

Licensed Electrician's Practical (LEP) Assessment Sample Paper (2023)



| | |
|-----------------------|--|
| Candidate Surname | |
| Candidate Given Names | |

Circle the appropriate answer below.

| | | |
|--|-----|----|
| Is the candidate's photo ID valid? | Yes | No |
| Does the IR tester supplied by candidate meet calibration requirements? | Yes | No |
| Does the type of IR tester supplied by candidate meet the assessment requirements? | Yes | No |

| | | | |
|-----------|------------|-----------|------|
| Candidate | | | |
| | Print name | Signature | Date |
| Assessor | | | |
| | Print name | Signature | Date |

| Marks Allocation | | Possible | Actual | | | | | | | | |
|-------------------|------------------------------------|----------|--------|-----|-----|-----|-----|-----|-----|----|--|
| Question 1 | Meter Panel and Switchboard Wiring | 35 | | | | | | | | | |
| Question 2 | Electrical Installation Testing | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 2.7 | 2.8 | 32 | |
| | | | | | | | | | | | |
| Question 3 | MEN System Voltage Measurement | 3.1 | | 3.2 | | 18 | | | | | |
| | | | | | | | | | | | |
| Question 4 | Visual Defects | 15 | | | | | | | | | |
| Total: | | 100 | | | | | | | | | |

Working Time: 4 hours (including reading time)

At the end of this time you will be asked to stop.

| Final Percentage | Pass/Fail |
|------------------|-----------|
| | |

I have conducted this assessment, and certify I am independent of the candidate.

| | | | |
|-------------------------------|------------|-----------|------|
| Assessor | | | |
| | Print name | Signature | Date |
| Reviewed by (If necessary) | | | |
| | Print name | Signature | Date |

Reference Material

- AS/NZS 3000:2018 Wiring Rules
- AS/NZS 3017:2007 Electrical installations – Verification guidelines
- AS/NZS 3008.1.1:2017 Electrical installations – Selection of cables
- The Victorian Service and Installation Rules 2014

Instructions

- Personal notepads and paper are not permitted.
- Pens only must be used. Answers in pencil may not be marked.
- Do not remove any sheets from this assessment paper or the room.
- Papers with no name or signature will not be marked.
- A mark will be deducted per section for each missing or incorrect unit where required.
- Speak to the assessor if you require assistance or have a query.

This LEP assessment will comprise of four questions. Throughout the assessment, the LEP assessor will instruct you as to which workstation to use, and when to move to them.

Question 1 - Meter Panel and Switchboard Wiring

Question 2 – Electrical Installation Testing

Question 3 – MEN System Voltage Measurements

Question 4 – Visual Defects

Inform your assessor if any equipment is missing or not available. DO NOT TAKE ANYTHING FROM ANOTHER WORKSTATION.

Results

Candidates need to obtain 75% or more to pass this assessment. If a mark of 74% or less is achieved, a minimum of 14 days is required before you are permitted to re attempt the assessment.

I, the above named candidate confirm:

- I understand the instructions provided to me.
- I do not have any unauthorised materials in my possession.
- I have not attempted the Licensed Electrician's Practical Assessment at any venue within the past 14 days.

| | | | |
|-----------|----------------------|----------------------|----------------------|
| Candidate | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| | Print name | Signature | Date |

