring termination including the ground/earthing
- Safety and integrity of installed electrical equipment

Always observe safety practices when working for this job.

PROJECT DRAWING



**DIRECT ON LINE MOTOR STARTER
(Main Circuit and Control Circuit Diagram)**



Resources Required:

Tools:	<ul style="list-style-type: none"> Measuring tape Marker or mechanical chalk Try square Ball pin hammer Tin snip Hacksaw Spirit level Portable drill Metal drill set Metal file Portable disc cutter Hole saw drill or knockout puncher, 25 mm Ø Hole saw drill or knockout puncher, 20 mm Ø Mechanical pliers set Riveter Electrical pliers set Combination wrench set Screw driver set Wire stripper Multi tester Megger Tester
--------	--

	Clamp meter/ optional if load is available
Equipment:	N/A
Machinery:	N/A
Materials:	<ol style="list-style-type: none"> 1. Channel/cable tray with cover – 80 mm x 80 mm x 3000 mm, with cover = 1 length 2. Side splice plates = 4 pcs 3. Bolts and nuts – 10 mm = 30 pcs 4. DIN Rail = 1 length 5. Blind rivets, Aluminium, 4 mm x 10 mm – 30 pcs 6. Rigid Steel Conduit (RSC) 25 mm Ø = 1 length 7. EMT clamp, 25 mm Ø = 5 pcs 8. EMT connector, 25 mm Ø = 4 pcs 9. RSC threaded connector, 25 mm Ø = 1 pc 10. PVC pipe 20 mm Ø = 1 length 11. PVC clamp, 25 mm Ø = 8 pcs 12. PVC Connector 20 mm Ø = 4 pcs 13. Electrical Panel Box, Top/Bottom Entry = 1 pc 14. 30 Amp. Main CB, Clip Type, 380/440V, 3 Ø with enclosed box = 1 pc 15. 20 Amp. CB, Clip Type 3- Phase = 1 pc 16. 15 Amp. CB, Clip Type 1- Phase = 1 pc 17. Incandescent lamp with holder = 1 pc 18. SPST switch = 1 pc 19. Electric meter, 3 phase (Square or round/Digital or analog) 20. Service entrance cap, 25 mm, 3 phase 21. Contactor 380/440V 3 Ø, 3 NO + 1 NC, Clip type = 1 pc 22. Terminal block (For neutral /grounding cables) 23. Push button set, NO contact (Green) 24. Push button set, NC contact (Red) 25. Pilot Lamp set (Green, Red) 26. Junction box, deep type (surface mount) = 2 pcs 27. Utility box deep type (surface mount) = 1 pc 28. C.O. 3 Ø = 1 pc 29. OL Relay, adjustable dial type, 0 – 30 Amps 30. Wood screw, Flat /Philips head, 5 mm X 2.5 mm = 50 pcs 31. Plastic expansion screw set 5 mm = 20 pcs 32. # 10 AWG stranded wire, black, Brown, Red, Blue, Yellow = 1 roll 33. # 12 AWG stranded wire, black, Brown, Red, Blue, Yellow = 1 roll 34. # 14 AWG stranded wire, black, Brown, Red, Blue, Yellow = 1 roll 35. Royal cord, # 15 AWG, (4 core) – 2 meters 36. 10 mm bare copper wire, 300 mm/Grounding cable 37. Copper terminal lugs, with bolt & nut set, 10 mm Ø = 3 pcs

	<p>38. Copper clamp, 15 mm Ø = 1 pc (for earth rod)</p> <p>39. Earth rod, 3000 mm x 15 mm Ø = 1 pc</p> <p>40. Copper Earthling plate, with 4 holes of 10 mm Ø</p> <p>41. G.I. wire, 1/16" for cable pulling, 1 roll</p> <p>42. Electrical tape = 1 roll</p> <p>43. 3 phase squirrel cage motor, 2 hp = 1 pc</p>
PPE:	<p>Apron</p> <p>Mask</p> <p>Safety helmet</p> <p>Safety goggles</p> <p>Gloves (long)</p> <p>Safety shoes</p>

Set B: Practical Demonstration 1 – Observation Checklist

PRACTICAL DEMONSTRATION 1 – OBSERVATION CHECKLIST		
Candidate Name:		
Assessor Name:		
Qualification:	Certificate in Electrical Installation and Maintenance	
Task:	Installation and mounting of electrical devices and circuit wiring connections for Direct On-Line Motor Starter using channel/cable trunking, PVC and metal conduit with energy meter, lamp circuit and earth/grounding system	
Assessment Centre:		
Date of Assessment:		
Instructions:	<p>The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate.</p> <p>Performance can be observed in an actual workplace or in a simulated working environment.</p> <p>If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject.</p> <p>The assessment activity (practical demonstration) should:</p> <ul style="list-style-type: none"> ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate 	
OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	No
Responded to work signage	<input type="checkbox"/>	<input type="checkbox"/>
Identified and used personal protective equipment (PPE)	<input type="checkbox"/>	<input type="checkbox"/>
Identified and followed safety signs and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Applied OSH policies and procedures in the workplace	<input type="checkbox"/>	<input type="checkbox"/>
Identified hazards and risks	<input type="checkbox"/>	<input type="checkbox"/>
Identified relevant drawings and specification	<input type="checkbox"/>	<input type="checkbox"/>
Identified hand tools	<input type="checkbox"/>	<input type="checkbox"/>
Interpreted application of tools to job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Prepared hand and power tools	<input type="checkbox"/>	<input type="checkbox"/>
Identified sources of power supply for power tools	<input type="checkbox"/>	<input type="checkbox"/>
Applied proper and safe use and operation of hand tools	<input type="checkbox"/>	<input type="checkbox"/>

Used power tools safely in accordance to manufacturer's operating specification	<input type="checkbox"/>	<input type="checkbox"/>
Comprehended scope, nature and major fields of electrical sector in the industry	<input type="checkbox"/>	<input type="checkbox"/>
Identified and interpreted relevant policies and guidelines	<input type="checkbox"/>	<input type="checkbox"/>
Completed work activities based on workplace standards	<input type="checkbox"/>	<input type="checkbox"/>
Identified difficulties and bottlenecks and put forward solutions	<input type="checkbox"/>	<input type="checkbox"/>
Monitored own work against workplace standards and identified and acted upon areas for improvement	<input type="checkbox"/>	<input type="checkbox"/>
Confirmed work requirements with colleagues	<input type="checkbox"/>	<input type="checkbox"/>
Collected and interpreted drawings	<input type="checkbox"/>	<input type="checkbox"/>
Identified signs and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Identified terms and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Interpreted specifications	<input type="checkbox"/>	<input type="checkbox"/>
Drawn wiring layout according to supplied drawing	<input type="checkbox"/>	<input type="checkbox"/>
Located, drilled and inserted rowel plug points as per procedure	<input type="checkbox"/>	<input type="checkbox"/>
Installed and screwed bottom parts of channels	<input type="checkbox"/>	<input type="checkbox"/>
Collected and fitted boards as per drawing diagram	<input type="checkbox"/>	<input type="checkbox"/>
Fitted switches, sockets, fan regulator and ballast on the board with screw	<input type="checkbox"/>	<input type="checkbox"/>
Connected switches, sockets and fan regulator to the circuits	<input type="checkbox"/>	<input type="checkbox"/>
Fitted ceiling rose and different types of holders on the board	<input type="checkbox"/>	<input type="checkbox"/>
Connected and fitted MCB and MCBB on the board	<input type="checkbox"/>	<input type="checkbox"/>
Placed and set bottom parts of the channels according to drawing on the board	<input type="checkbox"/>	<input type="checkbox"/>
Drawn cables through the bottom part of the channels	<input type="checkbox"/>	<input type="checkbox"/>
Placed circuit materials required for the specified circuit on the board	<input type="checkbox"/>	<input type="checkbox"/>
Connected and fitted other accessories	<input type="checkbox"/>	<input type="checkbox"/>
Covered the bottom parts of the channels with upper part of the channel	<input type="checkbox"/>	<input type="checkbox"/>
Cut and grooved wall	<input type="checkbox"/>	<input type="checkbox"/>
Cut and set collected conduits	<input type="checkbox"/>	<input type="checkbox"/>
Installed and clamped conduits on the wall	<input type="checkbox"/>	<input type="checkbox"/>
Measured and cut fish wires	<input type="checkbox"/>	<input type="checkbox"/>
Inserted fish wire	<input type="checkbox"/>	<input type="checkbox"/>
Cut collected cables	<input type="checkbox"/>	<input type="checkbox"/>
Tied cables with fish and inserted into the conduit	<input type="checkbox"/>	<input type="checkbox"/>
Checked polarity of wiring by megger as per procedure	<input type="checkbox"/>	<input type="checkbox"/>

