



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

**TRADESPERSON ELECTRICAL WORK CERTIFICATE
EXAMINATION
28 June 2008
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 will need to use some of the following documents in this examination:

- The Electricity Act 1992 reprinted at 19 August 2005.
- The Electricity Regulations 1997 reprinted at 5 September 2005.
- AS 60529 or AS 1939 supplement 1 – 1990; AS/NZS 3000:2000 (including amendments 1, 2, A and 3) or AS/NZS 3000:2007; 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) State the meaning of the term "breaking capacity" for fuses or circuit breakers.

(2 marks)

- (b) Explain what is meant by the term "open circuit".

(2 marks)

- (c) Refer to the Electricity Regulations and briefly state what is meant by the term "isolated".

(2 marks)

Ref:

- (d) State what is meant by the symbol of a **square within a square** on an electrical appliance.

(2 marks)

(turn over)

Question 1 continued

- (e) Name an **electrical safeguard** that will prevent an electric current flowing through the operator's body if a phase to framework fault occurs and the appliance protective earthing conductor is defective.

(2 marks)

- (f) 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:

- (g) State **ONE** method of minimising the possibility of exposing basic insulation when connecting a flexible cord to an appliance.

(2 marks)

(turn over)

Question 1 continued

(h) State the term used for:

(i) The electrical output of an appliance.

(1 mark)

(ii) The flow of electricity.

(1 mark)

(i) An HRC fuse, that protects a circuit, blows every time the correct fuse link is inserted. State **TWO** undesirable effects that may occur if the fuse link is replaced with one of a higher current rating.

(2 marks)

(1) _____

(2) _____

(j) Repairs have been carried out on a fixed wired electrical appliance rated at 2000W, 230V. Calculate the current drawn by the appliance.

(2 marks)

(turn over)

Question 2

- (a) Explain the meaning of the term "current rating" in relation to flexible cords.

(2 marks)

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

(2 marks)

(turn over)

Question 2 continued

- (c) The cores of a flexible cord are being terminated in an electrical appliance. State **ONE** reason why it is important to remove only sufficient basic insulation to allow the cores to be terminated.

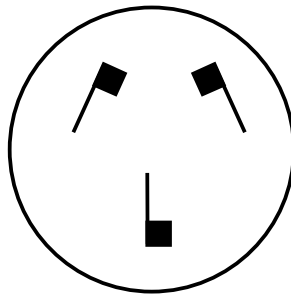
(1 mark)

- (d) Explain why the earth pin of a standard New Zealand 3 pin 10 amp plug is longer than the phase and neutral pins.

(2 marks)

- (e) The figure below represents the rear of an appliance plug after the cover has been removed. Indicate on the figure the active (phase), neutral and earth terminals.

(3 marks)



(turn over)

Question 3

Instruments used to test **THREE** separate resistive circuits indicate the values listed in the table below. Using this information, calculate the missing values numbered 1 to 5.

Circuit	Supply Volts	Total Ohms resistance	Current	Watts
One	230	<i>Value 1</i>	10	<i>Value 2</i>
Two	200	<i>Value 4</i>	<i>Value 3</i>	1000
Three	<i>Value 5</i>	46	5	1150

(a) Value 1

(2 marks)

(b) Value 2

(2 marks)

(c) Value 3

(2 marks)

(turn over)

Question 3 continued

(d) Value 4

(2 marks)

(e) Value 5

(2 marks)

(turn over)

Question 4

- (a) Replacement flexible cords are being fitted to a single phase Class I electrical appliance and a Class II electrical appliance.

(7 marks)

- (i) For the Class I appliance:

- (A) What is the minimum number of cores required in the flexible cord?

- (B) What colour coding is required for the cores of the flexible cord? State the polarity for each core.

- (ii) For the Class II appliance:

- (A) What is the minimum number of cores required in the flexible cord?

- (B) What colour coding is required for the cores of the flexible cord? State the polarity for each core.

(turn over)

Question 4 continued

- (b) A multimeter has been connected in parallel with an electric heating element to measure the single phase supply voltage. The multimeter has accidentally been left on the 10A a.c. range. Describe what will happen when the power is switched on.

(3 marks)

(turn over)

Question 5 continued

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

(3 marks)

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

(2 marks)

(turn over)

Question 6

- (a) Electrical equipment designed for use in damp situations has an International Protection Classification (IP rating). This is often referred to as ingress protection.

An IP rating consists of the initials IP followed by two numbers. Refer to AS1939, AS 60529 or AS/NZS 3000 and answer the following:

- (i) State what is meant by an International Protection Classification (IP rating)

(2 marks)

Ref:

- (ii) Explain what the first number after the letters IP indicates.

(2 marks)

Ref:

- (iii) Explain what the second number after the letters IP indicates.

(2 marks)

Ref:

(turn over)

Question 6 continued

(b) Refer to AS1939 or AS 60529 or AS/NZS 3000:2007 and describe the level of protection offered by fittings rated at IP34.

(2 marks)

Ref:

(c) When an electrical appliance is permanently connected it becomes part of an electrical installation. There are three damp situations relating to electrical appliances which are deemed **not to be electrically safe**. Refer to the Electricity Regulations and state **ONE** of those damp situations.