Question 1

| | |
|-------------------|--|
| Wiring Bay Number | |
|-------------------|--|

Meter Panel and Switchboard Wiring

A mark will be deducted for each missing or incorrect unit where required

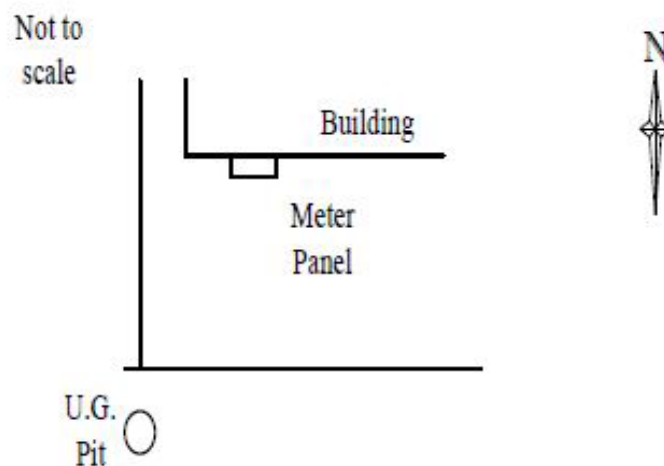
You are required to install a 3Φ 4 wire 400/230V 50Hz factory/office premises. The installation comprises a 3Φ meter panel and main switchboard in a common enclosure, and a separate 1Φ distribution board. The main switchboard and the distribution board are situated in the same building.

The installation is located at 23 Time Road, Hivesville.

The installation will be supplied from:

- Overhead supply** – from the fused overhead line connector box to the main switchboard. The consumer's mains are V90 SDI stranded copper cables. The cables are run enclosed in air.
- Underground supply** – from the service pit, the cables run underground in PVC conduit at a depth of 500mm. The consumer's mains are V90 SDI stranded copper cables.

The meter panel enclosure is located on the front of the building, 18 meters from the southern property boundary, and 6 metres from the western property boundary. The underground pit is located at the south west corner of the property.



All wiring and identification is to be carried and completed to the requirements of AS/NZS3000:2018 Wiring Rules. You may ignore voltage drop requirements. Assume unity power factor on all loads. Assume short circuit protection is provided on the supply side of the consumers mains. All cables installed are solid/stranded and will operate at normal operating temperatures.

You must select and arrange main switches, circuit breakers, RCDs and cables from the equipment provided. Divide the equipment in the installation into final sub-circuits, as per AS/NZS3000:2018 requirements. Select the **minimum** permissible cable size (cables available for final sub-circuits are 1.5mm², 2.5mm², 4mm² and 6mm²) and correct circuit protective device rating for each circuit.

Do not cut any cables or bus-bar, or take any equipment from another workstation, unless directed by your assessor. Inform your assessor if there is any equipment missing or not provided.

Note: Although Appendix C of AS/NZS3000:2018 Wiring Rules is classed as informative (i.e. for guidance only), Appendix C Tables C1, C2, C5 and C9 may be used in this assessment where appropriate.

Note: AS/NZS3008.1.1 shall be used for all cable selection and cable current ratings.

The installation will comprise of the following:

Equipment installed from the non-air conditioned factory main switchboard:

- 1 - 3Φ 18A pump motor, 400V control, wired to an external enclosure
- 15 - 230V 150W LED luminaires, installed on one circuit
- 3 - 230V 10A double socket outlets installed over two circuits. Both circuits are to be installed on the same phase.
- 1 - 230V 2.4kW electric vehicle charger
- 1 - 1Φ 4.8kW conveyer motor

Equipment installed from the distribution board in an air conditioned office:

An isolating device is required to be fitted at the distribution board to control all loads.

- 1 - 230V 12A Reverse Cycle Air Conditioning Unit
- 12 - 230V 18W LED lights installed on one circuit
- 1 - 230V 4A instantaneous water heater
- 4 - 230V 10A double socket outlets installed on one circuit

Note: Use of RCDs and/or RCBOs are permitted.

The 3Φ final sub-circuit wiring is V90 single insulated cable, installed enclosed in the cable duct/conduit provided.

The 1Φ sub-main is V90 single insulated cable, installed enclosed in the cable duct/conduit provided.

All 1Φ final sub-circuit wiring in the installation is two core and earth V90 flat copper TPS, installed partially surrounded in thermal insulation.

Note: This installation will never be connected to the electrical supply. Some parts and equipment may not satisfy the requirements of AS/NZS3000:2018 and other associated standards, they are only used in the assessment environment to keep assessment costs to a minimum. Please ask your assessor if you have any questions in relation to this.

Calculate the maximum demand of the installation. Use the maximum demand table below for your working.

