



Candidate Code No.	
For Board Use Only	
Result	Result
Date	Date
Int	Int

TRADESPERSON ELECTRICAL WORK CERTIFICATE EXAMINATION

14 May 2005

PLUMBERS *OR* GASFITTERS QUESTION AND ANSWER BOOKLET

Time Allowed Two hours and 30 minutes

INSTRUCTIONS – READ CAREFULLY

You have 10 minutes to read this paper but do not start writing until you are told to do so by the supervisor.

Write your Candidate Code Number in the box provided above. Your name must NOT appear anywhere on this paper

The pass mark for this examination is 60 marks.

Plumbers must attempt all questions in Sections 1 and 2.

Gasfitters must attempt all questions in Sections 1 and 3.

Use a pen for written answers. **Do not** use a pencil or a red pen.

Drawing instruments and pencils may be used when diagrams are required. Marks are allocated on the basis of correctness.

Do not use correcting fluid or correcting tape.

Non-programmable calculators may be used.

It is recommended that the reference source for your answers be included in the space provided if a question can be answered from the Act, Regulations, Standard or Code. However, just stating a reference only will earn no marks.

For calculation questions all workings, including formulae, must be shown to gain full marks.

Warning – You could get 0 marks for any question, or part of a question, if you show anything hazardous or dangerous in your answer.

You may need to use the following documents in this examination:

- The Electricity Regulations 1997 and the Electricity Amendment Regulations 1999, Electricity Amendment Regulations 2002 and the Electricity Amendment Regulations 2003; or
The Electricity Regulations Compilation 2003 and the Electricity Amendment Regulations 2003; or
The Integrated Electricity Regulations 1997
- AS 1939 supplement 1 – 1990; AS/NZS 3000:2000 (including amendments 1, 2, 3 and A); NZS 3019 (Int):2002 or NZS 3019:2004; AS/NZS 3760:2001 or; AS/NZS 3760:2003

PLEASE HAND THIS PAPER TO THE SUPERVISOR BEFORE LEAVING THE ROOM

(turn over)

SECTION 1 – ALL CANDIDATES

Question 1

- (a) A Class I portable electrical 230V appliance with a phase to framework fault and broken protective earthing conductor (earth continuity conductor) is being used outdoors.

What type of protection device will prevent the passage of an electric current through the operator's body?

(2 marks)

- (b) Refer to the Electricity Regulations and briefly explain what the term **electrically safe** means.

(2 marks)

Ref:

- (c) List **TWO** tests using instruments that should be carried out on a Class I electrical appliance after it has been repaired.

(2 marks)

(1) _____

(2) _____

- (d) Calculate the current that will be drawn by a water heater element rated at 1.2kW, 230V.

(2 marks)

(turn over)

Question 1 continued

- (e) A new fuse needs to be inserted into a fuse carrier to replace a blown fuse on a switchboard. Briefly explain the **TWO** main safety reasons why the main switch should be turned off before removing the fuse carrier from, or replacing it into, the fuse base.

(2 marks)

(1) _____

(2) _____

- (f) State the **TWO** primary characteristics that determine the maximum current a flexible cord can conduct safely without overheating.

(2 marks)

(1) _____

(2) _____

- (g) Refer to the Electricity Regulations and briefly explain what the term **insulated** means.

(2 marks)

Ref:

(turn over)

Question 1 continued

(h) Draw circuit symbols illustrating:

(i) A single pole switch in the **off** position. (1 mark)

(ii) A double pole switch in the **on** position. (1 mark)

(i) In accordance with AS/NZS 3000 what is a **damp situation**? (2 marks)

Ref:

(j) A Class I electrical appliance is used in an **earthed situation**. Briefly describe how the operator of the appliance is at risk of an electrical shock if the electrical appliance is used without an isolating transformer or RCD. (2 marks)

(turn over)

Question 2

(a) Explain what is meant by the terms:

(i) Closed circuit.

(2 marks)

(ii) Open circuit.

(2 marks)

(b) Refer to the Electricity Regulations and state what is meant by the term **Standard Low Voltage** for a single phase MEN system.