Justified and checked each of the switches, fuses and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected the main switches and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Connected and checked all loads for the continuity each of the switches and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected the main switches and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Tested continuity by observing the zero positions of the megger and measured insulation resistance	<input type="checkbox"/>	<input type="checkbox"/>
Connected earth terminals as per appropriate measurements and positions	<input type="checkbox"/>	<input type="checkbox"/>
Measured earth resistance by observing the positions of the pointer of the megger	<input type="checkbox"/>	<input type="checkbox"/>
Installed controlling and protective devices according to the layout plan	<input type="checkbox"/>	<input type="checkbox"/>
Controlling and protective devices are set and connected to the motor	<input type="checkbox"/>	<input type="checkbox"/>
Collected direct on-line starter and interpreted its diagram	<input type="checkbox"/>	<input type="checkbox"/>
Connected direct on-line starter with the motor	<input type="checkbox"/>	<input type="checkbox"/>
Checked and justified all the connections of each starter	<input type="checkbox"/>	<input type="checkbox"/>
Checked and tested connection between motor and starter	<input type="checkbox"/>	<input type="checkbox"/>
Wired up control and power circuits as per job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Connected starter with motors	<input type="checkbox"/>	<input type="checkbox"/>
Tested and commissioned the motors as per job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Checked visually mechanical defects in accordance with standard practices	<input type="checkbox"/>	<input type="checkbox"/>
Checked electrical defects of motors such as loose or burned electrical connections	<input type="checkbox"/>	<input type="checkbox"/>
Tested motors by using specified instruments	<input type="checkbox"/>	<input type="checkbox"/>
Tested motors under running conditions for detecting faults	<input type="checkbox"/>	<input type="checkbox"/>
Obtained work order for maintenance from concern personnel	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected motor mains before inspection and testing in accordance with standard procedure	<input type="checkbox"/>	<input type="checkbox"/>
Checked winding insulation of motors with megger/insulation resistance tester if necessary in accordance with standards	<input type="checkbox"/>	<input type="checkbox"/>
Assembled motors according to manufacturer's specification	<input type="checkbox"/>	<input type="checkbox"/>
Conducted no load and load test and noted down results in accordance with specification	<input type="checkbox"/>	<input type="checkbox"/>
Identified types and method of earthing in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Identified types and sizes of earthing materials in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Wired up control and power circuits as per job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Connected starter with motors	<input type="checkbox"/>	<input type="checkbox"/>
Tested and commissioned the motors as per job requirement	<input type="checkbox"/>	<input type="checkbox"/>

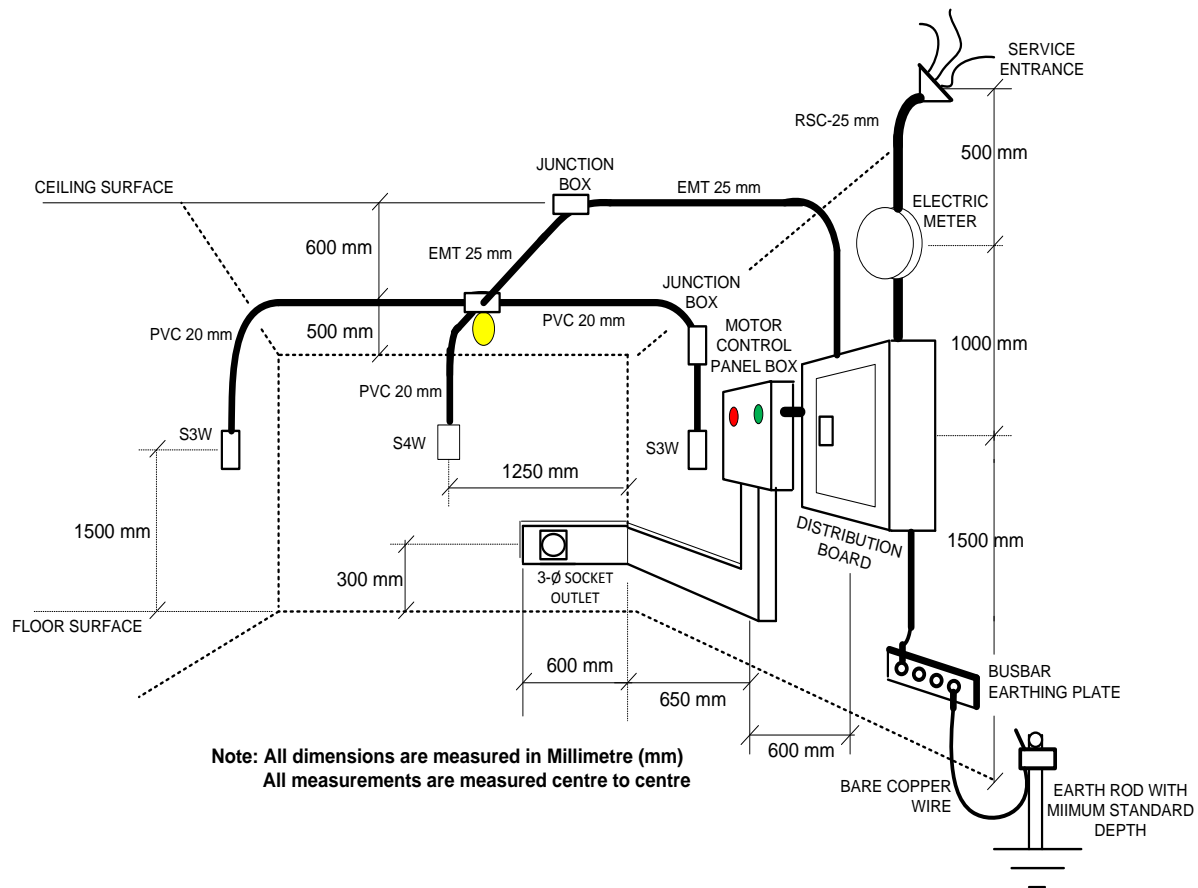
Checked visually mechanical defects in accordance with standard practices	<input type="checkbox"/>	<input type="checkbox"/>
Checked electrical defects of motors such as loose or burned electrical connections	<input type="checkbox"/>	<input type="checkbox"/>
Tested motors by using specified instruments	<input type="checkbox"/>	<input type="checkbox"/>
Tested motors under running conditions for detecting faults	<input type="checkbox"/>	<input type="checkbox"/>
Obtained work order for maintenance from concern personnel	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected motor mains before inspection and testing in accordance with standard procedure	<input type="checkbox"/>	<input type="checkbox"/>
Collected and checked earthing materials for conformance in accordance to specification	<input type="checkbox"/>	<input type="checkbox"/>
Shaped and sized hole in accordance to electrical plan/design specification	<input type="checkbox"/>	<input type="checkbox"/>
Fitted earthing element in the bottom of the excavated hole following standard earthing procedure	<input type="checkbox"/>	<input type="checkbox"/>
Connected earth lead to the earth element tightly and brought up the meter board through the conduit	<input type="checkbox"/>	<input type="checkbox"/>
Fitted a proper size and length of GI pipe from top of the earth element to the bottom of the earth pit chamber	<input type="checkbox"/>	<input type="checkbox"/>
Cleaned and checked electrical tools/instruments for operability	<input type="checkbox"/>	<input type="checkbox"/>
Cleaned work area as waste materials are disposed in accordance with workplace requirements	<input type="checkbox"/>	<input type="checkbox"/>
Feedback to candidate:		
Assessment decision for this assessment activity:		
<input type="checkbox"/> Competent <input type="checkbox"/> Not Yet Competent		
Candidate's Signature:		Date:
Assessor' Signature:		Date:

