



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

**ELECTRICAL WORKERS REGISTRATION BOARD  
TRADESPERSON ELECTRICAL WORK CERTIFICATE  
EXAMINATION**

**16 September 2006**

**PLUMBERS/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.**

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 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)**

## Question 1

- (a) Refer to the Electricity Act and state **TWO** actions that may be taken by the Electrical Workers Registration Board if the holder of a Tradespersons Electrical Work Certificate fails to satisfactorily complete the safety refresher courses as specified. (2 marks)

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

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

Ref: .....

- (b) 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? (2 marks)

\_\_\_\_\_  
\_\_\_\_\_

- (c) Rewirable fuses and HRC fuses may be found on switchboards. What is the main function of a fuse? (2 marks)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- (d) Work is being carried out on a 230V plug-in electrical appliance. The only instrument available is an ohmmeter which gives a reading of 35 ohms when connected to the appliance's flexible cord plug. Calculate the power the appliance will use when it is supplied at 240V. (2 marks)

(turn over)

**Question 1 continued**

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

(2 marks)

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

\_\_\_\_\_

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

\_\_\_\_\_

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

(2 marks)

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

\_\_\_\_\_

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

\_\_\_\_\_

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

(2 marks)

\_\_\_\_\_

\_\_\_\_\_

- (h) Repairs have been carried out on a fixed wired electrical appliance rated at 1500W, 230V. Calculate the current drawn by the appliance.

(2 marks)

**(turn over)**

## Question 1 continued

- (i) Briefly describe the electrical protection provided by a fuse.

(2 marks)

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- (j) If a 230V, Class I electrical appliance with a phase to framework fault and broken protective earthing 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)

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**(turn over)**

## Question 2

- (a) You are using an ammeter to measure the current drawn by an electrical appliance. Describe what would happen if you connected the ammeter in parallel with that appliance.

(3 marks)

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- (b) You are using a voltmeter to measure the voltage on an electrical appliance. Describe what would happen if you connected the voltmeter in series with that appliance.

(3 marks)

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(turn over)

## Question 2 continued

(c) When connecting test instruments to confirm the isolation of a 230V circuit (that may or may not be live), it is important to:

- Wear personal protection equipment.
- Use safety tags where necessary.
- Advise the supervisor or person in charge where applicable.

Briefly describe **FOUR** important precautions relating to test instruments which will promote personal safety.

(4 marks)

- (1) \_\_\_\_\_  
\_\_\_\_\_
- (2) \_\_\_\_\_  
\_\_\_\_\_
- (3) \_\_\_\_\_  
\_\_\_\_\_
- (4) \_\_\_\_\_  
\_\_\_\_\_

(turn over)

### Question 3

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

(4 marks)

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

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

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

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

- (b) State why is it important when selecting a fuse to ensure that the correct category of duty is chosen.

(2 marks)

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

(1 mark)

\_\_\_\_\_

\_\_\_\_\_

- (d) State **THREE** 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.

(3 marks)

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

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

(turn over)

## Question 4

- (a) A handheld electrical appliance used on a building or structure under construction must be used in conjunction with an appropriate safeguard. Refer to the Electricity Regulations and state **FIVE** such safeguards.

(5 marks)

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

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

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

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

Ref: .....

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

(2 marks)

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\_\_\_\_\_

**(turn over)**

### Question 4 continued

- (c) Briefly explain how an isolating transformer protects the user of a Class I electrical appliance from receiving an electric shock to earth.

(2 marks)

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- (d) An electric drill is used in an earthed situation. How can you tell if it is double insulated?

(1 mark)

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**(turn over)**

## Question 5

**Note: Answer (a) and (c) OR (b) and (c). DO NOT answer all parts.**

(a) Analogue ohmmeters - briefly explain the procedure for:

(i) Zero calibrating the analogue ohmmeter

(3 marks)

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(ii) Why is it necessary to zero an analogue ohmmeter before making a measurement of resistance?

(2 marks)

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(b) Digital ohmmeters - briefly explain the procedure for:

(i) Zero calibrating the digital ohmmeter

(3 marks)

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(ii) Why is it necessary to zero calibrate a digital ohmmeter before making a measurement of resistance?

(2 marks)

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**(turn over)**

### Question 5 continued

(c) A protective earthing conductor test is being carried out on the exposed metal parts of a Class I electric water heater appliance with a multimeter.

(i) Why it is necessary to select the appropriate ohms range?

(1 mark)

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(ii) Why it is necessary to first touch the meter probes together?

(2 marks)

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(iii) What may occur if the incorrect range is selected on the multimeter?

(2 marks)

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**(turn over)**

## Question 6

- (a) A permanently connected dishwasher, that incorporates a 230V single phase induction motor, has been reconnected after repair. What would be the result in terms of safety to the user and the motor's operation, if during reconnection the following conductors were accidentally interchanged at the permanent connection unit:

- (i) The phase and neutral (2 marks)

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- (ii) The neutral and earth (1 mark)

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- (iii) The phase and earth (3 marks)

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- (iv) State **TWO** tests that would detect the interchange of the phase and earth conductors? (2 marks)

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

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

**(turn over)**

### Question 6 continued

- (b) An adjacent isolating switch for single phase, fixed-wired waste disposal unit 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) \_\_\_\_\_

\_\_\_\_\_

**(turn over)**

## Question 7

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

\_\_\_\_\_

- (b) State **TWO** ways in which the effect of overheating of a flexible cord can be reduced.

(2 marks)

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

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

**(turn over)**

### Question 7 continued

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

(3 marks)

- (1) \_\_\_\_\_  
\_\_\_\_\_
- (2) \_\_\_\_\_  
\_\_\_\_\_
- (3) \_\_\_\_\_  
\_\_\_\_\_

## Question 8

- (a) Explain how a protective earthing conductor test should be carried out on a 230V ac plug-in Class I appliance. The answer must include the type of meter used and the maximum or minimum acceptable values.

(4 marks)

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

- (b) Briefly explain the reasons for carrying out the following tests on an electrical appliance.

- (i) Protective earthing conductor resistance test.

(2 marks)

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**(turn over)**

**Question 8 continued**

(ii) Insulation resistance test.

(2 marks)

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(ii) Polarity test.

(2 marks)

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**Question 9**

- (a) Refer to the Electricity Regulations and state the 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) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

Ref: .....

- (b) A gasfitter who holds a Tradespersons Electrical Work Certificate must complete refresher courses at intervals not exceeding 24 months. Refer to the Electricity Regulations and state **TWO** of the subject matter that must be included in a refresher course.

(2 marks)

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

Ref: .....

**(turn over)**

**Question 9 continued**

(c) Refer to the Electricity Regulations and briefly state what is meant by each of the following terms:

(i) Electrically safe (2 marks)

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Ref: .....

(ii) Direct contact (1 mark)

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Ref: .....

(iii) Isolated (1 mark)

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Ref: .....

(iv) Live (1 mark)

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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	
1		
2		
3		
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7		
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9		
<b>TOTAL</b>		