TRADESPERSONS ELECTRICAL WORK CERTIFICATE
134A - MARKING 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
   Power W or P
   Voltage V or E or U

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

Question 1

(a) A 230/230 volt isolating transformer

(2 marks)

(b) There is no significant risk of injury or death to any person or damage to any property as a result of the use of electricity.

ER 69(2)
(2 marks)

(c) Any TWO of:

- 500V insulation resistance test.
- Polarity test.
- Protective earthing conductor (earth continuity conductor) resistance.
- Circuit continuity test.

(2 marks)

(d) $I = \frac{W}{V}$

$= \frac{1200}{230}$

$= 5.22A$

(2 marks)

(e) ● 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 fails again because the initial fault has not been cleared.

(1 mark)

(f) ● The cross sectional area of the flexible cord conductors.

(1 mark)

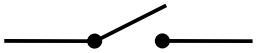
● The length of the flexible cord conductors.

(1 mark)

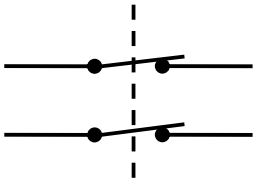
(g) Means in relation to conductors and other fittings, means that the conductors or other fittings are covered with insulation in such a manner that a person may safely handle them when they are live

ER2
(2 marks)

(h) (i) **Single pole switch** shown in the **off** position.



(ii) **Double pole switch** shown in the **on** position.



(2 marks)

(i) A situation in which moisture is either permanently present, or intermittently present to such an extent as would be likely to impair the effectiveness or safety of an electrical installation which complies with this Standard for ordinary situations.

AS/NZS 3000 :1.4.37
(2 marks)

(j) (b) ● With a phase to frame fault, the exposed earthed metal provides a path for earth leakage current to return to the supply.

or

● If supply cord insulation breaks down, the user is exposed to risk of electric shock between the cord and earth or earthed metal.

or

● If the earth is broken or high resistance the exposed earthed metal provides a path for earth leakage current to return to the supply.

(2 marks)

Question 2

(a) (i) Closed circuit means a continuous conducting circuit from, and back to, the source of electricity.

(2 marks)

(ii) Open circuit means a normally complete continuous circuit that has a break within the circuit.

(2 marks)

(b) **Standard low voltage** means:

- In respect of electricity supplied by either a single-phase MEN system or a multiple-phase MEN system, a nominal voltage of 230 volts a.c. between phase and neutral r

ER 2

(2 marks)

(c) (i) Volts or Voltage.

(1 mark)

(ii) Amp or amperes.

(1 mark)

(d) Any ONE of:

- Active.
- Line.
- Live.
- Alive.
- Hot.

(1 mark)

(e) Ohms

(1 mark)

Question 3

(a)
- To protect the fixed wiring
- Against effects of heat
- Caused by excess current flow.

(3 marks)

(b) (i) A fusible link will isolate a circuit when the temperature reaches an unsafe level.

(1 mark)

(ii) A fuse will isolate a circuit when excess current flows.

(1 mark)

(c) Any **FIVE** of :

- It will safely interrupt short circuit currents of much higher values.
- It eliminates arcing because the fuse element is sealed.
- It is obtainable in a range of Utilisation category (fusing factors).
- It is not repairable – therefore wrong size of wire cannot be used.
- Current rating is clearly marked.
- Reliable operation within prescribed limits.
- Good discrimination.
- Constant fusing characteristics.
- Faster operation/acting.
- Doesn't deteriorate over time.

(5 marks)

Question 4

(a)
- Locate and identify the fuse on the switchboard for the appliance. (1 mark)
- Switch off the circuit power supply and remove fuse carrier. (1 mark)
- Attach Danger tag to fuse base. (1 mark)

(b) Test for isolation at the supply side of the permanent connect unit using the prove-test-prove method. (2 marks)

(c) Disconnect flexible cord from the permanent connection unit and remove appliance. (1 mark)

(d)
- Ensure the permanent connection unit is securely fixed with no exposed live parts. (1 mark)
- Replace danger tag with an out of service tag. (1 mark)

(e)
- Go through the isolation procedure as in (a) above. (1 mark)
- Test for isolation using the prove test prove method as per (b) above. (1 mark)

Question 5

(a)
- Current rating.
- Voltage rating.
- Category of duty (Rupturing Capacity).
- Utilisation category (fusing factor) (Class).

(4 marks)

(b) (i) (1)
- A breakdown in insulation
- Results in a leakage current to earth
- RCD will operate rapidly

(3 marks)

(2) Minimising shock level.

(1 mark)

(ii) <u>RCD</u>

- To ensure the tripping mechanism has not become stuck or "frozen"

or

- To ensure it works correctly

or

<u>PRCD</u>

- To ensure the tripping mechanism has not become stuck or "frozen"

or

- To ensure PRCD does not reset to the “on” position after loss of supply.

(1 mark)

(iii) 30 mA

(1 mark)

Question 6

(a)
- Turn off the circuit isolator and locate the correct fuse or MCB.

