Licensed Electrical Inspector RE Class Theory Assessment – Sample Paper

April 2025

Candidate Surname	
Candidate Given Names	

Instructions

- Personal notepads, paper or electronic devices are not permitted (non-programmable calculators are permitted).
- Permanent pens only must be used. Answers in pencil or erasable pen 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.
- Units and table numbers (where required) must be shown to obtain full marks.
- Reference material listed on the following page will be supplied. Do not mark, fold or write on the reference material.

Working Time: 3 hours

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

Candidate			
	Print name	Signature	Date

Question	1	2	3	4	5	6	7	8	9	10	11
Mark											
Question	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19a**	**19b**	**20**	**Total**
Mark											

Paper total is 119 marks. Candidates need to obtain 75% or more (89 marks or more) to pass this assessment.

Final Percentage	Pass/Fail

Supervisor			
	Print name	Signature	Date
Assessor			
	Print name	Signature	Date
Reviewed by (If applicable)			
	Print name	Signature	Date

VICTORIA State Government

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Reference Material to be provided to the candidate by the assessment venue

- Electricity Safety (General) Regulations 2019
- AS/NZS 3000:2018 Wiring Rules
- AS/NZS 3008.1.1:2017 Electrical installations – Selection of cables
- AS/NZS 3010:2017 Electrical installations – Generating sets
- AS/NZS 4777.1:2024 Grid connection of energy systems via inverters, Part 1: Installation requirements
- AS/NZS 5033:2021 Installation and safety requirements for photovoltaic (PV) arrays
- AS/NZS 5139:2019 Electrical installations – Safety of battery systems for use with power conversion equipment
- AS/NZS 4509.1:2009 Stand-alone power systems, Part 1: Safety and installation
- AS/NZS 1170.2:2021 Structural design actions, Part 2: Wind actions
- AS/NZS 4836:2023 Safe working on or near low-voltage and extra-low voltage electrical installations and equipment

All Standards include amendments if applicable.

Clarification of requirements

In questions 1-11 and 16-18 you are required to:

- Answer the question based on the relevant regulation or rule/clause.
- Write the reference document e.g. General Regulations, Wiring Rules and/or Australian Standard number.
- Write the Regulation, Clause and/or Table number in the space provided. The correct Regulation and Sub-regulation, or Clause and Subclause must be given (e.g. 3.5.2(b)(i)). Including if it is an exception or note.
- For AS/NZS standards only, you may omit the 'AS/NZS', the year of publication and the title. You are only required to supply the number of the standard.
- If the same answer is available from two or more reference documents, either will be acceptable unless otherwise stated. If the reference documents state different answers, hierarchy of documents shall be applied in establishing the correct answer.

The correct answer to all parts must be given to obtain full marks.

Note: Two versions of question 13 (13-1 and 13-2) are provided on this sample paper to show the type of questions that may be supplied. Only one of these will appear on the assessment. Marks for question 13 should only be counted for one version of this question.

Question 1.

All Electrical installation work on a photovoltaic array must be tested in accordance with ___________.

Answer:

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 2.

In domestic and residential installations, BESS shall not be located in habitable rooms.

From the list below, identify ALL rooms that would be defined as a Habitable Room.

To obtain full marks you must identify all rooms correctly.

- ☐ Bedroom
- ☐ Cinema / home theatre room
- ☐ Laundry
- ☐ Kitchen
- ☐ Garage
- ☐ Childrens playroom
- ☐ Workshop
- ☐ Study

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 3.

As part of the installation of a grid connected inverter system, an RCD is to be installed to meet the mechanical cable protection requirements and isolation requirements of AS/NZS 3000 for a cable running from a switchboard to the inverter energy supply. In which conductor/s shall the RCD operate?

Answer:

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 4.

A grid connected inverter is located on a wall 3m from a 20,000 litre inground swimming pool. Is this a compliant location?

Answer:

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 5.