Maximum Demand Table Used:

| Circuits | Load Group | Calculations | MD | | |
|---|------------|--------------|-----|-------|------|
| | | | Red | White | Blue |
| 1 - 3Φ 18A pump motor | | | | | |
| 1 - 1Φ 4.8kW conveyer motor | | | | | |
| 15 - 230V 150W LED luminaires all on the same phase | | | | | |
| 14 - 230V 10A double socket outlets | | | | | |

| | | | | | |
|--|--|--|--|--|--|
| 1 - 230V 2.4kW electric vehicle charger | | | | | |
| Equipment 1Φ Distribution Board | | | | | |
| 12 - 230V 18W LED lights | | | | | |
| 1 - 230V 12A Reverse Cycle Air Conditioning Unit | | | | | |
| 4 - 230V 10A Double socket outlets | | | | | |
| 1 - 230V 4A instantaneous water heater | | | | | |
| Distribution Board MD | | | | | |
| Total Installation MD | | | | | |

Based on the maximum demand calculation, select the current rating of the main switch, the **minimum** size of the consumer's mains cable, and the **minimum** size of the main earth conductor.

Based on the maximum demand calculation, select the current rating of the distribution board isolator and the **minimum** size of the sub-mains cable.

Enter these details into the table below, and state the AS/NZS 3008.1.1 Table number and column number used for your cable selection:

| | | |
|---------------------------|-------|--------|
| Consumer's Mains | Table | Column |
| Sub-mains | Table | Column |
| Three phase load | Table | Column |
| Single phase loads | Table | Column |

| Maximum Demand of the Installation | Current Rating of the Main Switch | Size of the Consumers Mains Cable | | Size of the Main Earth Conductor | |
|------------------------------------|-----------------------------------|-----------------------------------|-----|----------------------------------|-----|
| | | O/head | U/G | O/head | U/G |
| | | | | | |

| Maximum Demand of the Distribution Board | Current Rating of the Distribution Board Sub-main Circuit Protection | Size of the Sub-main Cable |
|--|--|----------------------------|
| | | |

Question 1 = 35 marks

Question 2

Electrical Installation Testing

| | |
|------------|--|
| Bay Number | |
|------------|--|

A mark will be deducted for each missing or incorrect unit where required.

Using your insulation resistance and continuity tester, carry out the following tests, as required under AS/NZS3000:2018, on the electrical installation indicated by the assessor.

NEUTRAL CONDUCTORS MUST NOT BE DISCONNECTED.

Insert the meter readings with the correct units, and other information as required, in the appropriate places throughout question 2.

2.1 Resistance of Main Earth and Bonding Conductors

| Test | Record Instrument Reading and Units | Indicate if Test is Pass or Fail |
|---------------------------------|-------------------------------------|----------------------------------|
| Main Earthing Conductor | | |
| Bonding conductor to water pipe | | |

(1 + 1 = 2 marks)

2.2 Insulation Resistance of Wiring

| Circuit Test | Record Instrument Reading and Units | Indicate if Test is Pass or Fail |
|----------------------------------|-------------------------------------|----------------------------------|
| Whole Installation (wiring only) | | |
| Final sub-circuit 1 | | |
| Final sub-circuit 2 | | |
| Final sub-circuit 3 | | |
| Final sub-circuit 4 | | |

(5 x 2 = 10 marks)

2.3 Earthing and Insulation Resistance of Appliance

| Test | Record Instrument Reading and Units | Indicate if Test is Pass or Fail |
|---------------------------|-------------------------------------|----------------------------------|
| Earthing of Exposed Metal | | |
| Insulation Resistance | | |

(1 + 2 = 3 marks)

