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MINISTRY OF LABOR AND SKILLS

ELECTRICAL/ELECTRONICS EQUIPMENT SERVICING LEVEL – IV



CURRICULUM

Based on October, 2021 (V- I) Occupational standard (OS)

March, 2022
Addis Ababa, Ethiopia

Preface

The reformed TVET-System is an outcome-based system. It utilizes the needs of the labor market and occupational requirements from the world of work as the benchmark and standard for TVET delivery. The requirements from the world of work are analyzed and documented – taking into account international benchmarking – as occupational standards (OS).

In the reformed TVET-System, curricula and curriculum development play an important role with regard to quality driven comparable TVET-Delivery. The Curricula help to facilitate the training process in a way, that trainees acquire the set of occupational competences (skills, knowledge and attitude) required at the working place and defined in the occupational standards (OS).

This curriculum has been developed by a group of professional experts from different Regional TVET Bureaus, colleges, Industries, Institutes and universities based on the occupational standard for **Electrical/Electronic Equipment Servicing Level IV.**

The curriculum development process has been actively supported and facilitated by **Ministry of Labor and Skills.**

TVET-Program Design

TVET-Program Title: Electrical/Electronic Equipment Servicing Level - IV

1.1. TVET-Program Description

The Program is designed to develop the necessary knowledge, skills and attitude of the trainees to the standard required by the occupation. The contents of this program are in line with the occupational standard. The Trainees who successfully completed the Program will be qualified to work as a **Electrical Worker** with competencies elaborated in the respective OS. Graduates of the program will have the required qualification to work in the **Electro - Technology** sector in the field of **electrical/electronic equipment servicing.**

The prime objective of this training program is to equip the Trainees with the identified competences specified in the OS. Graduates are therefore expected to_Design and Develop Advanced Electrical/Electronic Systems, Develop Basic Integrated Security Systems, Assemble, enter and verify operating instructions in microprocessor equipped, Provide solutions and report on electro-technological problems, Commission Electrical /Electronic System, Manage Servicing Operations for Electronics Equipment/System, Plan and Organize Work Activities in accordance with the performance criteria and evidence guide described in the OS.

1.2. TVET-Program Training Outcomes

The expected outputs of this program are the acquisition and implementation of the following units of competences:

EISEEES4 01 0322 Design and Develop Advanced Electrical/Electronic Systems

EISEEES4 02 0322 Develop Basic Integrated Security Systems

EISEEES4 03 0322 Assemble, enter and verify operating instructions in microprocessor equipped

EISEEES4 04 0322 Provide solutions and report on electro-technological problems

EIS EEES4 05 0322 Commission Electrical /Electronic System

EIS EEES4 06 0322 Manage Servicing Operations for Electronics Equipment/System

EIS EEES4 07 0322 Plan and Organize Work Activities

1.3. Duration of the TVET-Program

The Program will have duration of **580 hours** including the on school/ Institution training and on-the-job practice or cooperative training time. Such cooperative training based on realities of the industry, nature of the occupation, location of the TVET institution, and other factors will be considered in the training delivery to ensure that trainees acquire practical and workplace experience.

No	Unit competency	TVET Institution training		Cooperative training	Total hours	Remarks
		Theory	Practical			
1.	Design and Develop Advanced Electrical/Electronic Systems	45	60	45	150	
2.	Develop Basic Integrated Security Systems	30	40	30	100	
3.	Assemble, enter and verify operating instructions in microprocessor equipped	36	48	36	120	
4.	Provide solutions and report on electro-technological problems	15	20	15	50	
5.	Commission Electrical /Electronic System	9	12	9	30	
6.	Manage Servicing Operations for Electronics Equipment/System	15	20	15	50	
7.	Plan and Organize Work Activities	24	32	24	80	
	Total Duration of hours =	174hrs	232hrs	174hrs	**580hrs**	

1.4. Qualification Level and Certification

Based on the descriptors elaborated on the Ethiopian National TVET Qualification Framework (NTQF) the qualification of this specific TVET Program is Level IV**.**

The trainee can exit after successfully completing the modules in one level and will be awarded the equivalent institutional certificate on the level completed. However, only institutional certificate of training accomplishment will be awarded.

1.5. Target Groups

Any citizen **with or without disability** who meets the entry requirements under items 1.7 and capable of participating in the training activities is entitled to take part in the Program.

1.7 Entry Requirements

The prospective participants of this program are required to possess the requirements or directive of the **Ministry of Labor and Skills**.

1.8 Mode of Delivery

This TVET-Program is characterized as a formal Program on middle level technical skills. The mode of delivery is co-operative training. The time spent by the trainees in the real work place/ industry will give them enough exposure to the actual world of work and enable them to get hands-on experience.

The co-operative approach will be supported with school-based lecture-discussion, simulation and actual practice. These modalities will be utilized before the trainees are exposed to the industry environment.

Hence based on the nature of the occupation, location of the TVET institutions, and interest of the industry alternative mode of cooperative training such as apprenticeships, internship and traineeship will be employed. In addition, in the areas where industry is not sufficiently available the established production and service centers/learning factories in TVET institutions will be used as cooperative training places. The Training-Institution and identified companies have forged an agreement to co-operate with regard to the implementation of this program.

1.9. TVET-Program Structure

Unit of Competence		Module Code & Title		Training Outcomes	Duration (In Hours)
EIS EEES4 01 0322	Design and Develop Advanced Electrical/Electronic Systems	EIS EEES4 M01 0322	Designing and Developing Advanced Electrical/Electronic Systems	• Design and develop Advanced Electrical/Electronic systems • Design and develop advanced digital systems. • Obtain approval for the design	150
EIS EEES4 02 0322	Develop Basic Integrated Security Systems	EIS EEES4 M02 0322	Developing Basic Integrated Security Systems	• Prepare to develop integrated security systems • Develop and approve integrated security system plan • Assemble wired and wireless security system • Complete and document security systems installation	100
EIS EEES4 03 0322	Assemble, Enter and verify operating instructions in microprocessor equipped	EIS EEES4 M03 0322	Assembling, Entering and verifying operating instructions in microprocessor equipped	• Prepare to assemble and enter operating instructions • Write assembly language instructions • Assemble and enter operating instructions • Test device operation and report.	120
EIS EEES4 04 0322	Provide solutions and report on electro-technological problems	EIS EEES4 M04 0322	Providing solutions and report on electro-technological problems	• Apply Occupational Health and Safety principles • Provide solutions to electro technological problems	50

				• Test operation of electro technological problems • Complete work and document solutions	
EIS EEES4 05 0322	Commission Electrical /Electronic System	EIS EEES4 M05 0322	Commissioning Electrical /Electronic System	• Prepare to commission electronics and communication systems • Commission electronics and communication systems • Complete and report commissioning activities	30
EIS EEES4 06 0322	Manage Servicing Operations for Electronics Equipment/System	EIS EEES4 06 0322	Managing Servicing Operations for Electronics Equipment/System	• Plan and prepare management of servicing operations • Manage and monitor servicing operation • Evaluate and document servicing system	50
EIS EEES4 07 0322	Plan and Organize Work Activities	EIS EEES4 M07 0322	Planning and Organizing Work Activities	• Set objectives • Plan and schedule work activities • Implement work plans • Monitor work activities • Review and evaluate work plans and activities	80

*The time duration (Hours) indicated for the module should include all activities in and out of the TVET institution.

1.10 Institutional Assessment

Two types of evaluation will be used in determining the extent to which training outcomes are achieved. The specific training outcomes are stated in the modules. In assessing them, verifiable and observable indicators and standards shall be used.

The ***formative assessment*** is incorporated in the training modules and form part of the training process. Formative evaluation provides the trainee with feedback regarding success or failure in attaining training outcomes. It identifies the specific training errors that need to be corrected, and provides reinforcement for successful performance as well. For the teacher, formative evaluation provides information for making instruction and remedial work more effective.

Summative Evaluation the other form of evaluation is given when all the modules in the program have been accomplished. It determines the extent to which competence have been achieved. And, the result of this assessment decision shall be expressed in the term of institutional Assessment implementation guidelines.

Techniques or tools for obtaining information about trainees' achievement include oral or written test, demonstration and on-site observation.

1.11 TVET Teachers Profile

The teachers conducting this particular TVET Program are (A) Level and above who have satisfactory practical experiences or equivalent qualifications.