When conducting verification of earth continuity to conductive parts of a PV array during an inspection, is this considered to be working on or near live electrical equipment according to AS/NZS 4836?

Answer:

Clause Number:

[2 + 2 = 4 marks]

Question 6.

A PV system is installed with a 6 mm^2 d.c. array cable and a 16mm^2 active inverter a.c. cable. The array has no d.c. overcurrent protection and is not required to be earthed for lightning protection. The array is connected to a grid connected system, and the inverter is a non-separated type and does not have a powered neutral. What size earthing conductor shall be required for this array?

Answer:

First Reference Document:

Clause Number:

Second Reference Document:

Clause and/or Table Number:

[2 + 1 + 2 + 1 + 1 = 7 marks]

Question 7.

A wiring system contains direct current (d.c.) PV array cables. The wiring system is not installed directly behind and adjacent to the PV modules and is visible after mounting. What are the labelling requirements for the wiring system?

Answer:

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 8.

An installation is installed as a stand-alone power system. Identify four locations that shall be displayed on the information sign at the main switchboard for emergency services?

All four must be correct to obtain marks for this question.

Answer:

1.

2.

3.

4.

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 9.

A wind generator is located in Ballarat, Victoria. The dossier provided by the installer indicates the installation has been designed and installed for Wind Region A5. This is the correct wind region for this location. Circle the correct response.

True or False

Reference Document:

Clause/Figure Number:

[2 + 1 + 2 = 5 marks]

Question 10.

An inverter is installed connected to a distribution board. What should the isolator for the normal supply be labelled at this distribution board?

Answer:

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 11.

When an alarm system provided for a pre-assembled integrated Battery Energy Storage System (BESS) has only an audible or a visual alarm signal, where shall the alarm signal be placed?

Answer:

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 12. Voltage Rise

A 3 phase 230/400V a.c. installation has a photovoltaic grid connected inverter installed.

The 3 phase inverter is rated at 10kVA. The a.c. supply cable from the inverter to the distribution board is a 20m run of 4mm^2 V90 orange circular with copper conductors, installed in conduit in air, and protected by a C20A circuit breaker.

The 3 phase sub-mains are 10mm^2 V90 orange multicore PVC/PVC copper conductors with a length of 30m from the main switchboard to the distribution board. The cables are enclosed in conduit installed underground at a depth of 500mm, and are protected at their origin by a C32A circuit breaker.

The main switchboard consumer's mains are one set of four single core 35mm^2 XLPE X-90 insulated and sheathed copper cables, connected from the point of supply to the main switchboard, with a length of 35m. The cables are enclosed in conduit buried in the ground at a depth of 500mm. They are provided with overload protection of C63A circuit breaker at the main switchboard. Short circuit protection is via fuses provided by the distributor.

The inverter full load current will be exported under no load.

a) Calculate the voltage rise for the installation. Your answer may be given as a voltage or as a percentage, either will be accepted.

b) Determine if the installation complies with AS/NZS 4777.1:2024 and AS/NZS 3008.1.1:2017.

Table numbers and calculations must be shown to obtain full marks. Work all calculations to 2 decimal places.

Answer:

a) Total voltage rise:

b) Installation is compliant Yes / No

[12 + 2 = 14 marks]

Question 13.

Two versions of question 13 (13-1 and 13-2) are provided on this sample paper to show the type of questions that may be supplied. Only one of these will appear on the assessment. Marks for question 13 should only be counted for one version of this question.

Question 13-1. PV module maximum voltage calculation – Method A

A solar PV installation connected to a light industrial installation is located on the north roof of the building and comprises multi-crystalline silicon modules.

The PV module data sheet states:

Open circuit voltage (Voc) at STC	45.0 V
Maximum Power Voltage (VMP) at STC	35.5 V
Temperature Coefficients of Voc	-0.28%/°C
Standard Test Conditions (STC)	25°C

The solar PV installation is connected to an inverter located on the north side wall of the building within 5 metres of the distribution switchboard it is connected to, and has the following characteristics:

Maximum PV Voltage = 600 VDC.

