

(e) It is the maximum fault current that a fuse or circuit breaker can safely interrupt.

(2 marks)

- (f) • Safe working practices that are appropriate to the type of work being undertaken.
• Testing to ensure safety before, during and after work.

ER 26(2)(a) & (b)
(2 marks)

(g) It will provide protection for the extension leads between the transformer and the appliance.

(2 marks)

(h) Any TWO of:

- Damage to the circuit wiring.
- Overheating or fire hazard.
- Shock hazard

(2 marks)

(i) $R = \frac{V^2}{W}$

(½ mark)

$$= \frac{230 \times 230}{1500}$$

(½ mark)

$$= 35.27\Omega$$

(1 mark)

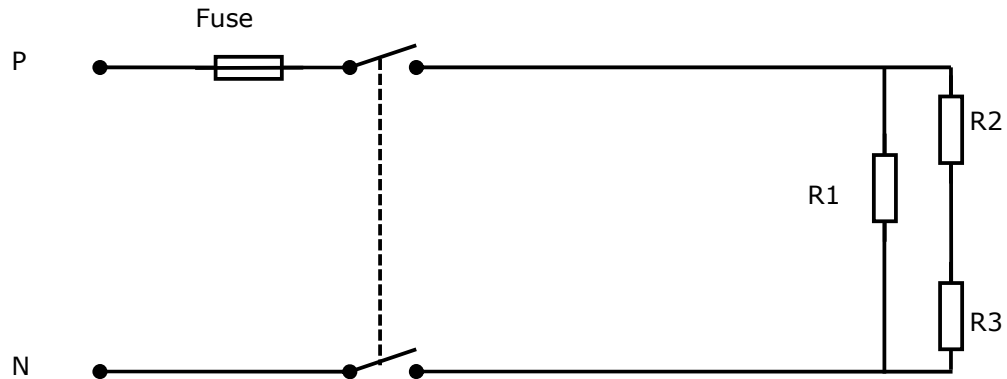
(j) ONE of:

- The words "double insulation" on the appliance nameplate.
- The symbol "square within a square" on the appliance nameplate.
- The words "Class II" on the appliance nameplate.

(2 marks)

Question 2

(a)



- Correct polarity (1/2 mark)
- Correctly connected fuse (1/2 mark)
- Correctly connected switch (1/2 mark)
- Correctly connected resistors. (1/2 mark)
- Working circuit (1 mark)

$$(b) \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2 + R_3} \quad (1/2 \text{ mark})$$

$$\frac{1}{R_p} = \frac{1}{30} + \frac{1}{50 + 40} \quad (1/2 \text{ mark})$$

$$\frac{1}{R_p} = \frac{1}{30} + \frac{1}{90} \quad (1/2 \text{ mark})$$

$$= \frac{4}{90} \quad (1/2 \text{ mark})$$

$$= 22.5\Omega \quad (1 \text{ mark})$$

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

$$= \frac{230}{22.5} \quad (1/2 \text{ mark})$$

$$= 10.22A$$

$$\begin{aligned} \text{(c) } W &= V \times A \\ &= 230 \times 10.22 \\ &= 2350.6W \end{aligned}$$

(1 mark)

(½ mark)

(½ mark)

(1 mark)

Question 3

- (a) • Protective earthing conductor test (½ mark)
- An ohmmeter
or
Any meter that can accurately read values of less than 1Ω . (½ mark)
 - 1Ω (½ mark)
 - Maximum (½ mark)
AS/NZS 3760: 2001: 2.3.3.1
AS/NZS 3760: 2003: 2.3.3.1
- Insulation resistance test (½ mark)
- Insulation resistance tester (½ mark)
 - 500 V d.c. (1 mark)
 - $1\text{ M}\Omega$ (½ mark)
 - Minimum (½ mark)
AS/NZS 3760: 2001: 2.3.3.2
AS/NZS 3760: 2003: 2.3.3.2, Table
- (b) • Not less than $1\text{ M}\Omega$ (½ mark)
- AS/NZS 3760: 2001: 2.3.3.3 or Appendix C3
Or
AS/NZS 3760: 2003: 2.3.3.3 (½ mark)
- (c) • To ensure that the control switch switches the active conductor.
• The active pin on the plug is connected to the active terminal in the appliance
• The neutral pin on the plug is connected to the neutral terminal in the appliance
• That only the earth pin on the plug is connected to the frame of the appliance. (4 marks)

Question 4

(a) Any FOUR of:

- Select the correct types of and rating of the instruments required.
- 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.
- Prove that the meter works on a known live source.

