



<b>Candidate Code No.</b>	
<b>For Board Use Only</b>	
Result	Result
Date	Date
Int	Int

## TRADESPERSON ELECTRICAL WORK CERTIFICATE EXAMINATION

**12 May 2007**

**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 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. Show all working to TWO decimal places**

**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 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); 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

Each part of this question is worth 2 marks.

- (a) State the meaning of the term "breaking capacity" for fuses or circuit breakers.

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- (b) State **TWO** ways of identifying a double insulated appliance.

(1) \_\_\_\_\_

(2) \_\_\_\_\_

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

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Ref: .....

- (d) State the main reason why it is recommended that a portable isolating transformer be placed as near as practical to the point of supply.

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**(turn over)**

**Question 1 continued**

- (e) State the main characteristic that determines the maximum current a flexible cord can conduct safely without overheating.

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- (f) HRC fuses provide circuit protection on a switchboard. You want to replace a fuse cartridge but it is not practical to turn off the main switch. State **TWO** precautions that should be taken before and during the replacement of the fuse cartridge.

(1) \_\_\_\_\_

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(2) \_\_\_\_\_

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- (g) When using a suitable test instrument to check for isolation of a circuit, the "prove-test-prove" procedure is recommended. Describe the **TWO** principal conditions that the procedure is intended to verify?

(1) \_\_\_\_\_

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(2) \_\_\_\_\_

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**(turn over)**

## Question 1 continued

(h) State **TWO** factors which affect the severity of electric shock upon the human body.

(1) \_\_\_\_\_

(2) \_\_\_\_\_

(i) A 25 metre three core flexible extension cord has been wound on a drum to provide ease of storage and mechanical protection. If the cord is used while still wound on the drum, how might the cord fail if precautions are not taken?

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(j) 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 (earth continuity conductor) is defective.

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**(turn over)**

## Question 2

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

(2 marks)

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- (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)

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**(turn over)**

## Question 2 continued

- (c) 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) \_\_\_\_\_

\_\_\_\_\_

- (d) 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)

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**(turn over)**

### Question 3

(a) Replacement flexible cords are to be fitted to some electrical appliances:  
(7 marks)

(i) What is the minimum number of cores required for a flexible cord for a Class I electrical appliance?

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(ii) What is the colour coding required for the cores of a flexible cord for a Class I electrical appliance?

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(iii) What is the minimum number of cores required for a flexible cord for a Class II electrical appliance?

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(iv) What is the colour coding required for the cores of a flexible cord for a Class II electrical appliance?

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**(turn over)**

### Question 3 continued

(b) When a three core flexible cord is fitted to an appliance, it is recommended that the protective earthing conductor (earth continuity conductor) should be left longer than the phase and neutral conductors.

(i) State **ONE** reason why this is recommended.

(1 mark)

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(ii) Explain what could happen if the protective earthing conductor (earth continuity conductor) was the same length as the phase and neutral conductors.

(2 marks)

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**(turn over)**

## Question 4

- (a) Draw and label a circuit diagram of a 230V, single phase circuit, controlled by a double pole switch and protected by a fuse that supplies three resistors connected in parallel.

$$\begin{aligned}R_1 &= 100\Omega \\R_2 &= 50 \\R_3 &= 25\Omega\end{aligned}$$

(2 marks)

- (b) Calculate the current flowing if the resistors were connected in series.  
(4 marks)

**(turn over)**

### **Question 4 continued**

- (c) Calculate the current flowing if the resistors  $R_2$  and  $R_3$  were connected in parallel and  $R_1$  was connected in series with the parallel resistors. (4 marks)

**(turn over)**

## SECTION 2 - PLUMBERS ONLY

### Question 5

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

(2 marks)

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Ref: .....

- (b) 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)

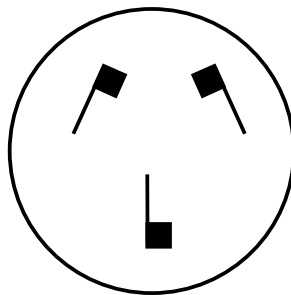
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- (c) The figure below represents the **rear** of an appliance plug top after the cover has been removed. Indicate on the figure the active (phase), neutral and earth terminals.

(3 marks)



**(turn over)**

## Question 5 continued

(d) List **TWO** examples of what could be an **earthed situation**.

(2 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(e) Describe **ONE** way in which the protective earthing conductor contributes to the electrical safety of a Class I electrical appliance.

(1 mark)

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\_\_\_\_\_

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**(turn over)**

## Question 6

(a) Fuses and RCDs are found on switchboards.

(i) What is the main purpose of a fuse found on a switchboard?  
(2 marks)

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(ii) What is the main purpose of a RCD found on a switchboard?  
(2 marks)

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(b) Each HRC cartridge fuse carries a label bearing information about its manufacture and operating characteristics. A new fuse carries the following information:

- 45 Amps.
- 415 Volt.
- AC 46.