2.4 Resistance of Protective Earthing Conductors

Determine Pass or Fail using Table 8.2 of AS/NZS3000:2018 Wiring Rules

| Test | Active Cond. Size mm ² | Earth Cond. Size mm ² | Protective Device Rating Type C | Active Cond. Resistance (R _{ph}) (Given) | R _e Value and Units (Measured) | R _{phe} Value and Unit (Calculated) | Indicate if Test is Pass or Fail |
|-----------------|-----------------------------------|----------------------------------|---------------------------------|--|---|--|----------------------------------|
| Ceiling Rose | 1.5mm ² | 1.5mm ² | 10A | 0.70Ω | | | |
| Fluorescent | 1.5mm ² | 1.5mm ² | 10A | 0.60 Ω | | | |
| Socket Outlet 1 | 2.5mm ² | 2.5mm ² | 16A | 0.25 Ω | | | |
| Socket Outlet 2 | 2.5mm ² | 2.5mm ² | 20A | 0.40 Ω | | | |

(4 x 1 = 4 marks)

2.5 Polarity Test of Consumers Mains

| Test | Record Instrument Reading and Units | Indicate if Test is Pass or Fail |
|-------------------------|-------------------------------------|----------------------------------|
| Consumers Mains Active | | |
| Consumers Mains Neutral | | |

(1 + 1 = 2 marks)

2.6 Operation of Switches

| Switch Under Test | Indicate which conductor is being switched ACTIVE / NEUTRAL / NEITHER | Indicate if Test is a Pass or Fail |
|-------------------|--|------------------------------------|
| Ceiling Rose | | |
| Fluorescent Light | | |
| Socket Outlet 1 | | |
| Socket Outlet 2 | | |
| Fan Socket Outlet | | |

(5 x 1 = 5 marks)

2.7 Testing of Circuit for Automatic Disconnection of Supply

Measure the fault loop impedance of the final sub-circuit supplying the socket outlet listed in the table below.

The final sub-circuits are protected by Type C miniature circuit breakers. The nominal supply voltage of the electrical installation is 230 volts.

Complete the table below, and determine Pass or Fail using Table 8.2 of AS/NZS3000:2018 Wiring Rules

| Test Point | Conductor Size | | Type C Circuit Breaker Rating | Measured Value and Units | Value of R_{phe} and Units From T8.2 | Indicate if Test is a Pass or Fail |
|-------------------------|----------------|--------------|-------------------------------|--------------------------|--|------------------------------------|
| | Active mm^2 | Earth mm^2 | | | | |
| Appliance socket outlet | 2.5 mm^2 | 2.5 mm^2 | | | | |

(2 marks)

2.8 Testing of Operation of RCDs

Using the RCD tester provided, test the three (3) RCD's and record their trip time and trip current at zero degrees.

| RCD Under Test | Earth Leakage | |
|----------------|---------------------------|------------------------------|
| | Trip Time Value and Units | Trip Current Value and Units |
| 1 | | |
| 2 | | |
| 3 | | |

(1 + 1 + 1) = 3 marks

RCDs may have any number of conductors. As a minimum, RCD's shall interrupt which conductors?

| | |
|------------------------------------|--|
| Answer: | |
| Wiring Rules Clause Number: | |

1 mark

(3 + 1 = 4 marks)

Question 3

MEN System Voltage Measurements

A mark will be deducted for each missing or incorrect unit where required.

The equipment on this test panel consists of:

- The earth electrode from the 400/230V distribution system substation MEN star point.
- A single phase electrical installation with earth electrode and bonding to a metallic underground water pipe.

Using the instrument provided, carry out the following tests. On the simulated MEN electrical installation, you are required to take voltage measurements, as follows:

Question 3.1

- i. With the main switch “ON” and all circuit breakers in the “OFF” position, take a voltage measurement across the terminals of the point of supply.
- ii. Measure the voltage between the
 - independent earth and frame of the appliance (refrigerator)
 - independent earth and water tap/pipe
 - appliance terminals

in each of the switchboard conditions outlined in the table below.

The main switch is to be in the “ON” position in all cases.

