071306T4EEN

ELECTRICAL ENGINEERING (POWER OPTION) LEVEL 6

ENG/OS/PO/CR/07/6

Install Solar systems

July/August 2025

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

PRACTICAL ASSESSMENT

INSTRUCTIONS TO ASSESSOR

1. Assess the candidate as the practical progresses observing the critical areas
2. You are required to mark the practical as the candidate perform the tasks
3. You are required to take video clips at critical points
4. Ensure the candidate has a name tag and registration code at the back and front

OBSERVATION CHECKLIST

Candidate's Name & Registration Code			
Assessors Name & Registration Code			
Venue of Assessment			
Date of Assessment			
Items to be Evaluated: *Please award marks as appropriate. Give a brief comment on your observation.*	**Marks Available**	**Marks Obtained**	**Comments**
1. Wore safety clothing i. Safety boots $(Award\ 1\ or\ 0)$ ii. Apron/dust coat $(Award\ 1\ or\ 0)$	**1** **1**		
2. Demonstrated the ability to use hand tools and measuring instruments *(Award 1or 0)*	**1**		
3. Performed housekeeping *(Award 1or 0)*	**1**		
Sub-Total 1	**4**		
TASK 1:			
4. Drew the wiring diagram. i. Solar Charge controller ii. Solar Panels *iii.* Battery iv. DC loads *(Award 1 for each component in the wiring diagram)*	**4**		
Sub-total 2	**4**		
TASK 2:			
5. Sized the system components.	**12**		

i. Daily energy demanded: ii. Array size: iii. Battery size: iv. Charge controller to carry the total load current. (Award 3 marks for each correct calculation)			
Sub-total 3	**12**		
TASK 3:			
6. Drew wiring diagram as per layout diagram i. Lighting. $(Award\,3\ or\,0)$ ii. Power. $(Award\,3\ or\,0)$ iii. Intake wiring. *(1 mark for each correct connection for any 4 correct)* Wired the solar PV components in the correct sequence	**3** **3** **4** **8**		
Sub-total 3	**10**		
TASK 4:			
Installed the circuit 7. Accurate measurements $\pm\ 2mm$ $\left(Award\ any\,6\ or\frac{1}{2}\right)$	**3**		
8. Fixed components (firm and level) $(Award\ any\,4\ \ x\,1\ each)$	**4**		
9. Trunks runs (straight and flat on surface) i. Vertical $\left(Award\ any\,4\ or\frac{1}{2}\right)$ ii. Horizontal $\left(Award\ any\,4\ or\frac{1}{2}\right)$	**2** **2**		

10. Cable bends 90^0 (flat and smooth) $(Award\,1\ for\ any\,2)$	**2**		
11. Connected circuit correctly at; i. Intake (For any 4 correct x 1 each) ii. CCU $(Award\,1\ or\,0)$ iii. Switches $(Award\,2\ or\,0)$ iv. Sockets $(Award\,2\ or\,0)$	 **4** **1** **2** **2**		
12. Perform earth test $ward\,1\ or\,0)$	**1**		
13. Correct circuit operation i. grid tied supply $(Award\,3\ or\,0)$ ii. Lighting$(Award\,2\ or\,0)$ iii. Power$(Award\,2\ or\,0)$	 **3** **2** **2**		
Sub-Total 2	**30**		
GRAND TOTAL	**68**		

ASSESSMENT OUTCOME

The candidate was found to be:

Competent ☐ Not yet Competent ☐

(Please tick as appropriate)