(2 marks)

Ref:

(turn over)

Question 7

- (a) Briefly explain how a Residual Current Device (RCD) disconnects the supply from an electrical appliance when an earth leakage fault occurs.

(4 marks)

- (b) Why should an RCD be operationally tested?

(1 mark)

- (c) Briefly explain why a residual current device protects a user from a severe electric shock when using a faulty appliance in an outdoor situation.

(4 marks)

(turn over)

Question 7 continued

- (d) Refer to NZS 3019 and state the maximum permissible residual tripping current (in mA) of an RCD when it is used to provide personal protection?
(1 mark)

(turn over)

Question 8

- (a) When selecting a replacement cartridge for an open circuit HRC fuse, it is necessary to consider its **Utilisation category (fusing factor)**. State what is meant by **Utilisation category (fusing factor)**.

(2 marks)

- (b) A circuit supplies a fixed wired electrical appliance rated at 3000W, 230V. The HRC fuse protecting the circuit has blown. Show by calculation, the rating of the HRC fuse cartridge that would be purchased to replace the blown one.

(3 marks)

(turn over)

Question 8 continued

(c) Refer to the Electricity Regulations and state **FIVE** categories of prescribed electrical work that can be carried out by a plumber who holds a Tradespersons Electrical Work Certificate issued by the Electrical Workers Registration Board.

(5 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

Ref:

(turn over)

Question 9

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

- (a) Explain the meaning of the term **current rating**.

(2 marks)

- (b) 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?

(2 marks)

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

(4 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(turn over)

Question 9 continued

- (d) The cores of a flexible cord are being terminated in an electrical appliance. Explain why it is important to remove the minimum amount of basic insulation from the cores?

(2 marks)

Section 3 – Gasfitters Only

Question 10

- (a) A single-phase fixed-wired electrical appliance is supplied from a circuit protected by an HRC fuse. When testing for isolation, it is found that there are live conductors at the terminals of the appliance after an isolating switch has been turned to the off position. State **TWO** circumstances that may cause such a situation to occur.

- Note:
1. The circuit wiring installation is not damaged
 2. The isolating switch is not damaged
 3. There is no capacitor in the circuit.

(2 marks)

(1) _____

(2) _____

- (b) A Class I, single phase plug-in electrical appliance has been repaired. There is a single pole control switch on the appliance and the repairer has mistakenly connected the neutral through this switch.

- (i) State the undesirable effect the switching of the neutral will have on the appliance.

(1 mark)

- (ii) Describe **TWO** situations (other than connecting the neutral to the switch as stated above) where an error can cause the neutral to be switched.

(2 marks)

(1) _____

(2) _____

(turn over)

Question 10 continued

- (c) State **TWO** reasons why it is not permitted to complete a permanent isolation of a circuit by only removing the carrier of a fuse. (2 marks)

(1) _____

(2) _____

- (d) State **THREE** reasons why covers must be in place and secured before returning the repaired appliance to service. (3 marks)

(1) _____

(2) _____

(3) _____

(turn over)

Question 11 continued

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

(3 marks)

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

(2 marks)

(turn over)

Question 12

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

(2 marks)

(ii) Explain how a "Danger Tag" system operates.

(3 marks)

(turn over)

Question 12 continued

(b) When using a test instrument to check the isolation of a circuit, the prove-test-prove safety rule should be observed.

(i) List **TWO** checks that are done by this method. (2 marks)

(1) _____

(2) _____

(ii) How is the rule applied? (3 marks)

(turn over)

Question 13

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

- (a) Explain the meaning of the term **current rating**. (2 marks)

- (b) 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? (2 marks)

- (c) A flexible cord is to be fitted to a single phase electrical appliance. List **FOUR** considerations which may influence the selection of the cord. (4 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(turn over)

Question 13 continued

- (d) The cores of a flexible cord are being terminated in an electrical appliance. Explain why it is important to remove the minimum amount of basic insulation from the cores?

(2 marks)

(turn over)

Question 14

(a) Refer to the Electricity Regulations and state the **THREE** categories of prescribed electrical work that can be carried out by a gasfitter who holds a Tradespersons Electrical Work Certificate issued by the Electrical Workers Registration Board.

(3 marks)

(1) _____

(2) _____

(3) _____

Ref:

(turn over)

Question 14 continued

(b) Refer to the Electricity Regulations and state the **FOUR** subjects that must be covered in refresher courses for the holders of Tradespersons Electrical Work Certificate.

(4 marks)

(1) _____

(2) _____

(3) _____

(4) _____

Ref:

(c) Refer to the Electricity Act and state **THREE** actions that may be taken by the Electrical Workers Registration Board against the holder of a Tradespersons Electrical Work Certificate who is found guilty of a disciplinary offence.

(3 marks)

(1) _____

(2) _____

(3) _____

Ref:

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>		
1		
2		
3		
4		
<u>Total Section 1</u>		
<u>Section 2</u>		
5		
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<u>Section 3</u>		
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14		
<u>Total section 3</u>		
TOTAL SECTIONS 1 & 2		
OR		
TOTAL SECTIONS 1 & 3		