Set C: Practical Demonstration 1

PRACTICAL DEMONSTRATION 1	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Electrical Installation and Maintenance
Task:	Installation of raceways for the industrial motor controller using PVC, metal conduit, channel/cable trunking and wiring connection of lighting circuit controlled in 3 different locations
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	
Instructions:	
Read and understand the directions carefully:	
<ul style="list-style-type: none">▪ this practical demonstration is based on the performance criteria from all or some of the units of competency in Electrical Installation and Maintenance▪ this assessment activity will be used to measure your underpinning skills▪ you will have fifteen (15) minutes to familiarise yourself with the resources to be used▪ you have five (5) hours to complete this demonstration	
Procedure:	
<ul style="list-style-type: none">▪ observe and wear personal protective equipment (PPE) as required for the task to be performed▪ read the specification information provided▪ collect all materials needed to complete the task▪ perform the task within the given time▪ observe and follow all health and safety (OHS) requirements at all times	
Job Specification Information:	
<ol style="list-style-type: none">1. Collect required tools, equipment, machinery and materials required for the task (refer to the list provided to you by the assessor).2. Perform layout and bench work fabrication on cable tray as measured.3. Perform layout, bending/offsetting, angles, threading and cutting on conduit as required.4. Install the electrical distribution board on the wall surface.5. Install the motor Control panel box on the wall surface.6. Install the channel tray, PVC and metal conduit according to the project requirement.7. Install the electrical meter using appropriate procedures and materials.8. Fix all the fittings, accessories and support and ensure safety and durability.9. Report to the assessor for evaluation.10. Clean tools, equipment, machinery and work area.11. Dispose of waste materials and excess materials.	
Drawing, Plan, Diagram or Sketch:	
The project drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:	
<ul style="list-style-type: none">▪ Proper use of tools and fabrication technique	

- Measurements according to project drawing
- Levelling and straightness
- Correct bending angle and offsetting without crumple and kinks
- No burrs and sharp edges
- Stability of all installed components

Always observe safety practices when working for this job.



Resources Required:

Tools:

Measuring tape
 Marker or mechanical chalk
 Try square
 Ball pin hammer
 Tin snip
 Hacksaw
 Spirit level
 Portable drill
 Concrete drill set
 Metal drill set
 Metal file
 Portable disc cutter
 Hole saw drill or knockout puncher, 25 mm Ø
 Hole saw drill or knockout puncher, 20 mm Ø
 Mechanical pliers set
 Combination wrench set

Equipment:	N/A
Machinery:	N/A
Materials:	<ol style="list-style-type: none"> 1. Channel tray with cover – 80 mm x 80 mm x 3000 mm, with cover = 1 length 2. Side splice plates = 4 pcs 3. Bolts and nuts – 10 mm = 30 pcs 4. DYNA Bolts, 10 mm x 40 mm = 8 pcs 5. Blind rivets, Aluminium, 4 mm x 10 mm – 30 pcs 6. Rigid Steel Conduit (RSC) 25 mm Ø = 1 length 7. RSC Threaded coupling connector = 1 8. EMT bracket/clamp, 25 mm Ø = 10 pcs 9. EMT connector, 25 mm Ø = 4 pcs 10. RSC threaded connector, 25 mm Ø = 3 pcs 11. Service entrance cap, 3 Ø = 1 pc 12. PVC pipe 20 mm Ø = 3 lengths 13. PVC Connector 20 mm Ø = 8 pcs 14. Distribution Box set with, 1 pc 60 Amp. Main CB/ Branches with 1 pc. 30 Amp. CB, 1 pc. 20 Amp. CB and 1 pc. 15 Amp. CB, Clip-On Type, Surface mounted, Bottom & Top Entry (standard size for the project) 15. Panel box with Stop-Start button, Wye-Delta starter controller set for 3 phase Power Circuit voltage & Low voltage control circuit in Bangladesh setting. <p>Sand paper #1000</p> <ol style="list-style-type: none"> 16. Junction box, deep type (surface mount) = 3 pcs 17. Utility box deep type (surface mount) = 4 pcs
PPE:	<p>Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes</p>

Set C: Practical Demonstration 1 – Observation Checklist

PRACTICAL DEMONSTRATION 1 – OBSERVATION CHECKLIST		
Candidate Name:		
Assessor Name:		
Qualification:	Certificate in Electrical Installation and Maintenance	
Task:	Installation of raceways for the industrial motor controller using PVC, metal conduit, channel tray and wiring connection of lighting circuit controlled in 3 different locations	
Assessment Centre:		
Date of Assessment:		
Instructions:	<p>The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate.</p> <p>Performance can be observed in an actual workplace or in a simulated working environment.</p> <p>If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject.</p> <p>The assessment activity (practical demonstration) should:</p> <ul style="list-style-type: none"> ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate 	
OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	No
Responded to work signage	<input type="checkbox"/>	<input type="checkbox"/>
Identified and used personal protective equipment (PPE)	<input type="checkbox"/>	<input type="checkbox"/>
Identified and followed safety signs and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Applied OSH policies and procedures in the workplace	<input type="checkbox"/>	<input type="checkbox"/>
Identified hazards and risks	<input type="checkbox"/>	<input type="checkbox"/>
Identified relevant drawings and specification	<input type="checkbox"/>	<input type="checkbox"/>
Identified hand tools	<input type="checkbox"/>	<input type="checkbox"/>
Interpreted application of tools to job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Prepared hand and power tools	<input type="checkbox"/>	<input type="checkbox"/>
Identified sources of power supply for power tools	<input type="checkbox"/>	<input type="checkbox"/>
Applied proper and safe use and operation of hand tools	<input type="checkbox"/>	<input type="checkbox"/>