LEARNING MODULE 01
TVET-PROGRAMME TITLE: **Electrical/Electronic Equipment Servicing Level IV**
MODULE TITLE: **Designing and Developing Advanced Electrical/Electronic**
MODULE CODE: **EISE EEES4 M01 0322**
NOMINAL DURATION **: 150Hours**
MODULE DESCRIPTION : This module covers the knowledge, skills and attitudes required to design and development of advanced Electrical/electronic systems. It encompasses working safely, following design brief, applying knowledge of Electrical/electronic components/devices, interpreting device/component specifications, constructing prototype devices, applying programming techniques to programmable devices, testing developed system prototype operation, verifying compliance of the design against the final brief, and documenting design and development work.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1: Design and develop Advanced Electrical/Electronic systems** **LO2: Design and develop advanced digital systems.** **LO3: Obtain approval for the design.**
MODULE CONTENTS: **LO1: Design and develop Advanced Electrical/Electronic systems** 1.1 Introducing the basic concepts of advanced electrical/electronic systems. 1.2 Identifying and obtaining OHS police and procedures 1.3 Following established OHS risk control measures and procedures. 1.4 Determining the extent of the proposed advanced electrical/electronic system. 1.5 Planning for design and development works 1.6 Selecting materials and devices/components required for the work. 1.7 Preparing, obtaining and checking tools and equipment, testing devices. **LO2. Design and develop advanced digital systems** 2.1 Following OHS risk control work measures and procedures 2.2 Applying knowledge of advance electrical/electronic devices and systems

2.1.1. Sequential circuits

2.1.2. Combinational functions

2.1.3. Electronic switching and control circuit.

2.1.4. System and Processes

2.3 Considering alternative arrangements for the design.

2.4 Incorporating safety, functional and budget considerations in the design.

2.5 Constructing and testing prototype devices and circuits

2.6 Rectifying and retesting prototype malfunctions.

2.7 Documenting electrical/electronic system design for submission.

2.8 Providing consistent solutions to unplanned situation.

LO3. Obtain approval for the design

3.1 Presenting and explaining the design to client representative.

3.2 Negotiating the requests for modifications of the design.

3.3 Documentation and approving of final design

3.4 Monitoring quality of work for the design.

Learning Methods:				
For none mpaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating rrangement to be accessible to trainees ❖ Write short notes on the black/white oard using large text ❖ Make sure the luminosity of the light of lass room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture n audio format ❖ Provide Orientation on the physical eature of the work shop ❖ Summarize main points	❖ Assign sign language nterpreter ❖ Arrange the class room eating to be conducive for eye to eye ontact ❖ Make sure the luminosity of he light of class room is kept ❖ Introduce new and relevant ocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual ecture and ensure the attention of the rainees ❖ Avoid movement during ecture time ❖ Present the lecture in video ormat ❖ Summarize main points	❖ Organize the lass room seating rrangement to be ccessible to trainees ❖ Speak loudly ❖ Ensure the ttention of the trainees ❖ Present the ecture in video format ❖ Ensure the ttention of the trainees	❖ Organize the lass room seating rrangement to be ccessible for heelchairs users. ❖ Facilitate and upport the trainees ho have severe mpairments on their pper limbs to take ote ❖ Provide rientation on the hysical feature of the ork shop

Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation ❖ Use video	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the rainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ ovide tutorial support (if necessary)	❖ Illustrate in lear & short method ❖ Use Video ecorded material ❖ Ensure the ttention of the trainees ❖ ovide tutorial support (if necessary)	❖ Facilitate and upport the trainees aving severe upper imbs impairment to perate equipment's/ nachines ❖ Assign peer rainees to assist ❖ Conduct lose follow up ❖ ovide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with roup members ❖ Conduct close follow up ❖ Introduce the trainees with other group nember ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ Facilitate the integration of rainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with ther group member	❖ Facilitate the ntegration of trainees vith group members ❖ Conduct close follow up ❖ Introduce the rainees with other group nember ❖ Inform the roup members to speak oudly	❖ Introduce the rainees with their eers

Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration /Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1: Design and develop Advanced Electrical/Electronic systems

- OHS police and procedures for a given work area are identified, obtained and understood, and personal protective equipment are prepared in line with job requirements
- Established OHS risk control measures and procedures are followed in preparation for the work.
- The extent of the proposed advanced Electrical/Electronic system development is determined from the design brief or in consultations with appropriate person(s).
- Design and development work is planned to meet scheduled timelines in consultation with others involved on the work site.
- Materials and devices/components required for the work are selected on compatibility of their specifications with digital system requirements, project budget constraints and Sources of Information
- Tools and equipment, testing devices needed to carry out the work are obtained and checked for correct operation and safety

.**LO.2: Design and develop advanced digital systems**

- OHS risk control work measures and procedures are followed.
- Knowledge of Advance Electrical/Electronic devices and systems and compliance standards are applied to the design
- Alternative arrangements for the design are considered based on the requirements outlined in the design brief.
- Safety, functional and budget considerations are incorporated in the design.
- Prototype devices and circuits are constructed and tested for compliance with the design brief and regulatory requirements.
- Prototype malfunctions are rectified and retested to ensure effective operation of design.
- Electrical/Electronic system design is documented for submission to appropriate person(s) for approval.
- Solutions to unplanned situation are provided consistent with organization policy

LO.3: Obtain approval for the design

- The design is presented and explained to client representative and/or other relevant person(s).
- Requests for modifications to the design are negotiated with relevant person(s) within the constraints of organization policy.
- Final design is documented and approval obtained from appropriate person(s).
- Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

Annex: Resource Requirements

EISE EEES4 M01 0322 : Designing and Developing Advanced Electrical/Electronic				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	by the trainer	25pcs	1:1
2.	Electronic Design Automation for Integrated Circuits Handbook	Author Luciano Lavagno,2 Volume Set	25pcs	1:1
3	Digital Design	Nicholas Louis Pappas Ph.D.	25pcs	1:1
B.	**Learning Facilities & Infrastructure**			
1.	Library	10 x 12 meter	1rooms	1 : 25
2.	Lecture Room	6 x 7 meter		1 : 25
3.	Work shop	10x 8 meter		1 : 25
D.	***Tools and Equipments***			
1.	Screw drivers	With flat tip and insulated, split proof handle blade in set of blade size 2x60,3x80,4x1oo,6x125,8x150,10x200mm	25	1 : 1
2	Screw drivers	With flat tip and fully insulated, handled with test lamp up to 380v.blade size 3x60mm	25	1 : 25
3	Screw drivers	Off set with Philips tip inset of four pieces with tip no. 1,2,3,4	25	1 : 25
4	Screw drivers	With Philips tip and insulated, split proof handle blade in set of blade size and length of 100,125,200mm	25	1 : 25
7	soldering iron/gun de-soldering tools	220V,50Hrz,25,40,60 W 220v,50Hrz,100W 220v,50Hrz,200W	25	1 : 25
9	multi-testers (analog/digital	DC voltage range 0.2,20,200,1000v AC voltage range 7.5,25,75,230,750v DC current range 0.2,5,10,30Am AC current range 2,20,200Am	25	1 : 25

		Ohmmeter 200Ohm,2K ohm,200K ohm,20M ohm		
10	electric blower	Standard	5	1 : 5
11	Logic analyzer	Standard	1	1 : 25
13	logic clip,	Standard	1	1 : 25
14	logic probe,	TTL: > 2.3V ±0.02V, CMOS: > 70% Vcc ± 10% ,TTL: < 0.08V ±0.02V	5	1 :5
15	logic current tracer,	Single phase ,220v AC	5	1 : 5
16	logic pulsar,	Standard	5	1 : 5
17	IC remover,	Sponge	5	1 : 5
18	high voltage probe	Single phase ,220v AC	5	1 : 5
19	Hand drilling machine electrical	Makita 220 volt	5	1 : 5
20	oscilloscope	220v/small/5mf-12v	5	1 : 5
21	Programmable Logic Controller – 12 In/8 Out- DL 2110AH	12 digital inputs and 8 relay outputs.	5	1 : 5

LEARNING MODULE 02
TVET-PROGRAMME TITLE: **Electrical/Electronic Equipment Servicing Level IV**
MODULE TITLE: **Develop Basic Integrated Security System**
MODULE CODE: **EISE EES4 M02 0322**
NOMINAL DURATION:**100Hours**
MODULE DESCRIPTION : This module covers the knowledge, skills and attitudes of integrating security components to form a complete security system with up to 100 connected intrusion and access devices and based on common security scenarios. It encompasses applying knowledge of common security scenarios and security network standards and protocols, selecting network topology and physical media, disaster recovery planning, performance management and documentation of work activities.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1. Prepare to develop integrated security systems** **LO2 Develop and approve integrated security system plan** **LO3. Assemble wired and wireless security system** **LO4. Complete and document security systems installation**
MODULE CONTENTS: **LO1 Prepare unit, tools and workstation.** 1.1 Introducing the basic concepts of integrated security systems 1.1.1 Common parts of integrated security systems 1.1.2 Classification of integrated security systems 1.2 Identifying, obtaining and understanding OHS. 1.3 Establishing and following WHS risk control measures and procedures. 1.4 Determining the extent of the proposed integrated security system. 1.5 Planning work developments to meet scheduled timelines. 1.6 Determining and obtaining CCTV & security surveillance materials/products. **1.7** Obtaining and checking tools, equipment and testing devices.