(2 marks)

Ref:

(c) State the term used for:

(i) The force or pressure of electricity.

(1 mark)

(ii) The flow of electricity.

(1 mark)

(d) State another common term used to describe the **phase** conductor.

(1 mark)

(turn over)

Question 2 continued

(e) State the unit used to describe resistance to the flow of electricity.

(1 mark)

(turn over)

Question 3

- (a) Rewirable fuses and HRC fuses may be found on switchboards. What are the main functions of a fuse?

(3 marks)

- (b) Briefly describe how:

- (i) Protection is provided by a fusible link.

(1 mark)

- (ii) Protection is provided by a fuse.

(1 mark)

(turn over)

Question 3 continued

(c) State **FIVE** technical advantages which HRC fuses have over rewirable fuses. (5 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(turn over)

Question 4

A 230V fixed wired appliance is connected via a flexible cord to a permanent connection unit and is supplied from a fuse on a three-phase switchboard.

You have been requested by the Supervisor to disconnect the appliance from the supply and remove it for major servicing work. The flexible cord is to remain connected to the appliance.

You do not need to contact the Supervisor before starting the work or after finishing.

Warning: If any part of your answer is dangerous or hazardous, you will get no marks for this question.

(a) Describe how you would safely isolate the appliance.

(3 marks)

(b) Describe how you would ensure that the appliance is safely isolated.

(2 marks)

(turn over)

Question 4 continued

(c) Describe the work the Supervisor requested you to do.

(1 mark)

(d) Describe what you would do to leave the site safe.

(2 marks)

(e) Describe the action you would take if you find that, when testing to ensure the appliance is safely isolated, the circuit is still live.

(2 marks)

(turn over)

SECTION 2 - PLUMBERS ONLY

Question 5

- (a) When an HRC cartridge fuse is replaced, the replacement cartridge must have similar characteristics to the original. State **FOUR** electrical characteristics to be checked for similarity.

(4 marks)

(1) _____

(2) _____

(3) _____

(4) _____

- (b) (i) Briefly explain:

- (1) The operation of an RCD when a fault occurs.

(3 marks)

- (2) How the RCD would protect a user when using a faulty appliance in an outdoor situation.

(1 mark)

(turn over)

Question 5 continued

(ii) Why should an RCD be operationally tested?

(1 mark)

(iii) Refer to NZS 3019 and state the maximum permissible residual tripping current of an RCD when it is used to provide personal protection?

(1 mark)

(turn over)

Question 6 continued

- (c) State **TWO** reasons why covers must be in place and secured before returning the repaired appliance to service.

(2 marks)

(1) _____

(2) _____

(turn over)

Question 7

- (a) Following the repair of 230V portable electrical appliance, it is necessary to carry out an orderly sequence of inspections and tests in accordance with a Standard. State that Standard.

(1 mark)

- (b) Refer to the Standard you have stated in (a) above and list the inspections and tests that must be carried out to comply with that Standard.

(3 marks)

Ref:

(turn over)

Question 7 continued

- (c) Refer to the Standard you have stated in (a) above and list **FIVE** visual checks on a portable electrical appliance that must be made **after** it has been repaired and **before** it is returned to service.

(5 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

Ref:

- (d) Refer to the Standard you have stated in (a) above and state the maximum permitted resistance of the protective earthing conductor (earth continuity conductor) when measured between the earth pin of the supply plug and the metal framework of a Class I electrical appliance.

(1 mark)

Ref:

(turn over)

Question 8

(a) Explain the purpose of the Safety Tag system.

(2 marks)

(b) State **TWO** examples of safety tag systems and briefly describe how they are used.

(i) (1) System

(1 mark)

(2) Description

(3 marks)

(turn over)

Question 8 continued

(ii) (1) System

(1 mark)

(2) Description

(3 marks)

(turn over)

Question 9

(a) All flexible cords are given a **current rating**.

(i) Explain the meaning of the term **current rating**.

