

ESTA 1034 - Electrical Service Technician "A" Answer Schedule

- Notes: 1. (1 mark) means that the preceding statement/answer earns 1 mark.
2. 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.
3. Symbols and terms - alternatives
Power W or P
Voltage V or E or U
Phase Active
4. 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
5. Where applicable, the parts of an answer underlined are the points that need to be covered.

Question 1

Each part in this question is worth 2 marks.

- (a) Light duty two core tough plastic sheathed **multi-choice answer - (4)**
- (b) No additional protection **multi-choice answer - (2)**
- (c) 2.0 kW **multi-choice answer - (1)**
- (d) Reduce the expected current flow through the element and indicate 230V **multi-choice answers - (4)**
- (e) Decrease **multi-choice answer - (3)**
- (f) 1 Megohm **multi-choice answer - (2)**
- (g) 69 cents **multi-choice answer - (2)**

(h) 16A

multi-choice answer – (4)

(i) Highest resistance

multi-choice answer – (1)

(j) The symbol “square within a square”

multi-choice answer – (3)

Question 2

(a) That the correct fuse has been identified.
(accept any reasonable answer) (1 mark)

(b) Items of apparel and equipment worn by a person that are intended either to prevent the occurrence of harm to the person or to minimise any harm that may occur from hazards that are present in the workplace or hazards that may arise in the course of work

ER 2
(2 marks)

(c) (i) (1) The appliance has become de-energised. (1 mark)
(2) The plug has deliberately been removed.

(1 mark)

(ii) Any ONE of:

- Attach a safety warning tag
- Disconnect the plug

(1 mark)

(d) Any FOUR of:

- Inspect instrument, clips, leads and probes to ensure they are in good condition.
- Ensure correct range is selected on the instrument.
- Ensure leads are correctly connected.

(4 marks)

Question 3

- (a) (i) A practising licence
- EA 95(1)
(1 mark)
- (ii) 30 June of the year it is stated to expire.
(also accept 1 July)
- EA 100
(1 mark)
- (iii) The Registrar
- 100(4)
(1 mark)
- (b) 1 year
- GK
(1 mark)
- (c) Any TWO of:
- Registered electricians
 - Registered line mechanics
 - Registered electrical inspectors
 - Persons who are authorised to carry out such work under a provisional licence
 - Trainees
 - Qualified engineers
- EA 108 (2)
(2 marks)
- (d) • Safe working practices
- Testing
 - CPR
 - Basic first aid
- ER 26
(4 marks)

Question 4

(a) (i) Fault current $I = \frac{V}{R}$ (1/2 mark)

$$= \frac{230}{7}$$

(1/2 mark)

$$= 32.88A$$

(1 mark)

(ii) • The fusing current = $10 \times 1.5 = 15A$ (1 mark)

• The fault current of 32.88 would operate the fuse. (1 mark)

(b) (i) Any ONE of:

• Most of the internal wiring will be alive (1 mark)

At 230V to earth with the switch in the "OFF" position. (1 mark)

• It will have no effect if the transposition has taken place on the load side of the switch. (2 marks)

(ii) Any FOUR of:

• The phase and neutral can be transposed at the plug on the flexible cord

• The phase and neutral can be transposed at the internal terminals in the appliance (other than at the switch)

• The phase and neutral can be transposed in an extension cord supplying the appliance.

• The phase and neutral can be transposed at the socket outlet supplying the appliance.

• Incorrect polarity at switchboard. (4 marks)

Question 5

- (a) A sustained overload (1 mark)
- (b) • Current rating (1 mark)
- Voltage rating (1 mark)
- Category of duty (Rupturing Capacity) (1 mark)
- Utilisation category (fusing factor) (1 mark)
- (c) • Neutral current out of balance with the phase current. (1 mark)
- A magnetic field is induced into the iron core. (1 mark)
- The induced magnetic field induces a current in the sensing coil (1 mark)
- The tripping coil is energised, isolating the circuit (1 mark)
- (d) Portable Residual Current Device (1 mark)

Question 6

- (a) (i) • To avoid possible contact with a live terminal when removing or replacing the fuse carrier (1 mark)
- To avoid flash burns from the fuse if it "blows" again because the initial fault has not been cleared (1 mark)
- (ii) (1) There is a fault in the fixed wiring (1 mark)
- (2) An electrician (1 mark)
- (b) If there is:
- a phase to frame fault on one appliance, and
 - a neutral to frame fault on the other appliance, and
 - a faulty protective earthing conductor on either appliance, then
 - simultaneous contact with both appliances when switched "on" can result in severe electric shock. (4 marks)
- (c) Any TWO of:
- An isolating transformer
 - An RCD rated for personal protection
 - A monitored earth unit (2 marks)

Question 7

- (a) • Phase (active) pin on the plug is connected to the phase terminal of the appliance.
 • Neutral pin on the plug is connected to the neutral terminal of the appliance.
 • Earth pin on the plug is connected to the frame of the appliance.
 • The appliance switch actually switches the phase (active).
 (4 marks)

- (b) (i) Any meter that can accurately read values of 1 ohm or less.
 (½ mark)

- (ii) Lowest ohms range
 (½ mark)

(c)

Test or check	Type of test instrument	Minimum maximum result value or test
Protective earthing	Any instrument that can accurately read values of 1 ohm or less	Max 1 ohm
Insulation resistance Or Leakage current test	Insulation resistance tester PAT tester	Min 10,000 ohms 5 mA

(3 marks)

- (d) (i) Any ONE of:
 • Plug the flexible lead into a live socket outlet and plug the RCD tester into the lead.
 • Operate the test button to ensure the mechanism is not frozen.
 (1 mark)

- (ii) 30 mA and 300 ms
 (1 mark)
 AS/NZS 3760: 2.3.3.4.1

Question 8

- (a) (i) Failure will be by insulation deterioration due to heat build-up
(1 mark)
- (ii) • Fully unwind the cord from the drum, or
• Reduce the load to under the rated current carrying capacity for the cord
(2 marks)
- (b) Current and resistance
Accept length of conductor or cross-sectional area in place of "resistance"
(2 marks)
- (c) (i) Voltage is dropped as the load current passes through the conductor resistance
(1 mark)
- (ii) • Use a flexible cord with an increased cross-sectional area
(1 mark)
• Reduce the length of the cord
(1 mark)
- (iii) It is the maximum current that a flexible cord is designed to carry safely
(2 marks)

Question 9

(a) Any TWO of:

- Connect phase and neutral together, and test between this linked pair and earth.
- Bridge out the semi-conductor devices before testing.
- Test between phase and earth and neutral and earth.
- Use a 250V d.c insulation resistance tester
- Use a PAT tester to carry out a leakage test

(2 marks)

(b) (i) An insulation resistance tester.

(1 mark)

(ii) 500 V d.c.

(1 mark)

(iii) A minimum value of 1 M Ω .

(1 mark)

(iv) Test between the phase/neutral and the frame of the appliance or the earth on the plug.

(2 marks)

(c) (i) 250 V d.c.

AS/NZS 3760:2001 2.3.3.2(d) Note (1)

AS/NZS 3760:2003 2.3.3.2(b)

(1 mark)

- (ii)
- To avoid triggering the MOV
 - To ensure the equipment does not fail the test

AS/NZS 3760:2001 2.3.3.2(d) Note (1)

AS/NZS 3760:2003 2.3.3.2(b)

(2 marks)