(4 marks)

(b) (i)

- That the test instrument functions correctly.
- That the circuit to be worked on has been correctly isolated and is safe to work on.

(2 marks)

(ii)

- Check that test instrument works correctly on a known live source.

(1 mark)

- Test for isolation (between all conductors) on the circuit being isolated.

(1 mark)

- Check again that test instrument works correctly on a known live source.

(1 mark)

(c) Any ONE of:

- To ensure an isolated circuit remains isolated until the person who attached the tag changes the status of the circuit.
- To warn against interference by any person who may attempt to liven the circuit

(1 mark)

Question 5

(a) The procedure has to cover:

- Identifying the correct fuse on the switchboard. (1 mark)
- Attaching a Danger tag to the circuit. (1 mark)
- Removing the isolator cover and testing for voltage at the supply side of the isolator using the prove-test-prove method. (2 marks)

(b) The description has to cover:

1. A protective earthing conductor test showing: (½ mark)
 - the use of a meter that can accurately read values of 1 ohm or less (½ mark)
 - a testing between the PEC conductor of the flexible cord and the case of the cylinder (½ mark)
 - an expected test result of 1 ohm (½ mark)
 - the test result being a maximum value (½ mark)
2. An insulation resistance test showing: (½ mark)
 - the use of an insulation resistance tester (½ mark)
 - a 500V d.c. test voltage (½ mark)
 - testing between phase and earth and neutral and earth (½ mark)
 - an expected test result of 10,000 ohms or 0.01 Mohms (1 mark)
 - the test result being a minimum value (½ mark)

Question 6

(a) Set 1

Brown	Phase	(1 mark)
Blue	Neutral	(1 mark)
Green or Green/Yellow	Earth	(1 mark)

Set 2

Red	Phase	(1 mark)
Black	Neutral	(1 mark)
Green	Earth	(1 mark)

- (b) • Fully unwind the cord from the drum
or
Partially unwind the cord to ensure the current rating is not exceeded when the cord is in use.
• Ensure that load is less than the current carrying capacity of the cord, when the cord is wound on the drum
(2 marks)
- (c) The current rating of the cord.
(1 mark)
- (d) Voltage is dropped as the load current passes through the conductor resistance
(1 mark)

Question 7

- (a) (i) • To protect the fixed wiring against excess current flow
or
• Safely interrupt and disconnect a faulty circuit (2 marks)
- (ii) To protect against earth leakage current in the circuit. (2 marks)
- (b) 45A Is the maximum current the fuse can continuously carry (1/2 mark)
without deterioration. (1/2 mark)
- 415V is the maximum voltage the fuse can withstand (1/2 mark)
without flashover. (1/2 mark)
- AC40 40,000AC is the maximum prospective short circuit current (1/2 mark)
the fuse can safely interrupt (1/2 mark)
- (c) Any TWO of:
- It prevents the fuse element from bulging out the side of the carrier and being accessible to touch.
 - Under overload conditions the heat produced in the element is confined to the tunnel area.
 - Under short-circuit conditions the arc and molten element is confined within the fuse carrier and base.
- (2 marks)
- (d) To disconnect a large fault current safely. (1 mark)

Question 8

- Carry out the protective earthing conductor test first. (1 mark)
To ensure that the protective earthing conductor resistance is low (or 1 ohm or below) so no false insulation resistance test reading is obtained. (2 marks)
- Protective earthing conductor test
 - Use an instrument that can read values of less than 1 ohm (1 mark)
 - Test between the end of the screen and the frame of the appliance (1 mark)
 - The acceptable test result is 1 ohm - maximum. (1 mark)
- Insulation resistance test
 - Use an insulation resistance tester (1 mark)
 - A test voltage of 500v d.c. (1 mark)
 - Test between phase/neutral and earth (1 mark)
 - The acceptable test result is 1 M Ω , minimum (1 mark)

Question 9

(a) Any THREE of:

- TPS cable entering the switch with bare exposed basic insulation.
- Broken switch cover.
- Flexible conduit removed from its clamp.
- Cover off the element thermostat enclosure or not fitted.
- Poor termination of cables
- Cables overheating

(3 marks)

(b) Any TWO of:

- To prevent basic insulation from being exposed.
- To prevent the connections pulling away in the event of strain on the conduit.
- To prevent damage to cables.
- Double insulation is maintained

(2 marks)

- (c) • There would be exposed live terminals in the fuse base.
• The circuit can be easily relivened by inserting another fuse carrier in the fuse.

(2 marks)

(d) Any THREE of:

- To prevent basic insulation being exposed
- To prevent live terminals being exposed
- To prevent access to moving parts
- The fitting will not comply with its IP rating

(3 marks)