(2 marks)

(ii) What could happen if the flexible cord was used to supply an electrical appliance that draws a current in excess of the cord's rating?

(3 marks)

(b) A flexible cord is to be fitted to a single phase electrical appliance. List **FIVE** considerations which may influence the selection of the cord.

(5 marks)

- (1) _____
- (2) _____
- (3) _____
- (4) _____
- (5) _____

Section 3 – Gasfitters only

Question 10

- (a) When an HRC cartridge fuse is replaced, the replacement cartridge must have similar characteristics to the original. State **FOUR** electrical characteristics to be checked for similarity.

(4 marks)

(1) _____

(2) _____

(3) _____

(4) _____

- (b) (i) Briefly explain:

- (1) The operation of an RCD when a fault occurs.

(3 marks)

- (2) How the RCD would protect a user when using a faulty appliance in an outdoor situation.

(1 mark)

(turn over)

Question 10 continued

(ii) Why should an RCD be operationally tested?

(1 mark)

(iii) Refer to NZS 3019 and state the maximum permissible residual tripping current of an RCD when it is used to provide personal protection?

(1 mark)

(turn over)

Question 11

- (a) List **THREE** possible causes of exposed basic insulation or live terminals on a gas fired boiler supplied by a TPS cable, a surface mounted switch, starter unit and flexible conduit enclosing PVC conduit wire.

(3 marks)

(1) _____

(2) _____

(3) _____

- (b) Give **TWO** reasons why the flexible cord used to supply a 230V gas heater must be securely clamped.

(2 marks)

(1) _____

(2) _____

- (c) An adjacent isolating switch for a single phase, fixed wired appliance has been switched off. It is found, when testing for isolation, that some terminals on the appliance are still live. State **TWO** reasons why the terminals may still be live.

(2 marks)

(1) _____

(2) _____

(turn over)

Question 11 continued

- (d) An electrical appliance has been repaired. The repair included the replacement of the flexible cord to the appliance. When the appliance is operated, the cord overheats. State **THREE** reasons why this could occur.

(3 marks)

(1) _____

(2) _____

(3) _____

(turn over)

Question 12

- (a) A 230V, single phase, ac mains operated gasheating appliance, has recently been serviced in a workshop. Some sections of its electronic control circuitry have been repaired and/or replaced, and are not accessible for disconnection.

Before returning the appliance to the factory for reinstallation, an insulation test is to be carried out between the frame and the internal wiring.

Describe the procedure that should be followed to carry out this test, the test instrument used and any minimum or maximum values that may apply.

(5 marks)

(turn over)

Question 12 continued

(b) When testing a 230V storage water heater to see whether it is safe to use, the following electrical tests are carried out:

- Protective earthing conductor (earth continuity conductor) test.
- Insulation resistance test
- Polarity test

Briefly explain the reason for carrying out each test:

(i) Protective earthing conductor (earth continuity conductor) test (1 mark)

(ii) Insulation resistance test. (2 marks)

(iii) Polarity test. (2 marks)

(turn over)

Question 13

(a) Explain the purpose of the Safety Tag system.

(2 marks)

(b) State **TWO** examples of safety tag systems and briefly describe how they are used.

(i) (1) System

(1 mark)

(2) Description

(3 marks)

(turn over)

Question 13 continued

(ii) (1) System

(1 mark)

(2) Description

(3 marks)

(turn over)

Question 14

(a) All flexible cords are given a **current rating**.

(i) Explain the meaning of the term **current rating**.

(2 marks)

(ii) What could happen if the flexible cord was used to supply an electrical appliance that draws a current in excess of the cord's rating?

(3 marks)

(b) A flexible cord is to be fitted to a single phase electrical appliance. List **FIVE** considerations which may influence the selection of the cord.

(5 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

For Candidate's Use

In the box, write the number of **EXTRA** sheets you have used. Write **NIL** if you have not used any

For Examiner's Use Only		
Questions Answered	Marks	
<u>Section 1</u>		
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TOTAL SECTIONS 1 & 2		
OR		
TOTAL SECTIONS 1 & 3		