LO2. Develop and approve integrated security system plan

2.1 Considering system arrangements

2.2 Incorporating safety, functional and budget

2.3 Checking System draft plan

2.4 Documenting appropriate persons and system requirements System plan

2.5 Making decisions appropriate persons and system requirements

2.6 Documenting and obtaining final system plan

2.7 Monitoring quality of work

LO3. Assemble wired and wireless security system

3. 1 Following WHS/OHS

3. 2 Checking and isolating circuits/machines/plant

3. 3 Positioning CCTV &Security surveillance devices

3. 4 Terminating cables and conductors

3. 5 Referring Unplanned events

3. 6 Carrying out security installation

LO4: Complete and document security systems installation

4.1 Following WHS/OHS

4.2 Cleaning and making Worksite and equipment

4.3 Testing and cleaning the final reassembling units

4.4 Documenting Security system installation

LEARNING METHODS:			
For None Impaired Trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**		
	Deaf	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist

	❖ Show clear and short method ❖ Use gesture ❖ provide tutorial support (if necessary)	trainees ❖ provide tutorial support (if necessary)	❖ Conduct close follow up ❖ Provide tutorial support (if necessary
Group discussion	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	❖ Introduce the trainees with their peers
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ use sign language interpreter ❖ provide briefing /orientation on the assignment	Provide briefing /orientation on the assignment Provide visual recorded material	

	❖ provide visual recorded material		
Interview	❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers if necessary	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration /Observation	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/ Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESMENT CRITERIA:

LO1. Prepare to develop integrated security systems

- OHS (Occupational Health and Safety) procedures for a given work area are identified, obtained and understood.
- WHS risk control measures and procedures are established followed in preparation for the work.
- The extents of the proposed integrated security system are determined from the System requirements or in consultations with appropriate person(s).
- Work developments are planned to meet scheduled timelines in consultation with appropriate persons involved on the work site.
- Nature, location and security system required is obtained from supervisor or other relevant person/s and/or workplace documentation to determine the scope and details of work to be undertaken)
- Advice is sought from work supervisor or other relevant person/s to ensure work is coordinated effectively with others.
- CCTV & Security Surveillance materials/products with accessories required for work are determined and obtained in accordance with workplace procedures
- Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety

LO2. Develop and approve integrated security system plan

- System arrangements are considered based on the requirement.
- Safety, functional and budget considerations are incorporated in the system equipment.
- System draft plan is checked for compliance with the job specifications and regulatory requirements.
- System plan is documented for submission to appropriate person(s) for approval
- Decisions for dealing with unexpected situations are made from discussions with appropriate persons and system requirements.
- Final system plan is documented and approval obtained from appropriate person(s).
- Quality of work is monitored against personal performance agreement

LO3: Assemble wired and wireless security system

- WHS/OHS risk control measures and workplace procedures for carrying out work are followed
- Circuits/machines/plant are checked and isolated in accordance with WHS/OHS workplace requirements and procedures
- CCTV &Security surveillance devices are positioned for optimum performance in accordance with workplace procedures and within limitations imposed by customers and regulations.
- Cables and conductors are terminated at security system components in accordance with manufacturer specifications and regulatory requirements
- Unplanned events are referred to supervisor for directions in accordance with WHS procedures
- Security installation are carried out without waste of materials or damage to apparatus, circuits or the surrounding environment using sustainable energy practices

LO4. Complete and document security systems installation

- WHS/OHS risk control measures and workplace procedures for work completion are followed
- Worksite and equipment are cleaned and made safe in accordance with WHS/OHS requirements and workplace procedures
- Security system installation is documented in accordance with regulatory requirements and workplace procedures.

Annex: Resource Requirements

EIS EEES4 M02 0322 Develop Basic Integrated Security System				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	**Learning Materials**			
1	TTLM	By trainers	25	1:1
3	Visual training Media	LCD, Laptops	25	1:1
4	Introduction to Networking	Barry Nance	25	1:1
5	The Encyclopedia of Electronic Circuits	Rudolf F. Graf	25	1:1
6	ECG	Master Replacement Guide	25	1:1
B.	**Learning Facilities and Infrastructure**			
1	Work Shop	10 x 8 meter square	pcs	1 : 25
2	Library	10 X12 meter	pcs	1 : 25
3	Class	6 x 7 meter square	Pcs	1 : 25
C.	**Consumable Materials**			
1.	Paper	A4	1dasta	1:25
2.	Printer ink/toner	Dot	Pcs	1:25
3.	Extension cord	50m	Pcs	5:25
4.	BNC Connector for CCTV	Triaxial Plug Jack Jack Type	Pcs	5:25
5.	BNC Connector For CCTV	Male Type With Plastic	Pcs	5:25
6.	CCTV BNC Connector	BNC Male Balun Connector for Coax Cat5 to CCTV	Pcs	5:25
7.	BNC Connector for CCTV	Camera Angled Jack for PCB with Bracket	Pcs	5:25
8.	VGA	15 Pin To 8 BNC CCTV Cable 2 Rows Female Jack Video VGA CCTV cable	Pcs	5:25
9.	**Cables**	cat6 cable	Roll	2 : 25
		12 core Single Mode Fiber 40	Mtrs	100 : 25
		12 core Multi Mode Fiber	Mtrs	100 : 25

		Armored 6 Sqmm*4 Core Cable 100	Mtrs	100 : 25
		Flexiable 2.5 Sqmm*3 Core	Mtrs	100 : 25
		MM LC-LC duplex Fiber Patch chord	Mtrs	100 : 25
		SM LC-LC duplex Fiber Patch Chord ,	Mtrs	10 : 25
		SM LC-SC duplex Fiber Patch Chord	Mtrs	10 : 25
		UTP CAT 6 Patch Chord (Black Color),	Mtrs	10 : 25
		1C*25 Sqmm Earthing cable	Mtrs	100 : 25
D.	**Tools and Equipment**			
10.	TL-22 CCTV Cable Stripper	Strips COAX Cables, Flat Cables, RG-59 RG-6. ...	5Pcs	1:5
11.	TL-70 CCTV Cable Crimping	Tool for RG58, RG59, RG6, RG-62 Coax Cable	5Pcs	1:5
12.	RJ45 Crimper	Ethernet Crimp Tool, RJ11, Cable Cutter Stripper	5Pcs	1:5
13.	TL-33 Connect Tight Compression Tool for	BNC, RCA, F Connectors	5Pcs	1:5
14.	Fixed BOX Box	2 MP Outdoor Box Cameras with	5Pcs	1:5
		NEMA 4X / IP-66 rated Housing,	5Pcs	1:5
		lens,	5Pcs	1:5
		Mounting bracket	5Pcs	1:5
15.	PTZ Camera	2 MP Outdoor PTZ Cameras with NEMA 4X / IP-66 rated Housing	5Pcs	1:5
		24v ac POWER SUPPLY 2	5Pcs	1:5
		Mounting bracket	5Pcs	1:5
16.	IR Dome Camera	1 MP IR Dome Cameras with ABS/IP rated Housing with mounting bracket	5Pcs	1:5
		12v 5A SMPS	5Pcs	1:5
17.	Outdoor IR Bullet Camera	2 MP Outdoor IR Bullet Cameras with NEMA 4X / IP-66 rated Housing with mounting bracket	5Pcs	1:5
18.	IR Illuminator	40m IR Illuminators- with NEMA 4X / IP-66 rated Housing with mounting bracket	5Pcs	1:5

19.	Network Video Recorder	8/16 Ch Network Video Recorder	5Pcs	1:5
		12 V DC ADPATER	5Pcs	1:5
		USB OPTICAL MOUSE	5Pcs	1:5
		IR REMOTE	5Pcs	1:5
		1 TB HDD	5Pcs	1:5
20.	Network Storage	Network Storage With 6 Tb Hard disk	5Pcs	1:5
		6TB (3 x 2TB SATA) HDD	5Pcs	1:5
		12V 7A POWER SUPPLY	5Pcs	1:5
21.	Network Switch	Switch should provide minimum 8 port	5Pcs	1:5
		Layer 3 switch should provide minimum 24 port	5Pcs	1:5
		Router	5Pcs	1:5
		12V 5.5A POWER SUPPLY	5Pcs	1:5
		Firewall	5Pcs	1:5
		12V 2A ADAPTER	5Pcs	1:5
		Wireless router	5Pcs	1:5
		12V 1.5A ADAPTER	5Pcs	1:5
22.	Computer hardware with peripherals &appropriate software	Dell 5.2GHz core due CPU, 1GB RAM,160GB Hard disk DVD-RW drive, LCD monitor with accessories Software installed	5Pcs	1:5
23.	Computer laptop	Any type	5Pcs	1:5
24.	Multimedia projector	Sony	5Pcs	1:5
25.	Display screen	standard	5Pcs	1:5
26.	Printer	Hp laser jet 4250/2015 series 128MB RAM or higher 3600DPI10/100bas NIC All necessary power bidirectional printer cable	5Pcs	1:5