Briefly describe the meaning of each of these items of information.  
(3 marks)

45 amps \_\_\_\_\_

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415 volts \_\_\_\_\_

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AC46 \_\_\_\_\_

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**(turn over)**

### Question 6 continued

- (c) State **TWO** reasons why it is important to thread the fuse wire from terminal to terminal through the **tortuous path** in the fuse carrier when reloading a rewirable fuse.

(2 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (d) State the primary purpose of using an HRC fuse to protect a circuit.

(1 mark)

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**(turn over)**



## Question 7 continued

- (b) After repairs have been carried out to a Class I plug-in electrical appliance, a **visual** inspection should be carried out in addition to the prescribed electrical tests. Refer to AS/NZS 3760 and describe **FIVE** visual checks that should be carried out.

**Note: The answers must relate only to a plug-in electrical appliance.**

(5 marks)

(1) \_\_\_\_\_

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\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(3) \_\_\_\_\_

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(4) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(5) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Ref: .....

**(turn over)**





## Question 9

- (a) 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) \_\_\_\_\_

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\_\_\_\_\_

Ref: .....

**(turn over)**

**Question 9 continued**

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

(3 marks)

(1) \_\_\_\_\_

(2) \_\_\_\_\_

(3) \_\_\_\_\_

Ref: .....

(c) Refer to the Electricity Act and state **TWO** 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.

(2 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

Ref: .....

### Section 3 – Gasfitters Only

#### Question 10

- (a) 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 alive. State **TWO** reasons why the terminals may still be live.

(2 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

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\_\_\_\_\_

- (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) \_\_\_\_\_

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(2) \_\_\_\_\_

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\_\_\_\_\_

(3) \_\_\_\_\_

\_\_\_\_\_

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**(turn over)**

## Question 11

- (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) \_\_\_\_\_

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(2) \_\_\_\_\_

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(3) \_\_\_\_\_

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Ref: .....

**(turn over)**

**Question 11 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: .....

**(turn over)**

## Question 12

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

(2 marks)

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Ref: .....

- (b) 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)

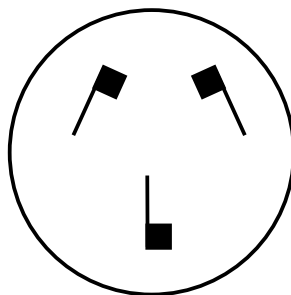
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- (c) The figure below represents the **rear** of an appliance plug top after the cover has been removed. Indicate on the figure the active (phase), neutral and earth terminals.

(3 marks)



**(turn over)**

## Question 12 continued

(d) List **TWO** examples of what could be an **earthed situation**.

(2 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(e) Describe **ONE** way in which the protective earthing conductor contributes to the electrical safety of a Class I electrical appliance.

(1 mark)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**(turn over)**

### Question 13

(a) Fuses and RCDs are found on switchboards.

(i) What is the main purpose of a fuse found on a switchboard?  
(2 marks)

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(ii) What is the main purpose of a RCD found on a switchboard?  
(2 marks)

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(b) Each HRC cartridge fuse carries a label bearing information about its manufacture and operating characteristics. A new fuse carries the following information:

- 45 Amps.
- 415 Volt.
- AC 46.

Briefly describe the meaning of each of these items of information.  
(3 marks)

45 amps \_\_\_\_\_

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415 volts \_\_\_\_\_

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AC46 \_\_\_\_\_

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**(turn over)**

### Question 13 continued

- (c) State **TWO** reasons why it is important to thread the fuse wire from terminal to terminal through the **tortuous path** in the fuse carrier when reloading a rewirable fuse.

(2 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (d) State the primary purpose of using an HRC fuse to protect a circuit.

(1 mark)

\_\_\_\_\_

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\_\_\_\_\_

**(turn over)**





### For Candidate's Use

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

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### For Examiner's Use Only

Questions Answered	Marks	
<b><u>Section 1</u></b>		
<b>1</b>		
<b>2</b>		
<b>3</b>		
<b>4</b>		
<b><u>Total Section 1</u></b>		
<b><u>Section 2</u></b>		
<b>5</b>		
<b>6</b>		
<b>7</b>		
<b>8</b>		
<b>9</b>		
<b><u>Total section 2</u></b>		
<b><u>Section 3</u></b>		
<b>10</b>		
<b>11</b>		
<b>12</b>		
<b>13</b>		
<b>14</b>		
<b><u>Total section 3</u></b>		
<b>TOTAL SECTIONS 1 &amp; 2</b>		
<b>OR</b>		
<b>TOTAL SECTIONS 1 &amp; 3</b>		