Maximum short circuit current = 18 Amps Isc.

a) Calculate the PV module maximum voltage (V mod max) correcting the voltage for the lowest expected operating temperature. Use the PV Module Temperature Coefficients values above with a lowest expected operating temperature zone of 1.5°C.

b) Using your answer from part a) what is the maximum number of modules in a single string that can be connected to the inverter specified above?

Calculations must be shown to obtain full marks. Work all calculations to 2 decimal places.

Answer:

a) V mod max =

b) Number of modules:

[5 + 2 = 7 marks]

Question 13-2. PV module maximum voltage calculation – Method B

A solar PV installation in Melbourne is connected to a commercial installation is located on the roof on the north side of the building and comprises multi-crystalline silicon modules.

The solar PV installation is connected to an inverter located on the north side wall of the building within 5 metres of the Distribution switchboard it is connected to and has the following characteristics:

Maximum PV Voltage = 600 VDC.

Maximum short circuit current = 18 Amps I_{SC}.

Standard Test Conditions (STC) = 25°C.

Manufacturers data sheet

FES Panel plus 1 STC	230W	245W	250W	270W
Performance tolerance	–0/+3 %	–0/+3 %	–0/+3 %	–0/+3%
efficiency (Pnom)	14.74%	15.05%	15.36%	15.66%
Voltage at maximum performance (Umpp	30.89 V	31.19 V	31.45 V	31.71 V
Current at maximum performance (Impp)	7.90 A	7.97 A	8.04 A	8.11 A
Off-load voltage (Uoc)	44.00 V	45.15 V	46.29 V	47.43 V
Short-circuit current (Isc)	8.45 A	8.50 A	8.54 A	8.58 A
Temperature coefficient (Pmpp)	–0.44 %/° C	–0.44 %/° C	–0.44 %/° C	–0.44 %/° C
Temperature coefficient (Uoc), in percent	–0.34 %/° C	–0.35 %/° C	–0.37 %/° C	–0.39 %/° C
Temperature coefficient (Isc) as a %age	0.059 %/° C	0.059 %/° C	0.059 %/° C	0.059 %/° C
Electrical rating at 800 W/m², NOCT and AM 1.5				
Power (Pmpp)	179.77 W	183.15 W	186.33 W	189.53 W
Off-load voltage (Uoc)	34.63 V	34.77 V	34.90 V	35.03 V
Short-circuit current (Isc)	6.85 A	6.89 A	6.92 A	6.96 A
Voltage (Umpp)	28.06 V	28.34 V	28.58 V	28.82 V
Current (Impp)	6.41 A	6.46 A	6.52 A	6.58 A

BOM data sheet (Melbourne temperatures)

Summary statistics for all years

Minimum Temperature

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	8.7	8..8	7.1	4.6	2.4	0.5	0.2	0.6	1.4	2.8	4.8	6.9	-0.8
Lowest	5.7	5.3	3.7	0.6	0.1	-3.3	-2.6	-2.4	-1.6	-0.3	2.2	4	-3.3
Median	8.3	8.9	7.2	4.5	2.7	0.5	-0.1	0.7	1.4	2.7	5.1	6.7	-0.8
Highest	13	11.7	10.2	7.7	6.2	3.2	3.2	4.1	5.3	7.2	7.4	9.3	1.1

Using the Manufacturers data sheet and BOM temperature data sheets provided:

a) Calculate the PV module maximum voltage (Vmod max) for a 250W module using the data tables provided.

b) Using your answer from part a) what is the maximum number of modules in a single string that can be connected to the inverter specified above?

Calculations must be shown to obtain full marks. Work all calculations to 2 decimal places.

Answer:

a) V mod max =

b) Number of modules:

[5 + 2 = 7 marks]

Question 14. PV module maximum voltage calculation – Method C

A solar PV installation connected to a domestic/commercial/light industrial installation is located on the roof on the north side of the building and comprises multi-crystalline silicon modules, the PV module data sheet states:

Open circuit voltage (Voc) at STC	47.0 V
Maximum Power Voltage (VMP) at STC	35.5 V
Temperature Coefficients of Voc	-0.29%/°C
Standard Test Conditions (STC)	25°C

The solar PV installation is connected to an inverter located on the north side wall of the building within 5 metres of the distribution switchboard it is connected to and has the following characteristics:

Maximum PV Voltage = 600 VDC.

Maximum short circuit current = 18 Amps Isc.

a) Calculate the PV module maximum voltage (Vmod max) for a module using the data above installed in a minimum expected operating temperature zone of 1°C using AS/NZS 5033:2021 Table 4.1 Voltage correction factors for crystalline and multi-crystalline silicon for your correction factors.

b) Using your answer from part a) what is the maximum number of modules in a single string that can be connected to the inverter specified above?

Calculations must be shown to obtain full marks. Work all calculations to 2 decimal places.

Answer:

a) V mod max =

b) Number of modules:

[2 + 2 = 4 marks]

Question 15. String Current

A PV Array consisting of monocrystalline PV modules with a short circuit current (Isc) of 10.31A

a) Calculate the maximum string current for one string of 12 PV modules in series.

b) Calculate the potential string fault current for three parallel strings, with each string having 12 PV modules in series.

All cables and components in a PV system shall be selected and installed to be adequately rated for the calculated max voltages and max currents.

Specify the relevant Standard and a Clause for both part a) and part b) above.

Calculations must be shown to obtain full marks. Work all calculations to 2 decimal places.

Answers:

a) _________A

b)_________A

Standard Number:

Part a) Clause Number:

Part b) Clause Number:

[2 + 2 + 1 + 1 + 1 =7 marks]

Question 16.

Where a permanently connected 125 kVA petrol engine generating set is installed in a room or enclosure, what are the egress requirements concerning the number of openings?

Answer:

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 17.

Is it permissible to use electronic touch screens, programmable control systems or the like to operate the Automatic Transfer Switch (ATS) when used as a main switch?

Answer:

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 18.

Where generating sets are to be synchronized with an electricity distributor's network, from whom shall the requirements for synchronization shall be obtained from?

Answer:

Reference Document:

Clause Number:

[2 + 1 + 2 = 5 marks]

Question 19.

An electrical installation is supplied from a kiosk sub-station located in a street reserve (not onsite). The consumer's mains are two sets of four single core 95 mm^2 XLPE X-90 insulated and sheathed copper cables, connected in parallel to supply a three phase main switchboard onsite which then supplies three tenancies.

Tenancy 3 is a separate outbuilding, and the sub-mains are four single core 35mm^2 X90 insulated and sheathed copper conductors installed in heavy duty conduit in the ground and are protected at their origin by a 100 Amp circuit breaker. Cable length is 35m with a 10mm^2 carried earth of the same length. The out of balance load on each phase is intermittent and values are as follows: red phase 86A, white phase 82A, blue phase 83A.