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

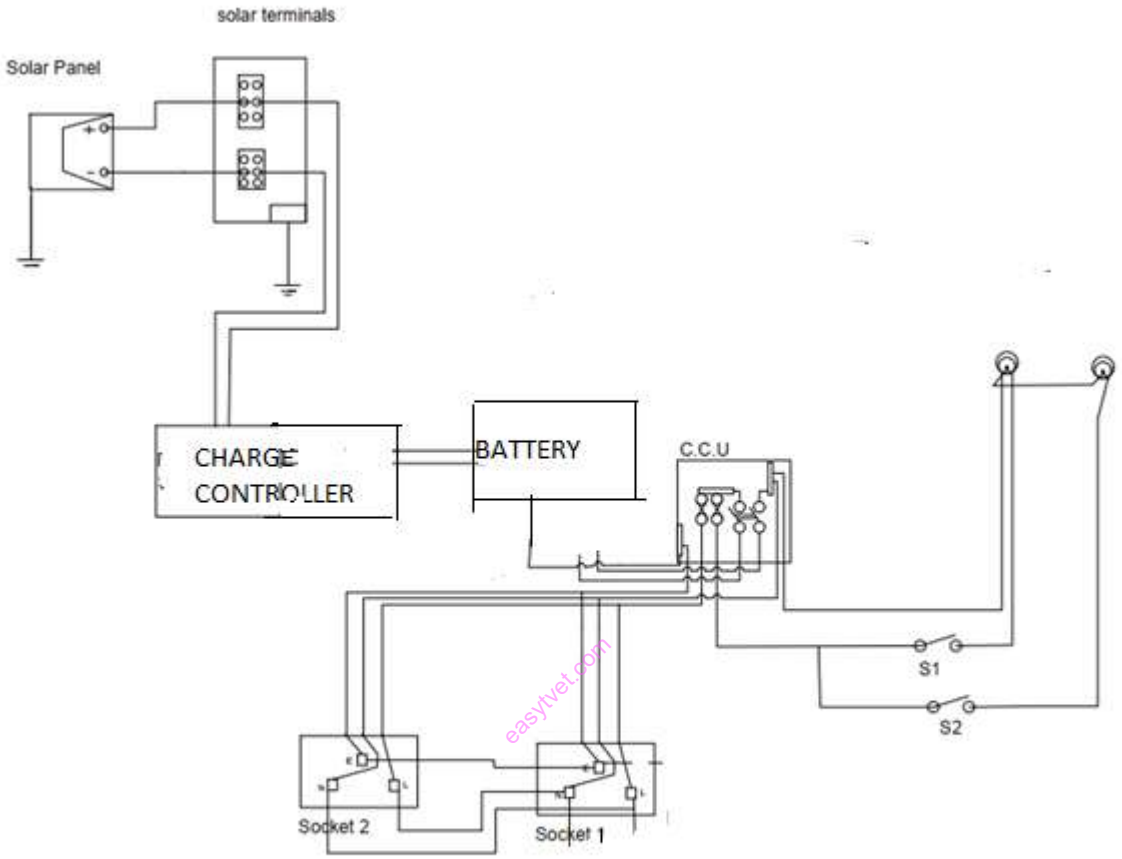
Feedback from the Candidate:

Feedback to the Candidate:

Candidate Signature _____	**Date:** _____
Assessor's Signature _____	**Date** _____

APPENDIX: PRINT FOR ASSESSOR ONLY

TASK 1: WIRING DIAGRAM



TASK 2: Design and Sizing of the system

i. Daily energy demanded:

2 tablets x 10W x 6hr = 120Whr

4 lamps x 5W x 4hr = 80Whr

2 laptops x 12W x 12hr = 288Whr

1 Radio 8W x 12hr = 96Whr

TOTAL Energy demanded = 584Whr

ii. **Array size:**

$$\text{Array size} = \frac{\text{Daily energy demand}}{\textit{module efficiency x sun peak hours}}$$

$$= \frac{584\ \text{Whr}}{0.8\ x\ 4hr}$$

Required 200W module for the system voltage of 12V.

Take two 100W modules to be connected in parallel

iii. Battery size:

$$\text{Battery size} = \frac{\textit{Energy demand x days of autonomy}}{\textit{battery efficiency x D.O.D x System voltage}}$$

$$= \frac{584\ Whr}{0.8\ x\ 0.5\ x\ 12}$$

$$= 121.7\text{AH}$$

Require battery 200AH, 12V

Or two 12V, 100AH batteries to connect in parallel

iv. **Charge controller to carry the total load current:**

Load current: 2 tablets 10W = 20W ÷ 12V

= 1.7A

4 lamps 5W = 20W ÷ 12V

= 1.7A

2 laptops 12W = 24W ÷ 12V

= 2A

1 Radio 8W = 8W ÷ 12V

= 0.7A

Total load current = 1.7A+1.7A+2A+0.7A

= 6.1A

15A charge controller considering Isc is required.

(award 3 marks for each correct sizing)

TASK 3: