

ER 11 – Electrician Regulations Answer Schedule

Note: (1 mark) means that the preceding statement earns 1 mark.

This schedule sets out the expected answers to the examination questions. The marker can exercise their discretion and decide on the overall accuracy of any answer that is presented in the candidate's own words.

Key to abbreviated terms:

EA	Electricity Act 1992
ER	Electricity Regulations 1997
AS/NZS	Australia and New Zealand Joint Standard
NZS	New Zealand Standard
AS	Australian Standard
ECP	New Zealand Electrical Code of Practice
GK	General Knowledge

Question 1

Any FOUR of:

- * Registered electricians
- * Registered line mechanics
- * Registered electrical inspectors
- * Registered electrical service technicians
- * Persons who are authorised to carry out such work under a provisional licence
- * Trainees
- * Qualified engineers

EA 108 (2)

Question 2

Any TWO of:

- * cancellation of the registration
- * suspension of the registration
- * limited to such work as the Board may specify
- * limited to work only on approved premises
- * limited to work only in the employ of an approved employer
- * impose a fine

EA 127(2)

Question 3

Any ONE of:

- * A supervisor of electrical work whose registration allows that supervisor to do the work
 - * A registered person whose registration allows that person to do the work, where the registered person is under the supervision of a supervisor of electrical work whose registration allows that supervisor to do the work
- ER 23(a),(b)

Question 4

Any TWO of:

- * Where the fittings have been tested and certified but no inspection is required.

ER 39(1)
ER 41(1)
- * Where the fittings have been tested but no certification is required.

ER 39(2)(a)(c)
- * To enable any testing or certification to be carried out.

ER 45

Question 5

Voltage

minimum 216.2 V

maximum 243.8 V

ER 53(1)(b)

Question 6

$230 - 11.5 = 218.5 \text{ V}$ ($230 \times 5\% = 11.5\text{V}$)

ER 53(3)(b)

Question 7

- (a) Must only be used in, or with, any works, electrical installations or electrical appliances that operate at standard low voltage.

(1 mark)
ER 74(1)(a)
- (b) AS/NZS 3760

(1 mark)
ER 76(4)

Question 8

- * Warrant of electrical fitness
- * Certificate of compliance

ER 97(4)(a),(b)

Question 9

- (a) Number 2
Protection of fingers against access to hazardous parts, and protection of equipment against objects larger than 12.5 mm (also accept "12.5 mm²")
(1 mark)

- (b) Number 3
Protection against spraying water at up to 60⁰ from the vertical
(1 mark)
AS 1939 Supplement 1:1990

Question 10

Any TWO of:

- * Automatic disconnection of the supply in accordance with clause 1.7.4.3
- * The use of Class II equipment of equivalent insulation, in accordance with clause 1.7.4.4
- * Electrical separation in accordance with clause 1.7.4.5
AS/NZS 3000: 1.7.4.2

Question 11

Every electrical installation shall be divided into circuits as necessary to:

- * avoid danger and to minimise inconvenience in the event of a fault.
- * Facilitate safe operation, inspection, testing and maintenance.
AS/NZS 3000: 1.8.5

Question 12

Any TWO of:

- * Where they are buried in concrete or plaster containing corrosion agents
- * Where they are installed underground in accordance with clause 3.11
- * Where they are in other locations where corrosion is likely to occur.
AS/NZS 3000: 3.9.8.3.1

Question 13

2.5 mm²

AS/NZS 3000: Table 5.1

Question 14

..... shall be deemed to be an earthing conductor for the purpose of this Clause
5.....

AS/NZS 3000: 5.5.1.2(e)(iv)

Question 15

- (1) Separated extra-low voltage (SELV)
- (2) Protected extra-low voltage (PELV)

AS/NZS 3000: 7.7.2

Question 16

- * Gas hazardous area
- * Dust hazardous area

AS/NZS 3000: 7.9.2.2

Question 17

- (1) Socket outlet must comply with AS 1939
- (2) Have a minimum degree of protection IP 24

AS/NZS 3001: 3.6.3.4

Section 2

Question 18

(a) Any THREE of:

- * Completed such training as prescribed.
- * Has had such experience as prescribed.
- * Has completed training in resuscitation, safe working practices and testing.
- * Has passed the prescribed examinations.

EA 75
(3 marks)

(b) (i) A practising licence

EA 95(1)
(1 mark)

(ii) 30 June of the year it is stated to expire.
(also accept 1 July)

Electricity Amendment Act 1997 4(2)(b)
(1 mark)

(iii) The Registrar

EA 96(1) or 100(4)
(1 mark)

Question 19

- (a) *
- * Must have own earthing system complying with AS/NZS 3000.
 - * Must have a protective earthing conductor linking the earthing terminal, connection or bar of the service pillar with the earthing terminal, connection or bar of the switchboard supplying it.
AS/NZS 3001: 2.1.4.2
(2 marks)
- (b) Any TWO of:
- * Must be controlled by its own individual switch.
 - * Switch must be immediately adjacent to the outlet or otherwise suitably identified as controlling the outlet.
 - * Clearly identified to indicate the on and off positions.
AS/NZS 3001: 2.3.2.4.6
(2 marks)
- (c) Any TWO of:
- * Maximum residual current of 30 mA
 - * Operates in all live (active and neutral) conductors.
 - * Mounted on or in the service pillar.
AAS/NZS 3001: 2.3.2.4.5(b)

Question 20

- (a) (1) Identified by an orange marker tape positioned above the cable.
AS/NZS 3000: 3.11.3.4
- (2) Marker signs where the cable enters or leaves the building
AS/NZS 3000 3.11.3.5
(2 marks)
- (b) 0.5 m
AS/NZS 3000: Table 3.7
(1 mark)
- (c) Shall be laid on a bed of not less than 50 mm of sand or friable soil free of sharp stone and covered by not less than 50 mm of the same material.
AS/NZS 3000: 3.11.3.2
(2 marks)
- (d) Any ONE of:
- * Sheathed and armoured and serviced cables.
 - * Neutral screen cable suitable for underground.
- AS/NZS 3000: 3.11.2(f)
Table 3.6. and 3.7

Question 21

- (a) Any person supplying electricity at standard low voltage to a connectable installation.
ER 98(5)
(1 mark)
- (b) (i) Yes
(ii) Under regulation 100(d)(vii) it is an offence to fail to comply with regulation 98.
(2 marks)
- (c) (i) 4 years from the date of issue
ER 97(4A)
(1 mark)
- (ii) (1) A registered electrical inspector
(2) A person authorised by the Secretary.
ER 97(5)
(2 marks)

Question 22

Group A

20 x lighting points	3 A	
12 x lighting points	2 A	5 A

(1 mark)

Group B

20 x socket outlets	10 A	
7 x socket outlets	5 A	15 A

(1 mark)

Group C

1 x 10 kW electric range		
50% of 10 kW		
43.4×0.5	21.7 A	

(1 mark)

1 x 3 kW clothes dryer		
50% of 3 kW		
13×0.5	6.5 A	28.2 A

(1 mark)

Group F

1 x 3 kW controlled water heater		
100% of 3 kW		13 A

(1 mark)

Total **61.2 A**

(1 mark)

AS/NZS 3000: Appendix C, Table C1
(Total – 6 marks)

Question 23

(a) Any FOUR of:

- * Sight the certificate of compliance. ER 43A(b)
- * Ensure the polarity and phase rotation is correct. ER 43A(c)
- * Ensure the protection of the supply is correctly rated ER 43A(d)
- * Verify the safety of the metering and associated load control equipment ER 43A(e)
- * Verify there is a main earthing system. ER 43A(f)
(4 marks)