27.	Scanner	Scan jet 5400 1600dpi optical resolution 1600X2600hard wave resolution36bit colour	5Pcs	1:5
28.	Blower	1hp,220V/50Hz	5Pcs	1:5
29.	Electrical tool &equipment	set	5Pcs	1:5
30.	logic probe	Standard	5Pcs	1:5
31.	soldering Iron	25W	5Pcs	1:5
32.	Solder	40/60	5Pcs	1:5
33.	Logic analyzer & logic clip	standard	5Pcs	1:5
34.	logic pulsar, IC extraction clip	Standard	5Pcs	1:5
35.	Bread board	Standard	5Pcs	1:5
36.	Electronic components	Standard	5Pcs	1:5

LEARNING MODULE 03
TVET-PROGRAMME TITLE: **Electrical/Electronic Equipment Servicing IV**
MODULE TITLE: **Assemble, enter and verify operating instructions in microprocessor equipped devices**
MODULE CODE: **EIS EEES4 M03 0322**
NOMINAL DURATION : **120Hours**
MODULE DESCRIPTION: This module covers the knowledge, skills and attitudes required to assemble, enter and verify operating instructions in microprocessor equipped device (embedded system) with simple built-in programming functions and verify/ensure the device operates as intended.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1. Prepare to assemble and enter operating instructions** **LO2. Write assembly language instructions** **LO3. Assemble and enter operating instructions** **LO4. Test device operation and report**
MODULE CONTENTS: **LO1. Prepare to assemble and enter operating instructions** 1.1Introducing basic concept of microprocessor. 2.1Identifying and applying work health and safety (WHS)/ and safety (OHS). 3.1 Obtaining and identifying tools, equipment and testing instruments 4.1Consulting supervisor/customers. 5.1Obtaining and checking tools, equipment and testing devices. 6.1 Checking device installation for compliance. **LO2. Write assembly language instructions** 1.1 Introducing machine languages. 1.2 Preparing basic flow chart for the intended assembly language. 1.3 Preparing machine language in assembly language 1.3.1. 8086 Microprocessor Assembly Language

1.3.2. Arduino microprocessor assembly Language

1.3.3. Unconditional and conditional Jump instructions

1.4. Including logic instructions for registers, stacks operations, interfacing input and output devices

1.5. Preparing assembly language

1.6. Implementing basic software techniques

1.6.1. Detail command based on the logic instructions.

1.6.2. Including STO, HALT, and FLAG to set or reset for given data

1.7 Compiling detailed commands in to one pack software.

LO3. Assemble and enter operating instructions

3.1. Checking and isolating circuits/machines/plant.

3.2. Identifying microprocessors equipped devices

3.3. Checking entered data.

3.4. Responding unplanned situations

LO4. Test device operation and report

4.1 Testing device operation using tools, materials and test instruments

4.2 Identifying and correcting operating anomalies.

4.3 Following WHS/OHS work completion risk control

4.4 Cleaning and making safe worksite.

4.5 Documenting work completion

4.6 Disposing waste materials based on environmental requirements.

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop

Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	❖ Introduce the trainees with their peers

Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Prepare to assemble and enter operating instructions

- Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
- Hazards are identified, risks assessed and control measures implemented
- Safety hazards not previously identified are reported on job safety assessment and advice on risk control measures is sought from supervisor
- Supervisor/customers are consulted to determine which functions of the device are used and the parameter of each
- Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety in accordance with workplace procedures
- Device installation is checked for compliance with job specification and regulations where required

LO.2 Write assembly language instructions

- WHS/OHS risk control measures and workplace procedures for carrying out the work are followed
- Basic flow chart is prepared for the intended assembly language
- Machine language is prepared in assembly language using unconditional and conditional Jump instructions
- Logic instructions for registers, stacks operations, interfacing input and output devices are included
- Assembly language for each component and periphery of an embedded microprocessor system is prepared
- Basic software techniques, detail command based on the logic instructions, and the including STO, HALT, and FLAG to set or reset for given data conditions are implemented.
- Detailed commands in to one pack software are compiled

LO.3 Assemble and enter operating instructions

- Circuits/machines/plant are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
- Required status of each function of the Microprocessors equipped devices is entered and their parameters set in accordance with manufacturer instructions
- Entered data is checked in accordance with specifications stated by work supervisor/customer

- Unplanned situations are responded to in accordance with workplace procedures and approval of supervisor/s

LO.4 Test device operation and report

- Device operation is tested using tools, materials and test Instruments in accordance with workplace procedures
- Operating anomalies are identified and corrected in accordance with workplace procedures
- WHS/OHS work completion risk control measures and workplace procedures are followed
- Worksite is cleaned and made safe in accordance with workplace procedures
- Work completion is documented and appropriate person/s notified in accordance with workplace procedures
- Waste materials are disposed based on Environmental Requirements

Annex: Resource Requirements

EIS EEES4 M03 0322 and **Assemble, enter and verify operating instructions in microprocessor equipped devices**				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	prepared by the trainer		
2.	Reference Books			
3.1	Computer System Architecture	M. Morris Mano Prentice Hall of India Computer System Architecture	5	5:25
3.2	Computer Organization & Architecture Designing for Performance	William Stallings Prentice Hall of India seventh	5	5:25
B.	***Learning Facilities & Infrastructure***			
1.	Lecture /Class room	6 x 7 meter	1	1:25
2.	work shop room	10x8 meter	1	1:25
3.	Library	10x12 meter	1	1:25
C.	***Consumable Materials***			
1.	Cables/connectors	Male /female	5pcs	1:5
2	Cleaning brush	Small	5pcs	1:5
5	Soldering lead	0.8mm^2/1mm^2	5roll	1:5
6	Wires	1.5mm^2/2.5mm	5roll	1:5
8	Contact cleaner	Standard	5pcs	1:5
D.	***Tools and Equipments***			
1.	Software Tools:			
2	Compiler		25 pcs	1:1
3	Libraries		25 pcs	1:1
4	Simulator		25 pcs	1:1
5	Integrated development environment IDE		25 pcs	1:1

6	Hardware tools			
7	Logic Analyzer		5pcs	1:5
8	Microprocessor	16-bit 8086 and Arduino	5pcs	1:5
9	Computer	HD-1tera	5pcs	1:5
10	RAM-4G	5pcs	5pcs	1:5
11	Variable power supply	1-50vDC	5pcs	1:5
12	Soldering iron/gun	220V	5pcs	1:5
13	De sordering tools	220V,Hot air gun	5pcs	1:5
14	Screwdriver	T1,T2,T3,T4,T5and T6	5pcs	1:5
15	Multi meter-testers	Digital	5pcs	1:5
16	Utility knife/stripper	Standard	5pcs	1:5
17	Pliers (assorted)	Assorted	5pcs	1:5
18	Insulation tester w/stand	Standard		
19		5pcs	1:5	
20	Programmable relays	100 to 240 VAC, 50/60 Hz, 12 to 24 VDC	5pcs	1:5
21	Timers	12 to 24 VDC	5pcs	1:5
22	Temperature controllers	2K to 1500K, 5 digits or more, autorange, K, °C (V, mV, Ω based on the sensor output)., 0.01° over complete range upto 999 K, 0.1°	5pcs	1:5
23	Transducer		5pcs	1:5
24	Contactors	24V,DC	5pcs	1:5
25	Microprocessor	16-bit 8086 and Arduino	5pcs	1:5

LEARNING MODULE 04
TVET-PROGRAMME TITLE: **Electrical/Electronic Equipment Servicing IV**
MODULE TITLE: **Providing solutions and reporting on electro-technological problems**
MODULE CODE: **EIS EEES4 M04 0322**
NOMINAL DURATION : 50Hours
MODULE DESCRIPTION: This module covers the knowledge, skill and attitude to identify electro technology problems encountered in workplace or community, implement required parameters, apply relevant problem-solving techniques and deal with system malfunctions..
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1. Apply Occupational Health and Safety principles** **LO2. Provide solutions to electro technological problems** **LO3. Test operation of electro technological problems** **LO4. Complete work and document solutions**