Used power tools safely in accordance to manufacturer's operating specification	<input type="checkbox"/>	<input type="checkbox"/>
Comprehended scope, nature and major fields of electrical sector in the industry	<input type="checkbox"/>	<input type="checkbox"/>
Identified and interpreted relevant policies and guidelines	<input type="checkbox"/>	<input type="checkbox"/>
Completed work activities based on workplace standards	<input type="checkbox"/>	<input type="checkbox"/>
Identified difficulties and bottlenecks and put forward solutions	<input type="checkbox"/>	<input type="checkbox"/>
Monitored own work against workplace standards and identified and acted upon areas for improvement	<input type="checkbox"/>	<input type="checkbox"/>
Confirmed work requirements with colleagues	<input type="checkbox"/>	<input type="checkbox"/>
Collected and interpreted drawings	<input type="checkbox"/>	<input type="checkbox"/>
Identified signs and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Identified terms and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Interpreted specifications	<input type="checkbox"/>	<input type="checkbox"/>
Drawn wiring layout according to supplied drawing	<input type="checkbox"/>	<input type="checkbox"/>
Located, drilled and inserted rowel plug points as per procedure	<input type="checkbox"/>	<input type="checkbox"/>
Installed and screwed bottom parts of channels	<input type="checkbox"/>	<input type="checkbox"/>
Collected and fitted boards as per drawing diagram	<input type="checkbox"/>	<input type="checkbox"/>
Fitted switches, sockets, fan regulator and ballast on the board with screw	<input type="checkbox"/>	<input type="checkbox"/>
Connected switches, sockets and fan regulator to the circuits	<input type="checkbox"/>	<input type="checkbox"/>
Fitted ceiling rose and different types of holders on the board	<input type="checkbox"/>	<input type="checkbox"/>
Connected and fitted MCB and MCBB on the board	<input type="checkbox"/>	<input type="checkbox"/>
Placed and set bottom parts of the channels according to drawing on the board	<input type="checkbox"/>	<input type="checkbox"/>
Drawn cables through the bottom part of the channels	<input type="checkbox"/>	<input type="checkbox"/>
Placed circuit materials required for the specified circuit on the board	<input type="checkbox"/>	<input type="checkbox"/>
Connected and fitted other accessories	<input type="checkbox"/>	<input type="checkbox"/>
Covered the bottom parts of the channels with upper part of the channel	<input type="checkbox"/>	<input type="checkbox"/>
Cut and grooved wall	<input type="checkbox"/>	<input type="checkbox"/>
Cut and set collected conduits	<input type="checkbox"/>	<input type="checkbox"/>
Installed and clamped conduits on the wall	<input type="checkbox"/>	<input type="checkbox"/>
Measured and cut fish wires	<input type="checkbox"/>	<input type="checkbox"/>
Inserted fish wire	<input type="checkbox"/>	<input type="checkbox"/>
Cut collected cables	<input type="checkbox"/>	<input type="checkbox"/>
Tied cables with fish and inserted into the conduit	<input type="checkbox"/>	<input type="checkbox"/>
Checked polarity of wiring by megger as per procedure	<input type="checkbox"/>	<input type="checkbox"/>

Justified and checked each of the switches, fuses and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected the main switches and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Connected and checked all loads for the continuity each of the switches and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected the main switches and circuit breakers	<input type="checkbox"/>	<input type="checkbox"/>
Tested continuity by observing the zero positions of the megger and measured insulation resistance	<input type="checkbox"/>	<input type="checkbox"/>
Connected earth terminals as per appropriate measurements and positions	<input type="checkbox"/>	<input type="checkbox"/>
Measured earth resistance by observing the positions of the pointer of the megger	<input type="checkbox"/>	<input type="checkbox"/>
Checked and measured distance between distribution pole and meter	<input type="checkbox"/>	<input type="checkbox"/>
Checked and measured distance between main switch and meter	<input type="checkbox"/>	<input type="checkbox"/>
Selected and collected quality of cables for service connection	<input type="checkbox"/>	<input type="checkbox"/>
Cut and set collected cables	<input type="checkbox"/>	<input type="checkbox"/>
Held on and clamped cables properly with distribution pole	<input type="checkbox"/>	<input type="checkbox"/>
Joined and connected cables with pole and energy meter	<input type="checkbox"/>	<input type="checkbox"/>
Collected energy meter and set on the board	<input type="checkbox"/>	<input type="checkbox"/>
Connected energy meter with service line	<input type="checkbox"/>	<input type="checkbox"/>
Measured and sized energy meter	<input type="checkbox"/>	<input type="checkbox"/>
Laid cables into the conduit	<input type="checkbox"/>	<input type="checkbox"/>
Performed connection between energy meter and main switches	<input type="checkbox"/>	<input type="checkbox"/>
Cleaned tools and equipment as per standard	<input type="checkbox"/>	<input type="checkbox"/>
Prepared cleaning tools and equipment for cleaning	<input type="checkbox"/>	<input type="checkbox"/>
Disposed waste materials	<input type="checkbox"/>	<input type="checkbox"/>
Stored tools and equipment as per standard	<input type="checkbox"/>	<input type="checkbox"/>
Feedback to candidate:		
Assessment decision for this assessment activity:		
<input type="checkbox"/> Competent <input type="checkbox"/> Not Yet Competent		
Candidate's Signature:		Date:
Assessor' Signature:		Date:

Set C: Practical Demonstration 2

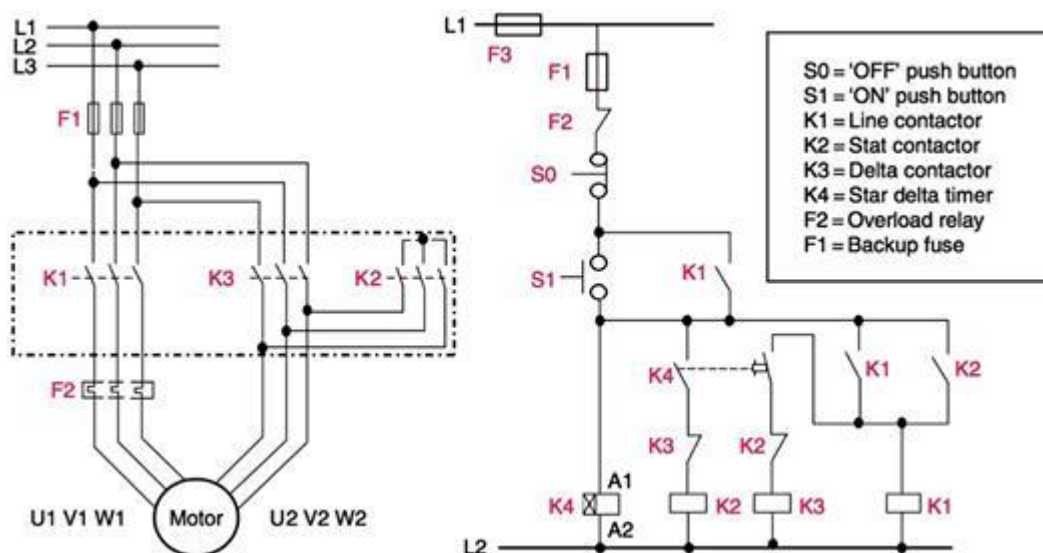
PRACTICAL DEMONSTRATION 2	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Electrical Installation and Maintenance
Task:	Wiring installation, testing and commissioning of motor control circuit (Star-Delta Motor Starter) and lighting circuit controlled in 3 different locations with earth/grounding connection
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	
Instructions:	
<p>Read and understand the directions carefully:</p> <ul style="list-style-type: none"> ▪ this practical demonstration is based on the performance criteria from all or some of the units of competency in Electrical Installation and Maintenance ▪ this assessment activity will be used to measure your underpinning skills ▪ you will have fifteen (15) minutes to familiarise yourself with the resources to be used ▪ you have three (3) hour to complete this demonstration 	
Procedure:	
<ul style="list-style-type: none"> ▪ observe and wear personal protective equipment (PPE) as required for the task to be performed ▪ read the specification information provided ▪ collect all materials needed to complete the task ▪ perform the task within the given time ▪ observe and follow all health and safety (OHS) requirements at all times 	
Specification Information:	
<ol style="list-style-type: none"> 1. Collect required tools, equipment, machinery and materials required for the task (refer to the list provided to you by the assessor). 2. Install the bare copper wire and its accessories pertaining to earth/grounding system. 3. Perform cable pulling, measure the required size and length of wires needed for each circuit. 4. Perform splicing and wiring termination. 5. Install the electrical devices; electric meter, circuit breaker, lamp, switch and power outlet. 6. Install the Main Circuit Breaker and CB on its branches. 7. Terminate the power cables to the line side and load side of the Main CB. 8. Terminate the load side cable of the CB connected to the branches. 9. Install the wiring connection and electrical devices for the WYE-DELTA starter controller. 10. Install the electrical devices for light, switch, socket outlet and wiring connection. 11. Fix all the fittings, accessories, support and ensure safety and durability. 12. Test for the continuity, grounding and short circuit of the electrical system. 13. Report to the assessor for evaluation. 14. Clean tools, equipment, machinery and work area. 15. Dispose of waste materials and excess materials. 	