(b) Fault kVA = $\frac{350}{0.06}$
= 5833 kVA (1 mark)

I_{sc} = $\frac{5833}{\sqrt{3} \times 400}$
= 8.42 kA (1 mark)

Question 24

(a) Voltage drop = $\frac{\text{mV/A.m} \times \text{amps} \times \text{metres}}{1000}$
From Table 42 – mV/A.m = 15.6 x 1.155 = 18.01 (1 mark)
= $\frac{18.01 \times 21 \times 20}{1000}$
= **7.56 V**

(1 mark)
(Total - 2 marks)

(b) No – it is greater than 2.5% (½ mark)

2.5% of 230 V = 5.75 V (½ mark)
(Total - 1 mark)

(c) From Table 27(1) the derating factor is 0.94
From Table 9 the current rating for 2.5 mm² is 30 amps (column 4) (½ mark)

Current rating = 30 x 0.94
= **28.2 A** (½ mark)
(Total - 1 mark)

(d) Yes (½ mark)

Because the rating of the oven is 12 A (½ mark)
(Total - 1 mark)

(e) No (½ mark)

The voltage drop is too great. (½ mark)
(Total - 1 mark)

Question 25

- (a) (1) Safe working practices appropriate to the work being undertaken.
(2) Testing to ensure safety before/during and after completion of the work.
(3) Basic first aid
(4) CPR

ER 26(2)
(2 marks)

- (b) Safe working practices, testing and basic first aid at intervals not exceeding 14 months, CPR at intervals not exceeding 7 months.

ER 26(4)(a), (b)
(2 marks)

- (c) Ensure employees are competent to do the work
or
Are under the supervision of a person competent to do that work

ER 25(3)
(2 marks)

Question 26

- (a) (1) Lines are not accessible without the use of a climbing device.

ECP 34: 7.3.1

- (2) No climbing step shall be placed at a height of less than 3 metres above ground level.

ECP 34: 7.3.2
(2 marks)

- (b) (i) (1) 4 metres

ECP 34: 5.2.1
(1 mark)

- (2) 1 metre

ECP 34: Table 6
(1 mark)

- (ii) (1) Not closer than 6 metres.

ECP 34: 2.2.3(a)
(1 mark)

- (2) Either of:

* Not to create an unstable batter.

* At a depth not greater than 3 metres between 6 metres and 12 metres of the outer edge of the tower.

ECP 34: 2.2.3(c)
(1 mark)

Question 27

(a) Any TWO of:

- * Earthed and protected by a residual current device with a maximum rated residual current of 30 mA.
- * Supplied at extra-low or low voltage through an isolating transformer complying with AS/NZS 3108 and not earthed.
- * Supplied by other suitable measures that take account of the electrical equipment construction and installation methods.

(2 marks)

AS/NZS 3000: 7.6.3.2.1

(b) (i) Bare aerial conductors shall not be installed over Zones 0, 1 or 2

(1 mark)

AS/NZS 3000: 7.2.4.2

(ii) Any THREE of:

- * Specifically intended for use in a swimming or spa pool.
- * Supplied as an SELV or PELV in accordance with clause 7.7.
- * Shall not be provided with a protective earthing conductor.
- * The supply source shall be installed outside of Zone 0

AS/NZS 3000: 7.2.4.5(a)

(3 marks)

Question 28

(a) (i) A certificate of compliance within one day of the completion of the work.

ER 39(4),(5)

(1 mark)

(ii) Yes, inspection is required for the relocation of the main switchboard.

ER 41(1)(c)(vii)

(2 marks)

(b) (i) AS/NZS 3760

ER 38

(1mark)

(ii) * Protective earthing conductor resistance – maximum 1 Ohm

(1mark)

AS/NZS 3760: 2.3.3.1

* Insulation resistance – minimum 1 Megohm

(1mark)

AS/NZS 3760: 2.3.3.2

(2 marks)