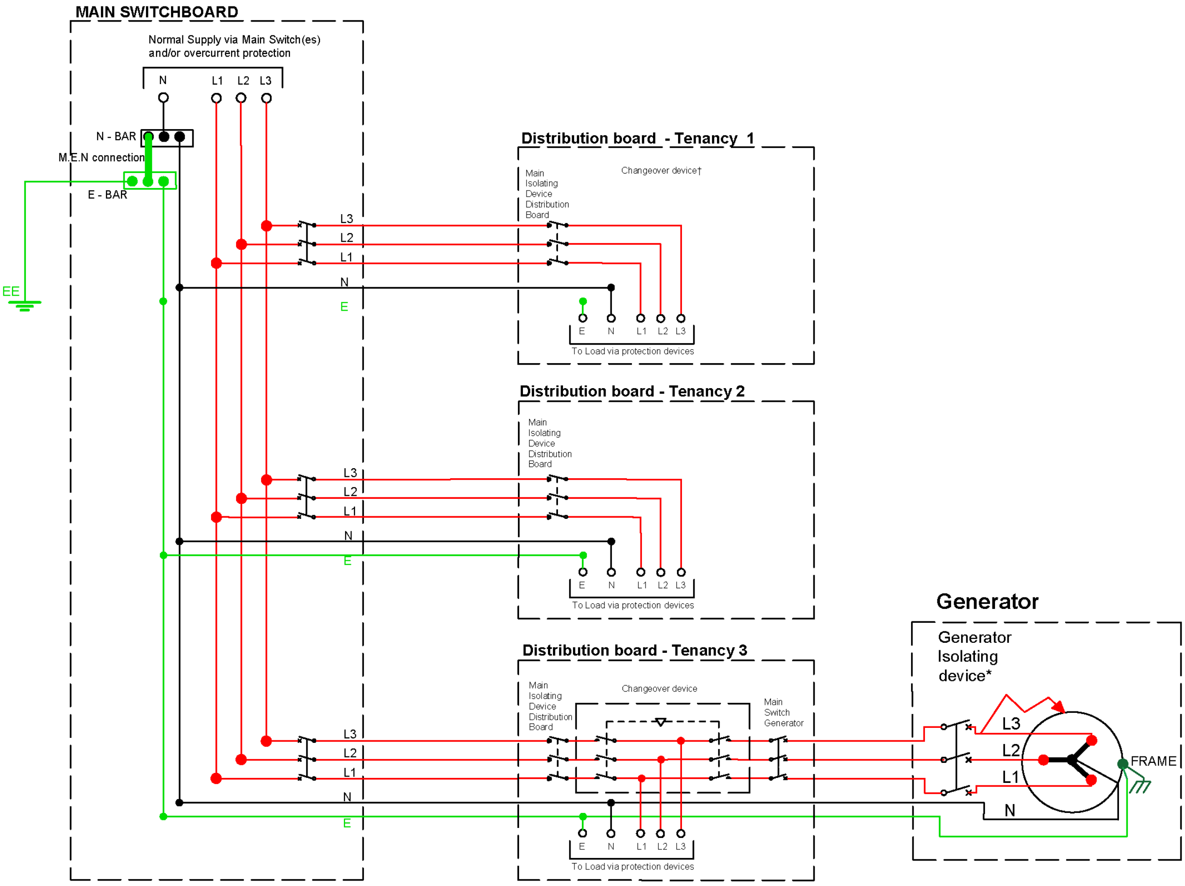
Tenancy 3 also has an internal combustion engine generator recently installed as a standby supply currently awaiting inspection. The generator is a 25kVA three phase generator set with one set of four single core 35 mm^2 XLPE X-90 insulated and sheathed copper cables, connected to the tenancy distribution board through an automatic transfer switch. Cable length is 25m to the generator terminals. A 10mm^2 XLPE X-90 carried earth connects directly to the generator frame and is 27m in length. All the generator internal cabling is single core XLPE X-90 35mm^2 and 1m in length.

Following the connection of the generator into the installation, there is a concern that the resistance of the earthing conductor connected from the generator to the Tenancy 3 distribution board will not be low enough to cause the circuit protection device located at the generator to operate within the required time of 0.4 seconds.

Please refer to the drawing on the next page. A fault is shown at the generator, which is a short between L3 and the frame of the generator.

Notes:

1. Refer below figure for further information.
2. The isolation device at the generator is a circuit breaker. The fault current required to operate this circuit breaker protection on the generator within the required time is 3250 Amps.
3. In calculating the fault current path impedance, you may need to consider more than the earthing conductors.
4. Work all impedances to 5 decimal places.