Drawing, Plan, Diagram or Sketch:

The project drawing below is the actual installation requirement for the task to be performed. During the installation process, you are to ensure:

- Proper use of tools and wiring technique
- Compliance in Building Electrical Code of Bangladesh
 - Colour coding of wires
 - Acceptable clearance on heights and distance
 - Specification of wires and circuit protection
- Correct connection for Main Circuit
- Correct connection for Control Circuit
- Correct connection for lighting and power outlet
- Correct connection for Electric/Energy Meter
- Proper splicing and termination
- Proper fixing and tightness of all wiring termination including the grounding/earth
- Safety and integrity of installed electrical equipment

STAR – DELTA CIRCUIT DIAGRAM (ISO / Main Circuit and Control Circuit)



Resources Required:

Tools:	Measuring tape Marker Spirit level Portable drill Electrical pliers set Combination wrench set Screw driver set Wire stripper Multi tester Clamp meter/ optional if load is available
Equipment:	3 Ø Squirrel cage motor, 2 Hp, (Specification upon discretion of the Assessor)
Machinery:	N/A

Materials:	<ol style="list-style-type: none"> 1. Distribution Box set with, 1 pc 60 Amp. Main CB/ Branches with 1 pc. 30 Amp. CB, 1 pc. 20 Amp. CB and 1 pc. 15 Amp. CB, Clip-On Type, Surface mounted, Bottom & Top Entry (standard size for the project) 2. Panel box with Stop-Start button, Wye-Delta starter controller set for 3 phase Power Circuit voltage & Low voltage control circuit in Bangladesh setting. (complete set for Star-Delta Requirement) 3. 3-Way Switch = 2 pcs 4. Intermediate/4-Way Switch = 1 pc 5. Incandescent lamp = 1 pc 6. 1 socket outlet, 3 Ø 7. Electric/Energy Meter 8. Plastic expansion screw set 5 mm = 20 pcs 9. # 10 AWG stranded wire, black, Brown, Red, Blue, Yellow = 1 roll 10. # 12 AWG stranded wire, black, Brown, Red, Blue, Yellow = 1 roll 11. # 14 AWG stranded wire, black, Brown, Red, Blue, Yellow = 1 roll 12. Electrical tape 13. 8 mm bare copper wire, 300 mm 14. Copper terminal lugs, with bolt & nut set, 8 mm Ø = 3 pcs 15. Copper clamp, 15 mm Ø = 1 pc 16. Earth rod, 3000 mm x 15 mm Ø = 1 pc 17. Copper Earthing plate, with 4 holes of 8 mm Ø 18. G.I. wire, 1/16" for cable pulling, 1 roll
PPE:	<p>Apron Mask Safety helmet Safety goggles Gloves (long) Safety shoes</p>

Set C: Practical Demonstration 2 – Observation Checklist

PRACTICAL DEMONSTRATION 2 – OBSERVATION CHECKLIST		
Candidate Name:		
Assessor Name:		
Qualification:	Certificate in Electrical Installation and Maintenance	
Task:	Wiring installation, testing and commissioning of motor control circuit (Star-Delta Motor Starter) and lighting circuit controlled in 3 different location with earth/grounding connection	
Assessment Centre:		
Date of Assessment:		
Instructions:	<p>The tasks listed on the observation checklist of the practical demonstration will provide performance evidence of the candidate.</p> <p>Performance can be observed in an actual workplace or in a simulated working environment.</p> <p>If performance of particular tasks cannot be observed, you may ask the candidate to explain a procedure or enter into a discussion on the subject.</p> <p>The assessment activity (practical demonstration) should:</p> <ul style="list-style-type: none"> ▪ fit industry requirements in which the assessment will be conducted ▪ adhere, where possible, to reasonable adjustment practices ▪ ensure that suitable performance benchmarks are applied and explained to the candidate 	
OBSERVATION RECORD		
Performance Criteria	Place a ✓ to show if evidence has been demonstrated competently	
	Yes	No
Responded to work signage	<input type="checkbox"/>	<input type="checkbox"/>
Identified and used personal protective equipment (PPE)	<input type="checkbox"/>	<input type="checkbox"/>
Identified and followed safety signs and symbols	<input type="checkbox"/>	<input type="checkbox"/>
Applied OSH policies and procedures in the workplace	<input type="checkbox"/>	<input type="checkbox"/>
Identified hazards and risks	<input type="checkbox"/>	<input type="checkbox"/>
Identified relevant drawings and specification	<input type="checkbox"/>	<input type="checkbox"/>
Identified hand tools	<input type="checkbox"/>	<input type="checkbox"/>
Interpreted application of tools to job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Prepared hand and power tools	<input type="checkbox"/>	<input type="checkbox"/>
Identified sources of power supply for power tools	<input type="checkbox"/>	<input type="checkbox"/>
Applied proper and safe use and operation of hand tools	<input type="checkbox"/>	<input type="checkbox"/>