MODULE CONTENTS:

LO1. Apply Occupational Health and Safety principles

1.1 Obtaining and understanding OHS procedures

1.2 Identifying hazards, assessing risk and implementing control measures and procedures

1.3 Reporting safety hazards not previously identified.

LO2. Provide solutions to electro technological problems

2.1 Obtaining the nature of the problems from documentation or work supervisor.

2.2 Stating problems clearly in writing and/or diagrammatic form.

2.3 Obtaining known constants and variable related to the problem.

2.4 Considering and discussing alternative methods for resolving the problem.

2.5 Solving problems using an appropriate mathematical processes and techniques.

LO3. Test operation of electro technological problems

3.1 Testing tools, materials and instruments.

3.2 Identifying and correcting operating anomalies.

3.3 Following WHS/OHS.

3.4 Cleaning and making safe workplace.

LO4. Complete work and document solutions

4.1 Documenting justification for solutions used to solve the problem.

4.2 Documenting and notifying work completion.

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ Provide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ Provide tutorial support	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ Provide tutorial support (if necessary

			(if necessary)	
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	❖ Introduce the trainees with their peers
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary

Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ Use sign language interpreter ❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	❖ Provide briefing /orientation on the assignment ❖ Provide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ se sign language interpreter ❖ nsure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ se short and clear questioning ❖ ime extension	❖ peak loudly ❖ sing sign language interpreter if necessary	❖ se written response as an option for the trainees having speech challenges

Written test	❖ epare the exam in large texts ❖ se interview as an option if necessary ❖ repare the exam in audio format ❖ ssign human reader ❖ (if necessary) ❖ Time extension	❖ repare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ void essay writing ❖ ime extension	❖ repare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ se oral response as an option to give answer for trainees having severe upper limb impairment ❖ ime extension for trainees having severe upper limb impairment
Demonstration/Observation	❖ rief the instruction or provide them in large text ❖ ime extension	❖ se sign language interpreter ❖ rief on the instruction of the exam ❖ rovide activity-based/ practical assessment method ❖ ime extension	❖ rovide activity based assessment ❖ rief on the instruction of the exam ❖ se loud voice ❖ ime extension	❖ rovide activity based assessment ❖ onduct close follow up ❖ ime extension

ASSESSMENT CRITERIA:

LO.1 Apply Occupational Health and Safety principles

- OHS procedures for a given work area are obtained and understood
- Hazards are identified, risks assessed and control measures implemented
- Safety hazards not previously identified are reported on job safety assessment and advice on risk control measures is sought from supervisor

LO.2 Provide solutions to electro technological problems

- The nature of the problems is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
- Problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.
- Known constants and variable related to the problem are obtained from measured values or problem documentation.
- Alternative methods for resolving the problem are considered and where necessary discussed with appropriate person(s).
- Problems are solved using appropriate mathematical processes and techniques and within the realistic accuracy.

LO.3 Test operation of electro technological problems

- Operation is tested using tools, materials and test Instruments in accordance with workplace procedures
- Operating anomalies are identified and corrected in accordance with workplace procedures
- WHS/OHS work completion risk control measures and workplace procedures are followed
- Worksite is cleaned and made safe in accordance with workplace procedures

LO.4 Complete work and document solutions

- Justification for solutions used to solve the problem is documented for inclusion in work/project development records in accordance with professional standards.
- Work completion is documented and appropriate person(s) notified

EIS EEES4 M04 0322 and Providing solutions and reporting on electro-technological problems				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	By trainers	25	1:1
2.	Visual training Media	LCD, Laptops	25	1:1
B.	***Learning Facilities & Infrastructure***			
1.	Work Shop	10 x 8 meter	pcs	1 : 25
2.	Library	10 X12 meter	pcs	1 : 25
3.	Class	6 x 7 meter	Pcs	1 : 25
C.	***Consumable Materials***			
1.	Paper	A4	1dasta	1:25
2	Printer ink/toner	Dot	Pcs	1:25
D.	***Tools and Equipments***			
1.	Variable power supply			
2	Soldering iron/gun	220V,50Hrz,25,40,60 W 220v,50Hrz,100W 220v,50Hrz,200W		1:1
3	Disordering tools			
4	Screwdriver (assorted)	With flat tip and insulated, split proof handle blade in set of blade size 2x60,3x80,4x1oo,6x125,8x150,10x200mm	pcs	1:1
5	Wrenches (assorted)			
6	Allen wrench/key			
7	Multi-testers (analog/digital)	DC voltage range 0.2,20,200,500v AC voltage range 7.5,25,75,230,750v DC current range 0.2,5,10,30Am AC current range 2,20,200Am Ohmmeter 200Ohm,2K ohm,200K ohm,20M ohmP	pcs	1:5
8	Utility knife/stripper	Standard	25Pcs	1:1
9	Pliers (assorted)			
10	Test jig			

11	ESD (Electrostatic discharge)	0A 50 to < 125 voltage	25 Pcs	1:1
12	RCA Cables/connectors	Male/female	25Pcs	1:1
13	Electric blower	1hp,220V/50Hz	Pcs	2:25
14	High-grade magnifying glass with lamp	10x,50x,100x	25Pcs	1:1
15	Flashlight	Standard	25Pcs	1:1
16	Cleaning brush	Standard	25Pcs	1:1
17	High voltage probe	Single phase ,220v AC	Pc	1:1
18	Ball peen hammer			
19	Soldering lead	0.8mm^2	25Pcs	1:1
20	Wires	0.8mm^2 , 1.5mm^2	25Pcs	1:1
21	Assorted electronic components	Different type	25Pcs	1:1
22	Contact Cleaner	Standard	25Pcs	1:1
23	Tweezers	Standard	25Pcs	1:1
24	Silicon Grease	Standard	25Pcs	1:1

LEARNING MODULE 05

TVET-PROGRAMME TITLE: **Electrical/Electronic Equipment Servicing Level IV**

MODULE TITLE: **Commissioning Electrical/Electronic Equipment Systems**

MODULE CODE: **EIS EEES4 05 0322**

NOMINAL DURATION:**30Hours**

MODULE DESCRIPTION : This module covers the competence required to undertake commissioning procedures of electronics and communications systems to comply with predetermined parameters and delivery to client. It encompasses safe working practices, system parameter testing, analysis and adjusting to assure optimum performance, following procedures, and documenting final operating parameters and settings.

LEARNING OUTCOMES.

At the end of the module the trainee will be able to**:**

LO1. Prepare to commission electronics and communication systems.

LO2. Commission electronics and communication systems.

LO3. Complete and report commissioning activities.

MODULE CONTENTS:

LO1. Prepare to commission electronics and communication systems.

1.1. Obtaining OHS procedures.

1.2. Following established OHS risk control measures and procedures.

1.3. Identifying safety hazards that have not previously been.

1.4. Coordinating appropriate personnel are consulted.

1.5. Identifying system operating parameters.

1.5.1 Reviewing system specifications and

1.5.2 Component technical data.

1.6. Obtaining tools, equipment, applications, and testing devices.

1.7. Checking preparatory work to ensure no unnecessary damage.

1.8. Checking circuits as being isolated.

LO2. Commission electronics and communication systems

2.1. Following OHS risk control measures and procedures.

2.2. Connecting and set up testing/measuring devices.

2.3. Making measurements and adjustments.

2.4. Making decisions for dealing with unexpected situations.

2.5. Performing systems' commissioning procedures.

2.6. Carrying out commissioning.

LO3. Complete and report commissioning activities.

3.1. Following OHS risk control work completion measures and procedures.

3.2. Documenting adjustment settings.

3.3. Cleaning and making safe work site.

3.4. Notifying commissioning results and work completion.

LEARNING METHODS:			
For None Impaired Trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**		
	Deaf	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop
Demonstration	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist

	❖ Use gesture ❖ provide tutorial support (if necessary)	❖ provide tutorial support (if necessary)	❖ Conduct close follow up ❖ Provide tutorial support (if necessary
Group discussion	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	❖ Introduce the trainees with their peers
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ use sign language interpreter ❖ provide briefing /orientation on the assignment ❖ provide visual recorded material	Provide briefing /orientation on the assignment Provide visual recorded material	

Interview	❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers if necessary	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/Observation	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader ❖ (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/Observation	❖ Brief the instruction or provide them in large text ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

ASSESSMENT CRITERIA:

LO.1 Prepare to commission electronics and communication systems.