Question 19. Part a)

Identify the correct fault current path if there is a fault on one of the active conductors between the windings and protective device in the generator (as shown on the diagram).

a) Generator Earth conductor, Submains Earth conductor, Generator Active conductor, Submains Neutral conductor, Generator Neutral conductor
b) Submains Neutral conductor, Generator Neutral conductor, Generator Active conductor, Generator Earth conductor, Submains Earth conductor
c) Generator Active conductor, Generator Earth conductor, Submains Earth conductor, Submains Neutral conductor, Generator Neutral conductor
d) Generator Neutral conductor, Submains Neutral conductor, Generator Active conductor, Generator Earth conductor, Submains Earth conductor
e) Submains Earth conductor, Generator Earth conductor, Submains Neutral conductor, Generator Neutral conductor, Generator Active conductor

Answer:

[2 marks]

Question 19. Part b)

i) Using AS/NZS 3008.1.1:2017, calculate the total fault current path impedance.

ii) Calculate the generator internal impedance and determine if the installation is compliant.

Answers:

i) Fault current path impedance =

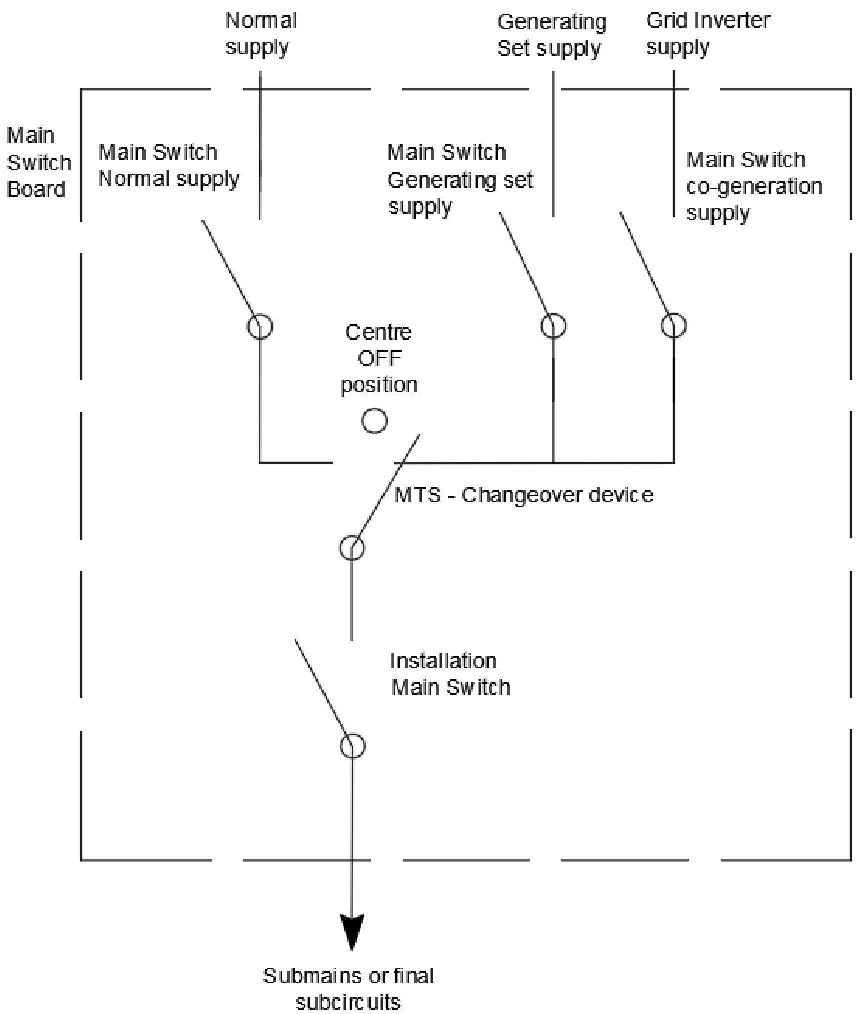
ii) Generator internal impedance =

The installation is compliant Yes / No

[9 + 2 = 11 marks]

Question 20.

Using AS/NZS 3010, confirm if the design of the following layout of the switching of a multiple supply installation is compliant.



Is this compliant? Yes / No

Clause Number:

[2 + 1 = 3 marks]