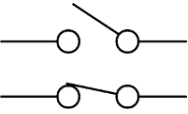
Used power tools safely in accordance to manufacturer's operating specification	<input type="checkbox"/>	<input type="checkbox"/>
Comprehended scope, nature and major fields of electrical sector in the industry	<input type="checkbox"/>	<input type="checkbox"/>
Identified and interpreted relevant policies and guidelines	<input type="checkbox"/>	<input type="checkbox"/>
Completed work activities based on workplace standards	<input type="checkbox"/>	<input type="checkbox"/>
Identified difficulties and bottlenecks and put forward solutions	<input type="checkbox"/>	<input type="checkbox"/>
Monitored own work against workplace standards and identified and acted upon areas for improvement	<input type="checkbox"/>	<input type="checkbox"/>
Confirmed work requirements with colleagues	<input type="checkbox"/>	<input type="checkbox"/>
Collected manuals and documents of controlling and protective devices	<input type="checkbox"/>	<input type="checkbox"/>
Sorted drawings and symbols of controlling and protective devices	<input type="checkbox"/>	<input type="checkbox"/>
Listed types of controlling and protective devices	<input type="checkbox"/>	<input type="checkbox"/>
Selected and collected controlling and protective devices according to the need of the operations	<input type="checkbox"/>	<input type="checkbox"/>
Installed controlling and protective devices according to the layout plan	<input type="checkbox"/>	<input type="checkbox"/>
Controlling and protective devices are set and connected to the motor	<input type="checkbox"/>	<input type="checkbox"/>
Collected direct on-line starter and interpreted its diagram	<input type="checkbox"/>	<input type="checkbox"/>
Connected direct on-line starter with the motor	<input type="checkbox"/>	<input type="checkbox"/>
Collected star-delta starter and interpreted its diagram	<input type="checkbox"/>	<input type="checkbox"/>
Connected star-delta starter with the motor	<input type="checkbox"/>	<input type="checkbox"/>
Collected auto-transformer starter and interpreted its diagram	<input type="checkbox"/>	<input type="checkbox"/>
Connected auto-transformer starter with motor	<input type="checkbox"/>	<input type="checkbox"/>
Checked and justified all the connections of each starter	<input type="checkbox"/>	<input type="checkbox"/>
Checked and tested connection between motor and starter	<input type="checkbox"/>	<input type="checkbox"/>
Wired up control and power circuits as per job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Connected starter with motors	<input type="checkbox"/>	<input type="checkbox"/>
Tested and commissioned the motors as per job requirement	<input type="checkbox"/>	<input type="checkbox"/>
Checked visually mechanical defects in accordance with standard practices	<input type="checkbox"/>	<input type="checkbox"/>
Checked electrical defects of motors such as loose or burned electrical connections	<input type="checkbox"/>	<input type="checkbox"/>
Tested motors by using specified instruments	<input type="checkbox"/>	<input type="checkbox"/>
Tested motors under running conditions for detecting faults	<input type="checkbox"/>	<input type="checkbox"/>
Obtained work order for maintenance from concern personnel	<input type="checkbox"/>	<input type="checkbox"/>
Disconnected motor mains before inspection and testing in accordance with standard procedure	<input type="checkbox"/>	<input type="checkbox"/>

Dismantled motor for replacing bearings and greasing, repairing windings, varnishing's, heating or any other tests if required as per standard procedures following safety precautions	<input type="checkbox"/>	<input type="checkbox"/>
Cleaned service parts of the motor using specified cleaning agent and tools in accordance with manufacturer's specification	<input type="checkbox"/>	<input type="checkbox"/>
Checked winding insulation of motors with megger/insulation resistance tester if necessary in accordance with standards	<input type="checkbox"/>	<input type="checkbox"/>
Assembled motors according to manufacturer's specification	<input type="checkbox"/>	<input type="checkbox"/>
Conducted no load and load test and noted down results in accordance with specification	<input type="checkbox"/>	<input type="checkbox"/>
Identified types and method of earthing in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Identified types and sizes of earthing materials in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Identified types of lightning protection system in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Identified types and sizes of lightning protection system in accordance to electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Collected and checked earthing materials for conformance in accordance to specification	<input type="checkbox"/>	<input type="checkbox"/>
Collected and checked for conformance lightning protection materials in accordance to specification	<input type="checkbox"/>	<input type="checkbox"/>
Dug hole following with safety requirements	<input type="checkbox"/>	<input type="checkbox"/>
Shaped and sized hole in accordance to electrical plan/design specification	<input type="checkbox"/>	<input type="checkbox"/>
Fitted earthing element in the bottom of the excavated hole following standard earthing procedure	<input type="checkbox"/>	<input type="checkbox"/>
Connected earth lead to the earth element tightly and brought up the meter board through the conduit	<input type="checkbox"/>	<input type="checkbox"/>
Laid powdered charcoal and salt around the earthing element in accordance to workplace procedure	<input type="checkbox"/>	<input type="checkbox"/>
Fitted a proper size and length of GI pipe from top of the earth element to the bottom of the earth pit chamber	<input type="checkbox"/>	<input type="checkbox"/>
Filled rest of the excavated hole with earth	<input type="checkbox"/>	<input type="checkbox"/>
Constructed earth pit chamber with brick chips, cements sand and water mixture in accordance with standard/specification	<input type="checkbox"/>	<input type="checkbox"/>
Made pit chamber cover with G.I. sheet in accordance with electrical plan/design	<input type="checkbox"/>	<input type="checkbox"/>
Fitted/installed pit cover on the pit chamber	<input type="checkbox"/>	<input type="checkbox"/>
Checked earth resistance in accordance with electrical plan/specification	<input type="checkbox"/>	<input type="checkbox"/>
Installed lightning rod at specified location	<input type="checkbox"/>	<input type="checkbox"/>
Connected earth down conductor as per diagram	<input type="checkbox"/>	<input type="checkbox"/>
Tested performance of lightning protection system (LPS) as per standard	<input type="checkbox"/>	<input type="checkbox"/>

Cleaned and checked electrical tools/instruments for operability	<input type="checkbox"/>	<input type="checkbox"/>
Cleaned work area as waste materials are disposed in accordance with workplace requirements	<input type="checkbox"/>	<input type="checkbox"/>
Feedback to candidate:		
Assessment decision for this assessment activity:		
<input type="checkbox"/> Competent <input type="checkbox"/> Not Yet Competent		
Candidate's Signature:		Date:
Assessor' Signature:		Date:

Oral Questions (Optional)

ORAL QUESTIONS - INSTRUCTIONS	
Candidate Name:	
Assessor Name:	
Qualification:	Certificate in Electrical installation and maintenance
Unit of Competency	
Generic Competencies	
GN1001A1	Use basic mathematical concepts
GN100112A	Communicate in the workplace
GN2003A1	Apply occupational health and safety (OH&S) practices in the workplace
GN2004A1	Operate in a self-directed team
Sector-specific Competencies	
LG-EIM	Interpret drawings and specifications
SEIP-LIG-ELE-2-S	Use hand and power tools for electrical sector
LG-EIM	Work with industrial electrical sector
Occupation-specific Competencies	
SEIP-LIG-ELE-3-O	Perform channel wiring
SEIP-LIG-EIM-2001A1	Perform conduit wiring
SEIP-LIG-ELE-5-O	Install earthing and atmospheric lightning protection system
SEIP-LIG-EIM-2002A1	Perform service connection
SEIP-LIG-EIM-3001A1	Perform motor connection with protective and controlling devices
SEIP-LIG-EIM-3003A1	Install and maintain of electric motor with control system
Assessment Centre:	
Date of Assessment:	
Time of Assessment:	
Instructions:	
<p>Read and understand the directions carefully:</p> <ul style="list-style-type: none"> ▪ these oral questions are based on the performance criteria from all the units of competency in Painting ▪ oral questions are designed to enable additional assessment of your underpinning knowledge ▪ you should present your responses as directed by the assessor ▪ answer all the questions asked by the assessor as best as possible 	