- **OHS procedures** for a given work area are obtained and understood.
- Established OHS risk control measures and procedures in preparation for the work are followed.
- Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
- Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
- System operating parameters are identified by reviewing system specifications and component technical data.
- Tools, equipment, applications, and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements.
- Circuits are checked as being isolated, where necessary, in strict accordance OHS requirements and procedures.

LO.2. Commission electronics and communication systems

- OHS risk control measures and procedures for carrying out the work are followed.
- Testing/measuring devices are connected and set up in accordance with requirements for a particular system.
- Measurements and adjustments are made to electronics and communications equipment to provide optimum system performance in accordance with system specifications and/or regulatory requirements.
- Decisions for dealing with unexpected situations are made from discussions with appropriate person and job specifications and requirements.
- Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.

- Systems' commissioning procedures are performed in accordance with requirements.
- Commissioning is carried out efficiently without unnecessary waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy principles.

LO.3 Complete and report commissioning activities

- OHS risk control work completion measures and procedures are followed.
- Adjustment settings are documented in accordance with established procedures.
- Work site is cleaned and made safe in accordance with established procedures.
- Commissioning results and work completion are notified to appropriate person or persons in accordance with established procedures Cleaning of unit is performed in accordance with standard procedures

Annex: Resource Requirements

EIS EEES4 M05 0322: Commissioning electrical/electronic equipment systems				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM Text Books.	By trainer	5Pcs	1:5
	Reference Books	Electrical and Electronics.	5Pcs	1:5
B.	***Learning Facilities & Infrastructure***			
1.	Library	10mx10m	1room	1:25
2	Class room with ramp	6mx8m	1room	1:25
3	Work shop with ramp	6mx8m	1room	1:25
4	Lift	If stair cases	1room	1:25
C.	***Consumable Materials***			
1.	Drawing Papers	White plane paper with size of A4,A3,A1&A2	25Pcs	1:1
2	Pencils	Wooden pencil and mechanical pencil	25Pcs	1:1
3	Sharper	Any type	25Pcs	1:1
4	Jumper Wire	Insulated	1Roll	1:5
5	Eraser	Gum type eraser	25Pcs	1:1
6	Thinner or PCB Cleaner	IPA or Isopropyl alcohol	1Lit	1:5
7	Paste flux	Rosin	1Pcs	1:5
8	Liquid flux	Alpha Cookson product	1Pcs	1:5
9	Solder Wire or lead	Tin/ Lead in the ratio 60:40 or 63:37 Tin / Silver / Copper in the Ratio 96.5% / 3.0% / 0.5 and 0.5mm diameter.	1roll	1:5
D.	***Tools and Equipments***			
1.	Soldering iron	Goot or Weller, withstand and 50 watt	5Pcs	1:5
2	Magnifying Lamp	Head Magnifier with LED Light and different	5Pcs	1:5

		magnification such as 3x, 4x, 5x, 10x, 50x etc		
3	Signal generator	AF/RF	5Pcs	1:5
4	Oscilloscope	220v/small/5mf-12v	5Pcs	1:5
5	Frequency counter	Sinewave15mV RMS from 30Hz to 100MHz	5Pcs	1:5
6	Video signal generator	HDMI 1.4Ver with 4K x 2K	5Pcs	1:5
7	Blower	Standard	5Pcs	1:5
8	Computer	Core i5,core i7	5Pcs	1:5
9	Microphone		5Pcs	1:5
10	Speaker	25ohm,100W	5Pcs	1:5
11	Signal generator		5Pcs	1:5
12	DC power supply	Variable 0 to 220V	5Pcs	1:5
13	Impedance matching transformer		5Pcs	1:5
14	Insulation remover		5Pcs	1:5
15	Multi-testers (analog/digital)	DC voltage range 0.2,20,200,500v AC voltage range 7.5,25,75,230,750v DC current range 0.2,5,10,30Am AC current range 2,20,200Am Ohmmeter 200Ohm,2K ohm,200K ohm,20M ohm	5Pcs	1:5
16	Clamp meter	Digital or analoge,220v,15A	5Pcs	1:5
17	Utility knife	Standard	5Pcs	1:5
18	Wire stripper	Standard	5Pcs	1:5
19	Screw drivers	With flat tip and insulated, split proof handle blade in set of blade size 2x60,3x80,4x1oo,6x125,8x150 ,10x200mm	5Pcs	1:5
20	Screw drivers	With flat tip and fully insulated, handled with test lamp up to 380v.blade size 3x60mm	5Pcs	1:5

21	Screw drivers	Off set with Philips tip inset of four pieces with tip no. 1,2,3,4	5Pcs	1:5
22	Screw drivers	With Philips tip and insulated, split proof handle blade in set of blade size and length of 100,125,200mm	5Pcs	1:5
23	Pliers	Assorted	5Pcs	1:5
24	Work bench	Wood type,50mmx200mm	5Pcs	1:5
25	Electronic components	Assorted and different types	5Pcs	1:5
26	Camera	Digital	5Pcs	1:5
27	Wrist strap	Antistatic or plastic	25Pcs	1:1
28	Working clothes/apron	Antistatic tetron6000	25Pcs	1:1
29				
30	Face/dust mask	Antistatic or plastic	25Pcs	1:1
31	Goggles	Transparent	25Pcs	1:1
32	Extension cord	Insulated 4x4mm2 x 100m	5roll	1:5

LEARNING MODULE 06
TVET-PROGRAMME TITLE: **Electrical/Electronic Equipment Servicing Level IV**
MODULE TITLE: **Manage Servicing Operations for Electronics Equipment and System**
MODULE CODE: **EISE EEES4 M06 0322**
NOMINAL DURATION:**50Hours**
MODULE DESCRIPTION: This module covers the knowledge, skills and attitudes required to manage servicing operations for electronics products and systems.
LEARNING OUTCOMES At the end of the module the trainee will be able to: **LO1: Plan and prepare management of servicing operations.** **LO2: Manage and monitor servicing operation.** **L03: Evaluate and document servicing system.**
MODULE CONTENTS: **LO1: Design and develop Advanced Electrical/Electronic systems** 1.1. Planning and preparing management of servicing and maintenance 1.2 Consulting and directing the programs for servicing and maintenance. 1.3 Checking and managing programs for servicing and maintenance. 1.4 Identifying necessary materials, tools and test instruments. 1.5 Formulating procurement management plan for servicing and maintenance **LO2. Manage and monitor servicing operation** 2.1 Associating normal function of consumer electronics products 2.2 Using mechanisms to measure, record and report progress of activities. 2.3 Managing and monitoring servicing and maintenance system 2.4 Detailing responses to unplanned events or conditions 2.5 Maintaining Records and documentation of servicing and maintenance activities. 2.6 Monitoring results of routine maintenance activities. 2.7 Acting upon Shortfalls in quality outcomes **LO3. Evaluate and document servicing system** **3.1.** Reporting quality management issues and responses. **3.2.** Reporting servicing and maintenance.

Learning Methods:				
For none impaired trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture-discussion	❖ Provide large print text ❖ Prepare the lecture in **Audio/video** ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop

Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation ❖ Use video	❖ Use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ Provide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ Provide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipments/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ Provide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Introduce the trainees with their peers

			❖ nform the group members to speak loudly	
Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ onduct close follow up and guidance ❖ rovide tutorial support if necessary ❖ rovide special attention in the process/practical training ❖ ntroduce new and relevant vocabularies	❖ onduct close follow up and guidance ❖ rovide tutorial support if necessary ❖ rovide special attention in the process/ practical training	❖ ssign peer trainees ❖ se additional nominal hours if necessary
Individual assignment	❖ prepare the assignment questions in large text ❖ Encourage the trainees to prepare and submit the assignment in large texts ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ se sign language interpreter ❖ rovide briefing /orientation on the assignment ❖ rovide visual recorded material	❖ rovide briefing /orientation on the assignment ❖ rovide visual recorded material	

ASSESSMENT METHODS:				
Written test	❖ repare the exam in large texts ❖ se interview as an option if necessary ❖ repare the exam in audio format ❖ ssign human reader ❖ (if necessary) ❖ Time extension	❖ repare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ void essay writing ❖ ime extension	❖ repare the exam using short sentences, multiple choices, true or false, matching and short answers if necessary.	❖ se oral response as an option to give answer for trainees having severe upper limb impairment ❖ ime extension for trainees having severe upper limb impairment
Demonstration/ Observation	❖ rief the instruction or provide them in large text ❖ ime extension	❖ se sign language interpreter ❖ rief on the instruction of the exam ❖ rovide activity-based/ practical assessment method ❖ ime extension	❖ rovide activity based assessment ❖ rief on the instruction of the exam ❖ se loud voice ❖ ime extension	❖ rovide activity based assessment ❖ onduct close follow up ❖ ime extension

ASSESSMENT CRITERIA:

LO1: Plan and prepare management of servicing operations.