On the following page:

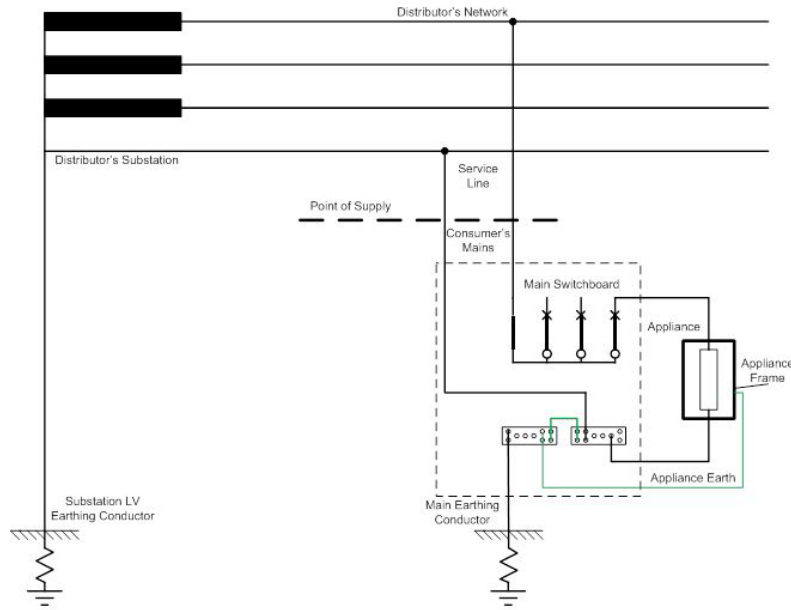
- a) Record the voltage readings and units, and write them in the table.
- b) Answer the two questions in relation to your readings.
- c) Draw the current path, and the location of the fault (if any) on the diagram supplied.

| Measure and record the supply voltage at the point of supply (Main switch on, all circuit breakers off) | | | | _____Volts | | |
|--|-------------------|-------------------|-------------------|--|--------------------------------------|------------------------------------|
| Test Condition | Circuit Breaker 1 | Circuit Breaker 2 | Circuit Breaker 3 | Independent Earth and Appliance Frame (refrigerator) | Independent Earth and Water Tap/Pipe | Appliance Terminals (refrigerator) |
| 1 | ON | Off | Off | | | |
| 2 | ON | ON | Off | | | |
| 3 | ON | ON | ON | | | |

Is the electrical installation you have measured above safe? Yes / No

Draw the current path of your measured circuit on the diagram below, and indicate on the diagram the location of the fault (if any). Indicate if you have drawn a:

High impedance circuit / Open circuit / No fault circuit (Cross out those not applicable.)



(3 + 1 + 2 + 4 = 10 marks)

Question 3.2

Answer the following four (4) questions about the MEN system.

Note: These questions may not directly relate to your measurements or diagram on the previous page.

1. In a healthy distribution and electrical installation the current return path is:
 - a) in series with the general mass of earth
 - b) via the MEN connection and main earth
 - c) via the main neutral conductor

2. In an installation with an open circuit main neutral conductor, the current will return via the earthing system
 - a) true
 - b) false

3. In an installation with a high impedance main neutral conductor, as loads increase the voltage at the appliance terminals
 - a) increases
 - b) decreases
 - c) stays the same

4. A high impedance main neutral may cause a voltage to be available on metallic water pipes within the installation:
 - a) True
 - b) False

(2 + 2 + 2 + 2 = 8 marks)

Question 4

Your workstation to inspect is:

Visual Defects

When instructed by the assessor, carry out a visual inspection of the installation.

You are to find five (5) installation defects and record them in the table below. **A maximum of three (3) defects may be taken from the switchboard enclosure.**

- Record five **different** instances of non-compliance with the Wiring Rules AS/NZS3000:2018.
- Record the defect in the column provided. (1 mark)
- Record the complete Wiring Rules Clause. (2 marks)
- Indicate the switch or socket outlet number and panel location when recording the defect.
- Only the first five recorded defects will be marked.

| Panel Location | Wiring Defect | Wiring Rules Clause Number |
|----------------|---------------|----------------------------|
| | | |
| | | |
| | | |
| | | |
| | | |

[5 x (1 + 2) = 15 marks]