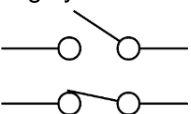
ORAL QUESTIONS			
Question		Place a ✓ in the appropriate box to show if evidence has been demonstrated competently	
		Yes	No
1.	What is the percentage of female workers if there are 7 male workers and 3 female workers in a team?	<input type="checkbox"/>	<input type="checkbox"/>
2.	What will you do if there was a live wire in your workplace?	<input type="checkbox"/>	<input type="checkbox"/>
3.	What are your duties and responsibilities as an electrical installation and maintenance worker?	<input type="checkbox"/>	<input type="checkbox"/>
4.	Interpret the following symbol. 	<input type="checkbox"/>	<input type="checkbox"/>
5.	What is the use of a wire stripper?	<input type="checkbox"/>	<input type="checkbox"/>
6.	Why should you not use loose clothing when working as an electrician?	<input type="checkbox"/>	<input type="checkbox"/>
7.	What is the use of a circuit breaker?	<input type="checkbox"/>	<input type="checkbox"/>
8.	What are the uses of flexible and corrugated conduits?	<input type="checkbox"/>	<input type="checkbox"/>
9.	Why is lightning protection system essential for a building?	<input type="checkbox"/>	<input type="checkbox"/>
10.	Which type of energy meter is suitable for avoiding tampering of energy meter?	<input type="checkbox"/>	<input type="checkbox"/>
11.	How does a relay work?	<input type="checkbox"/>	<input type="checkbox"/>
12.	What is a magnetic starter?	<input type="checkbox"/>	<input type="checkbox"/>
13.	Differentiate between earthing and lightning protection system.	<input type="checkbox"/>	<input type="checkbox"/>
14.	Babul needs to repair an electric motor, what steps and procedures should he take to solve the problem?	<input type="checkbox"/>	<input type="checkbox"/>
15.	What do you mean by the 'No load test of electric motor'?	<input type="checkbox"/>	<input type="checkbox"/>
Feedback to candidate:			
Assessment decision for this assessment activity:			
<input type="checkbox"/> Competent		<input type="checkbox"/> Not Yet Competent	
Candidate's Signature:		Date:	
Assessor's Signature:		Date:	

Oral Questioning Guideline

General Guidelines For Effective Questioning	
▪	Keep questions short and focused on one key concept
▪	Ensure that questions are structured
▪	Test the questions to check that they are not ambiguous
▪	Use `open-ended questions such as `what if...?' and `why...?' questions, rather than closed questions
▪	Keep questions clear and straight forward and ask one at a time
▪	Use words that the candidate is able to understand
▪	Look at the candidate when asking questions
▪	Check to ensure that the candidate fully understands the questions
▪	Ask the candidate to clarify or re-phrase their answer if the assessor does not understand the initial response
▪	Confirm the candidate's response by repeating the answer back in his/her own words
▪	Encourage a conversational approach with the candidate when appropriate, to put him or her at ease
▪	Use questions or statements as prompts for keeping focused on the purpose of the questions and the kind of evidence being collected
▪	Use language at a suitable level for the candidate
▪	Listen carefully to the answers for opportunities to find unexpected evidence
▪	Follow up responses with further questions, if useful, to draw out more evidence or to make links between knowledge areas
▪	Compile a list of acceptable responses to ensure reliability of assessments

Oral Questions (Optional) - Answers

Answers are highlighted in **bold** and *italics*.

ORAL QUESTIONS		
Question		Answer
1.	What is the percentage of female workers if there are 7 male workers and 3 female workers in a team?	30%
2.	What will you do if there was a live wire in your workplace?	May include but are not limited to: 1. Disconnect the supply line in the workplace 2. Use appropriate PPE in the workplace
3.	What are your duties and responsibilities as an Electrical installation and maintenance worker?	May include but are not limited to: <ul style="list-style-type: none"> • Awareness of and practice safety practices • Awareness on the proper use of the tools, equipment and materials • Perform electrical wiring, connection, testing and troubleshooting
4.	Interpret the following symbol. 	Upper symbol represents the power OFF, lower symbol represents the power ON.
5.	What is the use of a wire stripper?	Wire stripper is used to remove the protective coating of an electrical wire in order to connect to terminals or other wires.
6.	Why should you not use loose clothing when working as electrician?	Loose clothing may cause accident in the workplace, thus; PPE is recommended.
7.	What is the use of a circuit breaker?	A circuit breaker is used to protect an electrical circuit from damage caused by overload or short circuit.
8.	What are the uses of flexible and corrugated conduits?	The flexible and/or corrugated conduits are mostly used to protect cables in industrial, outdoor and underground application.
9.	Why is lightning protection system essential for a building?	Lightning protection system is essential for protection of lives and internal equipment and to avoid damage of the structure.
10.	Which type of energy meter is suitable for avoiding tampering of energy meter?	Smart energy meter is suitable for avoiding of tampering of energy meter where there is scope of using power in an illegal way.
11.	How does a relay work?	A relay is an electrically operated switch that open and close circuits electromechanically or electronically.

12.	What is a magnetic starter?	<i>A magnetic starter is an electromagnetically operated switch which provides a safe method for starting an electric motor with a large load.</i>
13.	Differentiate between earthing and lightning protection system	<i>Earthing is the process of transferring the immediate discharge of the electrical energy directly to the earth by the help of the low resistance wire while the lightning protection system provides a means by which a lightning discharge may enter or leave earth without passing through and damaging personnel, electrical equipment and non-conducting structures such as buildings.</i>
14.	Babul need to repair an electric motor, what steps and procedures should he take to solve the problem?	<i>Clean the motor, inspect moving parts, check contact, perform contact resistance test, inspect overload relay and solve problems if any.</i>
15.	What do you mean by the 'No load test of electric motor'?	<i>This is an indirect method used for determining the efficiency and also to determine the circuit parameters of electric motor.</i>

Assessment Evidence Summary Sheet

EVIDENCE SUMMARY SHEET			
Candidate Name:			
Assessor Name:			
Qualification:	Certificate in Electrical Installation and Maintenance		
Assessment Centre:			
Date(s) of Assessment:			
The performance of the candidate in the following unit or units of competency and the methods engaged to assess performance are as follows:			
Unit of Competency	Assessment Method	Competent	Not Yet Competent
All units of competency comprising of the qualification	Written Test	<input type="checkbox"/>	<input type="checkbox"/>
	Practical Demonstration 1 (Set)	<input type="checkbox"/>	<input type="checkbox"/>
	Practical Demonstration 2 (Set)	<input type="checkbox"/>	<input type="checkbox"/>
	Oral Questioning (optional)	<input type="checkbox"/>	<input type="checkbox"/>
Note: Issuance of a certificate will only be given to a candidate who has successfully been assessed as competent for ALL units of competency.			
Recommendation			
<input type="checkbox"/> Issuance of Statement of Achievement (<i>indicate title of SOA, if full Certificate is not met</i>)	<input type="checkbox"/> Submission of additional documents Specify:	<input type="checkbox"/> Reassessment Specify:	
Did the candidate overall performance meet the required evidence/standard?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Overall Evaluation:	<input type="checkbox"/> Competent <input type="checkbox"/> Not Yet Competent		
General Comments:			
Candidate Signature:		Date:	
Assessor Signature:		Date:	
Institution Manager Signature:		Date:	

CANDIDATES COPY
(Please presents this form when you claim your Certificate)

Assessment Results Summary			
Qualification:	Certificate in Electrical Installation and Maintenance		
Name of Candidate:		Date:	
Name at Assessment Centre:		Date:	
Assessment Results:	<input type="checkbox"/> Competent <input type="checkbox"/> Not Yet Competent		
Recommendation:	<input type="checkbox"/> Issuance of SOA <i>(indicate title of SOA, if full certificate is not met)</i>		
	<input type="checkbox"/> Submission of additional documents – specify:		
	<input type="checkbox"/> Reassessment - specify:		
Assessed by: (name and signature)		Date:	
Attested by: (name and signature):		Date	

Assessment Validation Map

This identifies how the assessment tools in this resource assess:

- elements and performance criteria
- critical aspects of assessment
- skills and knowledge
- employability skills

Unit of Competency:		GN1001A1 – Use basic mathematical concepts		
Element		Assessment Method		
		Written	Practical	Oral
1.	Identify calculation requirements in the workplace.	1	A1, A2, B1, C1, C2	1
2.	Select appropriate mathematical methods for the calculation.	1	A1, A2, B1, C1, C2	1
3.	Use basic mathematical concepts to calculate workplace calculation.	1	A1, A2, B1, C1, C2	1
Unit of Competency:		GN100112A – Communicate in the workplace		
Element		Assessment Method		
		Written	Practical	Oral
1.	Receive verbal instructions.		A1, A2, B1, C1, C2	2
2.	Interpret verbal and written information/instruction.		A1, A2, B1, C1, C2	2
3.	Convey instructions using verbal and written forms of communication.		A1, A2, B1, C1, C2	
4.	Complete written documentation.		A1, A2, B1, C1, C2	
5.	Participate in workplace meetings and discussions.		A1, A2, B1, C1, C2	

Unit of Competency:	GN2003A1 – Apply occupational health and safety (OHS) practice at workplace		
Element	Assessment Method		
	Written	Practical	Oral
1. Identify OHS policies and procedures.		A1, A2, B1, C1, C2	2, 6
2. Apply personal health and safety practices.	10	A1, A2, B1, C1, C2	2, 6
3. Report hazards and risks.		A1, A2, B1, C1, C2	2
4. Respond to emergencies.		A1, A2, B1, C1, C2	2
Unit of Competency:	GN2004A1 – Operate in a self-directed team		
Element	Assessment Method		
	Written	Practical	Oral
1. Identify team goals and processes.		A1, A2, B1, C1, C2	
2. Communicate and cooperate with team members.		A1, A2, B1, C1, C2	
3. Work as a team member.		A1, A2, B1, C1, C2	
4. Solve problems as a team member.		A1, A2, B1, C1, C2	
Unit of Competency:	LG-EIM – Interpret drawings and specifications in electrical installation		
Element	Assessment Method		
	Written	Practical	Oral
1. Identify information from manuals.	9	A1, A2, B1, C1, C2	

2.	Identify drawings and specifications.		A1, A2, B1, C1, C2	
3.	Interpret drawings and specifications.		A1, A2, B1, C1, C2	
4.	Store manuals.		A1, A2, B1, C1, C2	
Unit of Competency:		SEIP-LIG-ELE-2-S – Use hand and power tools for electrical works		
Element		Assessment Method		
		Written	Practical	Oral
1.	Inspect hand tools and power tools for usability.	2, 4, 11	A1, A2, B1, C1, C2	5
2.	Use hand tools.	2, 4, 11	A1, A2, B1, C1, C2	5
3.	Operate power tools.	2, 4	A1, A2, B1, C1, C2	
4.	Clean/maintain hand tools and power tools after use.		A1, A2, B1, C1, C2	
Unit of Competency:		LG-EIM – Work with industrial electrical sector		
Element		Assessment Method		
		Written	Practical	Oral
1.	Comprehend structure of electrical sector within the industry.			3
2.	Identify job roles and responsibilities.		A1, A2, B1, C1, C2	3
3.	Plan work activities.		A1, A2, B1, C1, C2	3
4.	Identify workplace requirements.	9	A1, A2, B1, C1, C2	3
5.	Organize own workload.		A1, A2, B1, C1, C2	3

6.	Work with others.		A1, A2, B1, C1, C2	3
7.	Identify and observe OSH in the industrial electrical sector.		A1, A2, B1, C1, C2	
Unit of Competency:		SEIP-LIG-ELE-3-O – Perform channel wiring		
Element		Assessment Evidence Method		
		Written	Practical	Oral
1.	Interpret drawings and specifications.	3, 4	A2, B1, C1	4
2.	Collect tools, equipment and materials.		A2, B1, C1	7
3.	Draw the layout and set channels.	13	A2, B1, C1	
4.	Install boards and set all other accessories.		A2, B1, C1	
Unit of Competency:		SEIP-LIG-EIM-2001A1 – Perform conduit wiring		
Element		Assessment Method		
		Written	Practical	Oral
1.	Collect tools, equipment and materials.	4	A2, B1, C1	7, 8
2.	Install conduits and set cables.	12	A2, B1, C1	8
3.	Install boards and other accessories of wiring.		A2, B1, C1	
4.	Test the wiring.		A2, B1, C1	
5.	Measure the earth resistance.		A2, B1, C1	
6.	Clean the workplace.		A2, B1, C1	
Unit of Competency:		SEIP-LIG-ELE-5-O – Install earthing and atmospheric lightning protection system		
Element		Assessment Method		
		Written	Practical	Oral

1.	Identify the type of earthing to be used.	5	A2, B1, C2	13
2.	Identify the type of lightning protection system to be used.	6	A2, B1, C2	9, 13
3.	Select and collect tools, equipment and materials.	6	A2, B1, C2	13
4.	Excavate the hole for earthing element installation.		A2, B1, C2	13
5.	Install earthing components.		A2, B1, C2	13
6.	Finish earth chamber for pipe earthing method.		A2, B1, C2	13
7.	Install lightning protection system.		A2, B1, C2	
8.	Clean/maintain the work area.		A2, B1, C2	
Unit of Competency:	SEIP-LIG-EIM-2002A1 – Perform service connection			
Element		Assessment Method		
		Written	Practical	Oral
1.	Interpreted drawings and specifications.	7	A1, A2, B1, C1, C2	
2.	Collect tools, equipment and materials.	7	A1, A2, B1, C1, C2	7
3.	Measure the distance of service line.		A1, A2, B1, C1, C2	
4.	Install cables for service connection.	12	A1, A2, B1, C1, C2	
5.	Install energy meter.		A1, A2, B1, C1, C2	10
6.	Connect energy meter and main switch.		A1, A2, B1, C1, C2	10
7.	Clean the work.		A1, A2, B1, C1, C2	

Unit of Competency:		SEIP-LIG-EIM-3001A1 – Perform motor connection with protective system		
Element		Assessment Method		
		Written	Practical	Oral
1.	Identify and select controlling and protective devices for motor connection.	8	A2, B1, C2	11, 14, 15
2.	Collect tools, equipment and materials.	8	A2, B1, C2	11, 14, 15
3.	Install, controlling and protective devices.		A2, B1, C2	11, 14, 15
4.	Perform motor connection.		A2, B1, C2	11, 14, 15
5.	Check and test circuit.		A2, B1, C2	14, 15
6.	Clean the workplace.		A2, B1, C2	14
Unit of Competency:		SEIP-LIG-ELE-1-O – Install and maintain motor with control system		
Element		Assessment Method		
		Written	Practical	Oral
1.	Identify and select controlling devices for motors.		A2, B1, C1	12, 14, 15
2.	Connect starter with the motors.		A2, B1, C1	14, 15
3.	Monitor and test conditions of motor.		A2, B1, C1	14, 15
4.	Service motors.		A2, B1, C1	12, 14, 15
5.	Maintain tools, equipment, materials and workplace.	14	A2, B1, C1	12, 14, 15