- Management of servicing and maintenance of OHS policies and procedures is planned and prepared to ensure that the work sequence is in accordance with requirements
- Appropriate personnel are consulted and directed to ensure the programs for servicing and maintenance are coordinated effectively with others involved on the work site
- Programs to be managed for servicing and maintenance are checked against job requirements
- Materials necessary to complete the work are identified and detailed in accordance with established procedures and checked against job requirements.
- Tools, equipment and testing devices needed to carry out the work are identified and detailed in accordance with established procedures
- Procurement management plan is formulated for servicing and maintenance in accordance with established procedures and checked against requirements

LO2: Manage and monitor servicing operation.

- Normal function of consumer electronics products and associated circuits are ascertained and detailed in accordance with requirements
- Mechanisms are used to measure, record and report progress of activities in relation to the agreed servicing and maintenance schedules and plans
- Servicing and maintenance system is managed and monitored in accordance with established procedures and requirements to achieve designated objectives
- Response to unplanned events or conditions in accordance with established procedures are detailed
- Records and documentation of servicing and maintenance activities are maintained in accordance with established procedures to facilitate quality management and to provide an audit trail.
- Results of routine maintenance activities are monitored in accordance with established procedures to determine compliance with agreed quality standards
- Shortfalls in quality outcomes are acted upon in accordance with established procedures to enable appropriate action to be initiated

L03: Evaluate and document servicing system

- Quality management issues and responses are reported in accordance with established procedures
- Completion of servicing and maintenance is reported in accordance with established procedures

Annex: Resource Requirements

EISE EEES4 M06 0322 : **Manage Servicing Operations for Electronics Equipment and System**				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	***Learning Materials***			
1.	TTLM	prepared by the trainer	25psc	1:1
2.	Basic Electronics Devices , Circuits and it Fundamentals	Santiram KA	25psc	1:1
B.	**Learning Facilities & Infrastructure**			
1.	Work Shop	10 x 8 meter	1room	1 : 25
2.	Library	10 X12 meter		1 : 25
3.	Class	6 x 7 meter		1 : 25
D.	**Tools and Equipments**			
1.	Screw drivers	With flat tip and insulated, split proof handle blade in set of blade size 2x60,3x80,4x1oo,6x125,8x150,10x200mm	5pcs	1:5
2	Screw drivers	With flat tip and fully insulated, handled with test lamp up to 380v.blade size 3x60mm	5pcs	1:5
3	Screw drivers	Off set with Philips tip inset of four pieces with tip no. 1,2,3,4	5pcs	1:5
4	Screw drivers	With Philips tip and insulated, split proof handle blade in set of blade size and length of 100,125,200mm	5pcs	1:5
7	Soldering iron/gun	220V,50Hrz,25,40,60 W 220v,50Hrz,100W 220v,50Hrz,200W	5pcs	1:5
9	Multi testers (analog/digital	DC voltage range 0.2,20,200,500v AC voltage range 7.5,25,75,230,750v DC current range 0.2,5,10,30Am AC current range 2,20,200Am Ohmmeter 200Ohm,2K ohm,200K ohm,20M ohm	5pcs	1:5
10	Electric blower	Standard	5pcs	1:5
11	Logic analyzer	Standard	5pcs	1:5
13	Logic clip,	Standard	5pcs	1:5
14	Logic probe	TTL: > 2.3V ±0.02V, CMOS: > 70% Vcc ± 10% ,TTL: < 0.08V ±0.02V	5pcs	1:5

15	Logic current tracer	Single phase ,220v AC	5pcs	1:5
16	Logic pulsar	Standard	5pcs	1:5
17	IC remover	Sponge	5pcs	1:5
18	High voltage probe	Single phase ,220v AC	5pcs	1:5

LEARNING MODULE 07
TVET-PROGRAMME TITLE: **Electrical/Electronic Equipment Servicing Level IV**
MODULE TITLE: **Planning and Organizing Work**
MODULE CODE: **EISE EES4 M07 0322**
NOMINAL DURATION:80Hours
MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required in planning and organizing work activities in a production application. It may be applied to a small independent operation or to a section of a large organization.
LEARNING OUTCOMES At the end of the module the learner will be able to: **LO1.Set objectives** **LO2.Plan and schedule work activities** **LO3.Implement work plans** **LO4. Monitor work activities** **LO5. Review and evaluate work plans and activities**
MODULE CONTENTS: **LO1.Set objectives** 1.1. Planning objectives and linking to work activities. 1.2. Stating objectives as SMART. 1.3. Reflecting support and commitment of team members. 1.4. Identifying realistic and attainable objectives **LO2.Plan and schedule work activities** 2.1. Identifying and prioritizing tasks/work activities 2.2. Breaking down tasks/work activities 2.3. Assigning task/work activities to appropriate team/person 2.4. Allocating resources 2.5. Coordinating schedule of work activities **LO3.Implement work plans** 3.1 Identifying team work and consultation strategies

3.2 Implementing work plan.

LO4. Monitor work activities

4.1 . . Monitoring and comparing work activities with set objectives

4.2 . Monitoring work performance

4.3 . Reporting deviations from work activities

4.4 . Complying reporting requirements.

4.5 . Establishing and maintaining files.

LO5. Review and evaluate work plans and activities

5.1. Reviewing work plans, strategies and implementation

5.2. Providing results of review to concerned parties

5.3 Forming results of review as basis for adjustments/simplifications

5.4. Conducting performance appraisal

5.5. Preparing and documenting performance appraisal report regularly

5.6. Preparing and presenting recommendations

5.7.Implementing feedback mechanisms

LEARNING METHODS:				
For None Impaired Trainees	**Reasonable Adjustment for Trainees with Disability (TWD)**			
	Low Vision and Blind	**Deaf**	**Hard of hearing**	**Physical impairment**
Lecture discussion	❖ Provide large print text ❖ Prepare the lecture in Audio/video & in Brail format ❖ Organize the class room seating arrangement to be accessible to trainees ❖ Write short notes on the black/white board using large text ❖ Make sure the luminosity of the light of class room is kept ❖ Use normal tone of voice ❖ Encourage trainees to record the lecture in audio format ❖ Provide Orientation on the physical feature of the work shop ❖ Summarize main points	❖ Assign sign language interpreter ❖ Arrange the class room seating to be conducive for eye to eye contact ❖ Make sure the luminosity of the light of class room is kept ❖ Introduce new and relevant vocabularies ❖ Use short and clear sentences ❖ Give emphasis on visual lecture and ensure the attention of the trainees ❖ Avoid movement during lecture time ❖ Present the lecture in video format ❖ Summarize main points	❖ Organize the class room seating arrangement to be accessible to trainees ❖ Speak loudly ❖ Ensure the attention of the trainees ❖ Present the lecture in video format ❖ Ensure the attention of the trainees	❖ Organize the class room seating arrangement to be accessible for wheelchairs users. ❖ Facilitate and support the trainees who have severe impairments on their upper limbs to take note ❖ Provide Orientation on the physical feature of the work shop

Demonstration	❖ Conduct close follow up ❖ Use verbal description ❖ Provide special attention in the process of guidance ❖ facilitate the support of peer trainees ❖ Prepare & use simulation	❖ use Sign language interpreter ❖ Use video recorded material ❖ Ensure attention of the trainees ❖ Provide structured training ❖ Show clear and short method ❖ Use gesture ❖ rovide tutorial support (if necessary)	❖ Illustrate in clear & short method ❖ Use Video recorded material ❖ Ensure the attention of the trainees ❖ rovide tutorial support (if necessary)	❖ Facilitate and support the trainees having severe upper limbs impairment to operate equipment's/ machines ❖ Assign peer trainees to assist ❖ Conduct close follow up ❖ rovide tutorial support (if necessary
Group discussion	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Brief the thematic issues of the work	❖ Use sign language interpreters ❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member	❖ Facilitate the integration of trainees with group members ❖ Conduct close follow up ❖ Introduce the trainees with other group member ❖ Inform the group members to speak loudly	❖ Introduce the trainees with their peers

Exercise	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/practical training ❖ Introduce new and relevant vocabularies	❖ Conduct close follow up and guidance ❖ Provide tutorial support if necessary ❖ provide special attention in the process/ practical training	❖ Assign peer trainees ❖ Use additional nominal hours if necessary
Individual assignment	❖ repare the assignment questions in large text/Brail ❖ Encourage the trainees to prepare and submit the assignment in large texts/Brail ❖ Make available recorded assignment questions ❖ Facilitate the trainees to prepare and submit the assignment in soft or hard copy	❖ se sign language interpreter ❖ rovide briefing /orientation on the assignment ❖ rovide visual recorded material	❖ rovide briefing /orientation on the assignment ❖ rovide visual recorded material	