(1 mark)

- Remove fuse carrier and affix a danger tag or affix danger tag to MCB.

(1 mark)

- Check for isolation at supply side of permanent connection unit using the prove-test-prove method.

(2 marks)

- Remove the flexible cord completely from the permanent connection unit and ensure that the cover of the connection unit is securely replaced.

(1 mark)

- Replace the danger tag with an out of service tag.
  or
  Replace the fuse or close MCB

(1 mark)

(b) Any TWO of:
- There would be exposed live terminals in the fuse base.
- The circuit can be easily relivened by inserting a fuse carrier in the fuse.
- Don't need a tool to reliven.

(2 marks)

(c) Any TWO of:

- If covers are left off basic insulation will be exposed.
- If covers are left off live terminals will be exposed.
- If covers are left off moving parts will be exposed.
- If covers are unsecured access can be gained to live terminals.
- If covers are unsecured access can be gained to basic insulation.
- If covers are unsecured access can be gained to moving parts.

(2 marks)

Question 7

(a) AS/NZS 3760

(1 mark)

(b)
- Visual Inspection.
- Insulation Resistance.
- Continuity of Earthing Conductor.

(3 marks)

(c) Any **FIVE** of – from AS/NZS 3760:2001:

- Check for obvious damage or defects in the accessories, connectors, plugs or extension outlet sockets.
- Check that flexible cords are effectively anchored to equipment, plugs and cord extension sockets.
- Check for damage to flexible cords -
  (i) the inner cores of flexible supply cords are not exposed or twisted;
  (ii) the external sheaths are not cut, abraded, twisted, or damaged to such an extent that the insulation of the inner cores is visible; and (In) unprotected conductors or insulation tape are not in evidence.
- For portable outlet devices, check that the warning indicating the maximum load to be connected to the device is intact and legible.
- Check that any controls are in good working order i.e. they are secure, aligned and appropriately identified.
- Check that covers, guards and the like are secured in the manner intended by the manufacturer or supplier.
- Check that safety facilities and devices are in good working order.
- Check that ventilation inlets and exhausts are unobstructed.

AS/NZS 3760: 2.3.2
(5 marks)

Or

Any **FIVE** of – from AS/NZS 3760:2003:

- Check for obvious damage or defects in the accessories, connectors, plugs or extension outlet sockets; and for discolouration that may indicate exposure to heat, chemicals and moisture.
- Check that flexible cords are effectively anchored to equipment, plugs and cord extension sockets.
- Check for damage to flexible cords -
  (i) the inner cores of flexible supply cords are not exposed or twisted;

(ii) the external sheaths are not cut, abraded, twisted, or damaged to such an extent that the insulation of the inner cores is visible.
(iii) unprotected conductors or banding insulation tape are not in evidence.

- For portable outlet devices (power boards), check that the warning indicating the maximum load to be connected to the device is intact and legible.
- Check that any operating controls are in good working order i.e. they are secure, aligned and appropriately identified.
- Check that covers, guards and the like are secured in the manner intended by the manufacturer or supplier.
- Check that ventilation inlets and exhausts are unobstructed.
- The pins of insulated pin plugs should be inspected for damage to the insulation of the pins, and, if fitted, the shroud on cord extension sockets.

AS/NZS 3760: 2.3.2
(5 marks)

(d) 1 ohm.

(1 mark)

Question 8

(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.

(3 marks)

(b)

- To prevent basic insulation from being exposed.
- To prevent the connections pulling away in the event of strain on the flexible cord.

(2 marks)

(c) Any TWO of:

- The wiring is damaged, faulty or wrongly installed.
- The wrong isolating switch has been operated.
- The isolating switch is damaged or faulty
- The appliance is supplied from two or more sources, e.g., main and control supplies.
- The appliance is supplied from a secondary control circuit.

(2 marks)

(d) Any THREE of:

- An incorrect component has been connected in the appliance which increased the current.
- The cross-sectional area of the flexible cord is too small.
- The flexible cord is too long.
- Fault in the appliance.

(3 marks)

Question 9

(a)
- With all control switches on:

(1 mark)

- Join phase and neutral joined together to avoid damage to electronic components.

(2 marks)

- Test with a 500V insulation resistance tester from the appliance framework to phase and neutral

(1 mark)

- The result must not be less than 1 MΩ.

(1 mark)

(b) (i)
- To ensure that the resistance to earth from protectively earthed parts is low enough to permit adequate fault current to flow to earth.

Ref: AS/NZS3760:2001 Foreword

or

- To ensure that the resistance of the protective earthing conductor is not greater than 1 ohm.

(1 mark)

(ii)
- To ensure the integrity of the insulation between live mains parts and exposed or external metal parts.

Ref: AS/NZS3760:2001 Foreword

or

- To ensure that the insulation resistance:
  - between active and neutral and between neutral and earth
  - between active and earth

(1 mark)

  - is not less than 10,000 ohms.

(1 mark)

(iii)
- Ensure phase, neutral and earth conductors are terminated at the correct terminals

(1 mark)

- Ensure switch and thermostat are in the phase conductor.

(1 mark)