

# ESTA 1011- 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

## Section One

Each part in this section is worth 5 marks.

### Question 1

Lowest current

**multi-choice answer – (c)**

### Question 2

AS /NZS 3760

**multi-choice answer – (a)**

### Question 3

A 230/230 volt isolating transformer

**multi-choice answer – (b)**

### Question 4

Water - gas expelled

**multi-choice answer – (c)**

### Question 5

A clear airway to the patient’s lungs

**multi-choice answer – (b)**

### Question 6

To minimise the possibility of electric shock.

**multi-choice answer – (b)**

**Question 7**

Withdraw the appliance plug flexible cord from the socket

**multichoice answer – (c)**

**Question 8**

1 ohm

**multi-choice answer – (d)**

**Question 9**

10 metres of 0.75mm<sup>2</sup> cord

**multi-choice answer – (c)**

**Question 10**

Highest voltage drop

**multi-choice answer – (d)**

### Question 11

- (a) A centrifugal switch or a relay opens. (1 mark)
- (b) Reverse the connections on the start winding or the run winding but not both (2 marks)
- (c) Reverse connections to either the field windings or the armature windings (or brush-holder connections). (2 marks)

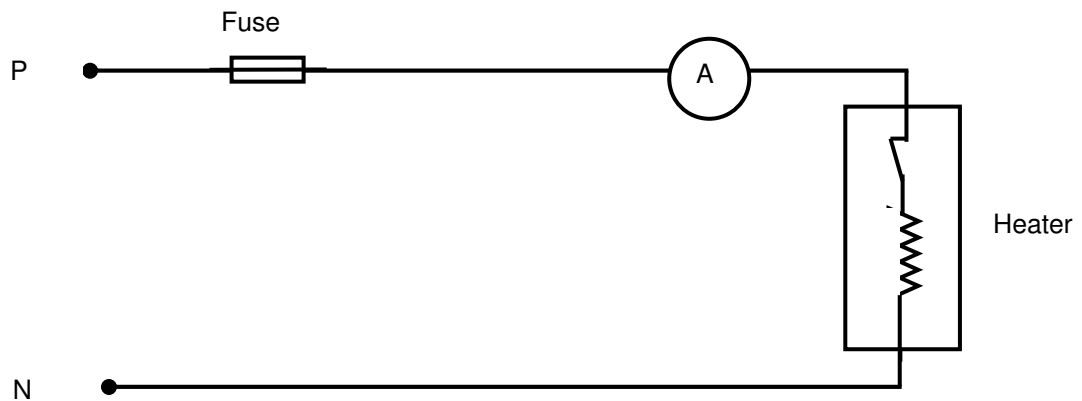
Question 12

<b>Existing cord conductor colours</b>	<b>Acceptable Colours in New Zealand</b>	<b>Polarity</b>
<b>Green</b>	<b><i>Green/Yellow</i></b>	<b><i>Earth</i></b>
<b>Black</b>	<b><i>Light Blue (or Blue)</i></b>	<b><i>Neutral</i></b>
<b>Red</b>	<b><i>Brown</i></b>	<b>Phase or Active or Live</b>

(5 marks)

### Question 13

(a)



- Correct polarity (1 mark)
- Fuse protects the circuit and is in the phase conductor. (½ mark)
- Heater correctly connected and switch is on supply side of element. (1 mark)
- Ammeter correctly connected. (½ mark)

Note: If the appliance is shown as earthed, bullet points one and three are incorrect.

(b)  $I = \frac{V}{R}$  (½ mark)

$= \frac{230}{8.7}$  (½ mark)

$= 26.44\Omega$  (1 mark)

**Question 14**

- (a) Current flowing  $I = \frac{V}{R}$  (1/2 mark)  
 $= \frac{230}{17.8}$  (1/2 mark)  
 $= 12.92 \text{ A}$  fault current would flow (1 mark)
- (b)  $W = VI$  (1/2 mark)  
 $= 230 \times 12.92$  (1/2 mark)  
 $= 2971.6 \text{ W}$  (1 mark)
- (c) No. Because the minimum fusing current of the fuse is 18.75 A – higher than the fault current of 12.92A. (1 mark)

**Question 15**

(a) AS: /NZS 3760

(1 mark)

(b)

<b>Type of test</b>	<b>(i) Type of instrument required</b>	<b>(ii) Test result</b>
<b>Earthing continuity</b>	<i>Ohmmeter or other instrument with a low reading ohms scale</i>	<i>Max 1 ohm resistance</i>
<b>Insulation resistance test</b>	<i>Insulation resistance tester</i>	<i>min 10,000 ohms</i>

(4 marks)

### Question 16

- (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) Low reading ohmmeter or multimeter or any test instrument that incorporates a low ohms range.

( $\frac{1}{2}$  mark)

- (ii) Lowest ohms range

( $\frac{1}{2}$  mark)

### Question 17

- (a) (i) The current rating is too low for the circuit, and could blow for no apparent reason well below the circuit full-load current. (1 mark)
- (ii) The current rating is too large, and the circuit current could increase to a high level causing damage, before the fuse blows. (1 mark)
- (b) Any THREE of:-
- It will safely interrupt short circuit currents of much higher values or higher rupturing capacity.
  - It eliminates arcing because the fuse element is sealed.
  - It is obtainable in a range of Utilisation category (fusing factors).
  - Current rating is clearly marked.
  - Reliable operation within prescribed limits.
  - Good discrimination.
  - Constant fusing characteristics.
  - Faster operation/acting.
  - Doesn't deteriorate over time.
- (4 marks)

### Question 18

Any FIVE of:

- If the fuse blows again an arc may be established between the fuse terminals causing damage or injury
- Cannot safely interrupt short circuit currents of much higher values.
- Fuse wire may protrude past the holder which creates an exposure to shock.
- Suitable fixing for the fuse wire is not generally available.
- Fuse holder is not fire proof.
- Slower operation/acting.

(5 marks)

**Question 19**

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

$= \frac{230}{21.8}$  (1/2 mark)

$= 10.55A$  (1 mark)

(b)  $W = VA$  (1/2 mark)

$= 230 \times 10.55$  (1/2 mark)

$= 2426.5 W$  (1 mark)

or

$= I^2R$   
 $= 10.55 \times 10.55 \times 21.8$   
 $= 2426.4 W$

(c) Yes. It would rise to 2532 W because the power dissipated is proportional to the supply voltage.

**Question 20**

(a)  $W = \frac{V^2}{R}$  (1/2 mark)

$= \frac{230 \times 230}{92}$  (1/2 mark)

$= 575 \text{ W}$  (1 mark)

(b)  $R_t = \frac{\text{Product}}{\text{Sum}}$  (1/2 mark)

$= \frac{46 \times 46}{46 + 46}$  (1/2 mark)

$= 23 \text{ ohms}$  (1 mark)

$I = \frac{V}{R}$

$= \frac{230}{23}$  (1/2 mark)

$= 10 \text{ amps}$  (1/2 mark)