ASSESSMENT METHODS:				
Interview		❖ Use sign language interpreter ❖ Ensure or conform whether the proper communication was conducted with the trainee through the service of the sign language interpreter ❖ Use short and clear questioning ❖ Time extension	❖ Speak loudly ❖ Using sign language interpreter if necessary	❖ Use written response as an option for the trainees having speech challenges
Written test	❖ Prepare the exam in large texts/Brail ❖ Use interview as an option if necessary ❖ Prepare the exam in audio format ❖ Assign human reader (if necessary) ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers ❖ Avoid essay writing ❖ Time extension	❖ Prepare the exam using short sentences, multiple choices, True or False, matching and short answers if necessary.	❖ Use oral response as an option to give answer for trainees having severe upper limb impairment ❖ Time extension for trainees having severe upper limb impairment
Demonstration/ Observation	❖ Brief the instruction or provide them in large text/Brail ❖ Time extension	❖ Use sign language interpreter ❖ Brief on the instruction of the exam ❖ Provide activity-based/ practical assessment method ❖ Time extension	❖ Provide activity based assessment ❖ Brief on the instruction of the exam ❖ Use loud voice ❖ Time extension	❖ Provide activity based assessment ❖ Conduct close follow up ❖ Time extension

Assessment criteria

LO1. Set objectives

- Objectives are planned consistent with and linked to work activities in accordance with organizational aims.
- Objectives are stated as measurable targets with clear time frames.
- Support and commitment of team members are reflected in the objectives.
- Realistic and attainable objectives are identified.

LO2. Plan and schedule work activities

- Tasks/work activities to be completed are identified and prioritized as directed.
- Tasks/work activities are broken down into steps in accordance with set time frames and achievable components.
- Task/work activities are assigned to appropriate team or individuals in accordance with agreed functions.
- Resources are allocated as per requirements of the activity.
- Schedule of work activities is coordinated with personnel concerned.

LO3. Implement work plans

- Work methods and practices are identified in consultation with personnel concerned.
- Work plans are implemented in accordance with set time frames, resources and standards

LO4. Monitor work activities

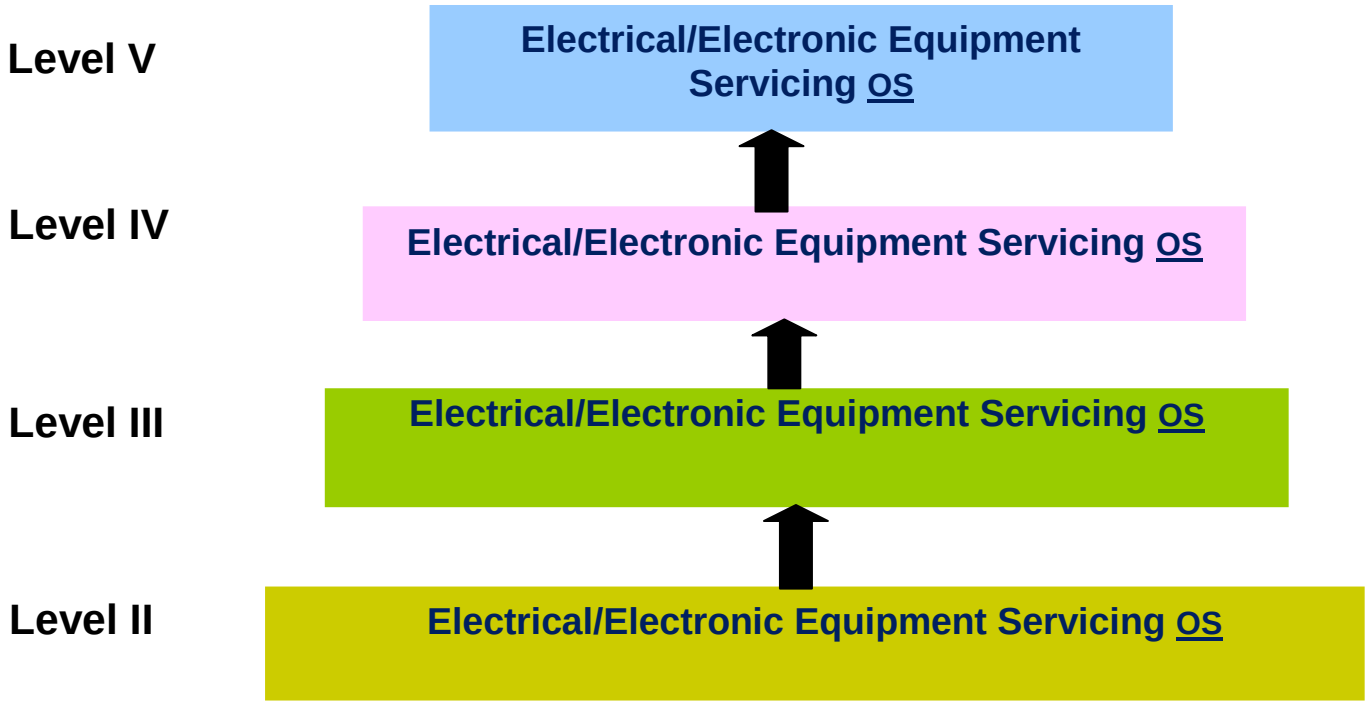
- Work activities are monitored and compared with set objectives.
- Work performance is monitored.
- Deviations from work activities are reported and recommendations are coordinated with appropriate personnel and in accordance with set standards.
- Reporting requirements are complied with in accordance with recommended format.
- Timeliness of report is observed.
- Files are established and maintained in accordance with standard operating procedures.

LO5. Review and evaluate work plans and activities

- Work plans, strategies and implementation are reviewed based on accurate, relevant and current information.
- Review is done based on comprehensive consultation with appropriate personnel on

Annex: Resource Requirements

EISE EES4 M07 0322: Planning and Organize Work				
Item No.	**Category/Item**	**Description/ Specifications**	**Quantity**	**Recommended Ratio (Item: Trainee)**
A.	**Learning Materials**			
1	TTLM.	By trainers	25pcs	1:1
2	Revolutionaries Innovations management	Aerssen B.v., 2009	25pcs	1:1
3	Visual training Media	LCD, Laptops	5pcs	1:5
B.	**Learning Facilities & Infrastructure**			
1	Work Shop	10 x 8 meter	1room	1 : 25
2	Library	10 X12 meter	1room	1 : 25
3	Class	6 x 7 meter	1room	1 : 25
C.	**Consumable Materials**			
1	Paper	A4	1dasta	1:25
2	Printer ink/toner	Dot	5Pcs	1:5


Level V
Electrical/Electronic Equipment Servicing OS
Level IV
Electrical/Electronic Equipment Servicing OS
Level III
Electrical/Electronic Equipment Servicing OS
Level II
Electrical/Electronic Equipment Servicing OS

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The trainers who developed the curriculum

No	Name	Qualification	Educational background	Region	College	Mobile number	E-mail
1	Mesfin Cheru Abebe	BED. In Electrical/Electronics.Techo		A.A	World together Ethiopia	091141933	mesfin.cheru@worldtogether.0r.kr.
2	Tesfahun Ayalew Denidine	**BSc** -Applied Electrical/Electronic Technology **MSc** -Electronics and comm Eng.		BGRS	Assosa poly TVET	0912132308	tesfugps44@gmial.com
3	Ayano Assefa Mekebo	**BSc** - Applied Electrical/Electronic.techno **MSc** Electrical power Eng.		SNNP	Arbaminch sat. instu.	0920062670	assefahule@gmial.com
4	Wubishut temesgen Jaleta	**BSc** Applied Electrical/Electronic Technology. **MSc** - Electrical &comm.T		Sidama	Hawassa poly TVET	0910040962	Wubepg2@gaimale.com
5	Yohannis fetene Dassalgn	**BSc** - Applied Electrical/Electronic Technology. **MSc**- Electronic & communication Technology		ANRS	Kombolcha Poly TVET	0991642905	Yohannesfetene1@gmail.com
6	Yidnekachew Regassa Hirpa	**BSc** - Applied Electrical/Electronic Technology **M.Sc.** - Electronic & communication Technology		Harari	Harari poly TEVET	0910343909	yidne888@gmial.com

Group coordinator

No	Name	Qualification	Educational background	Region	College	Mobile number	E-mail
1	Teferi Muleta	B	Soil &water Engineering Mg,t	BG/Assosa	TVET Agency	0913311083	Teferimuleta2013@gmail.com