TEWC140

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

ELECTRICAL WORKERS REGISTRATION BOARD
TRADESPERSON ELECTRICAL WORK CERTIFICATE EXAMINATION
16 September 2006
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. 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

(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)

_____

_____

_____

(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)

_____

(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)

(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)

(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)

_____

_____

_____

_____

(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) _____

_____

_____

(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)

_____

_____

(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)

_____

_____

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

(1 mark)

_____

(turn over)

SECTION 2 - PLUMBERS ONLY

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)

_____

_____

_____

_____

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

(2 marks)

_____

_____

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

(i) Zero calibrating the digital ohmmeter

(3 marks)

_____

_____

_____

_____

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

(2 marks)

_____

_____

(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)

_____

_____

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

(2 marks)

_____

_____

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

(2 marks)

_____

_____

(turn over)

Question 6

(a) Before a Class I dishwasher is returned to service after being repaired, AS/NZS 3760 requires that it must be visually inspected and two tests carried out using test instruments. Refer to AS/NZS 3760 and:

(i) Complete the following in relation to the tests using test instruments:

Test No.1

(1) Type of test

(1 mark)

_____

(2) Instrument used

(1 mark)

_____

(3) The maximum or minimum acceptable test result

(1 mark)

_____

Ref: .....

Test No.2

(1) Type of test

(1 mark)

_____

(2) Instrument used

(1 mark)

_____

(3) The maximum or minimum acceptable test result

(1 mark)

_____

Ref: .....

(turn over)

Question 6 continued

(ii) State **TWO** visual checks that must be carried out.

(2 marks)

(1) _____

_____

(2) _____

_____

Ref: .....

(b) Refer to AS/NZS 3760 and state the **TWO** actions that must be taken if one of the tests stated in (a)(ii) is non-compliant.

(2 marks)

(1) _____

_____

(2) _____

_____

Ref: .....

(turn over)

Question 7

(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) _____

_____

_____

Ref: .....

(turn over)

Question 7 continued

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

(i) Electrically safe

(2 marks)

_____

_____

_____

_____

Ref: .....

(ii) Direct contact

(1 mark)

_____

_____

_____

Ref: .....

(iii) Isolated

(1 mark)

_____

_____

_____

Ref: .....

(iv) Live

(1 mark)

_____

_____

_____

Ref: .....

(turn over)

Question 8

(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)

_____

_____

_____

_____

(ii) The neutral and earth

(1 mark)

_____

_____

_____

_____

(iii) The phase and earth

(3 marks)

_____

_____

_____

_____

_____

_____

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

(2 marks)

(1) _____

(2) _____

(turn over)

Question 8 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 9

(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 9 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) _____

_____

Section 3 – Gasfitters Only

Question 10

(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)

_____

_____

_____

_____

(turn over)

Question 10 continued

(ii) Insulation resistance test.

(2 marks)

_____

_____

_____

_____

(ii) Polarity test.

(2 marks)

_____

_____

_____

_____

(turn over)

Question 11

(a) Before a Class I dishwasher is returned to service after being repaired, AS/NZS 3760 requires that it must be visually inspected and two tests carried out using test instruments. Refer to AS/NZS 3760 and:

(i) Complete the following in relation to the tests using test instruments:

Test No.1

(1) Type of test

(1 mark)

_____

(2) Instrument used

(1 mark)

_____

(3) The maximum or minimum acceptable test result

(1 mark)

_____

Ref: .....

Test No.2

(1) Type of test

(1 mark)

_____

(2) Instrument used

(1 mark)

_____

(3) The maximum or minimum acceptable test result

(1 mark)

_____

Ref: .....

(turn over)

Question 11 continued

(ii) State TWO visual checks that must be carried out.

(2 marks)

(1) _____

_____

(2) _____

_____

Ref: .....

(b) Refer to AS/NZS 3760 and state the **TWO** actions that must be taken if one of the tests stated in (a)(ii) is non-compliant.

(2 marks)

(1) _____

_____

(2) _____

_____

Ref: .....

(turn over)

Question 12

(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) _____

_____

_____

(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 12 continued

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

(i) Electrically safe

(2 marks)

_____

_____

_____

_____

Ref: .....

(ii) Direct contact

(1 mark)

_____

_____

_____

Ref: .....

(iii) Isolated

(1 mark)

_____

_____

_____

Ref: .....

(iv) Live

(1 mark)

_____

_____

_____

Ref: .....

(turn over)

Question 13

(a) An isolating switch supplying a 230V a.c. single phase induction motor in a gas boiler is to be replaced. 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 supply side of the isolating switch:

(i) The phase and neutral

(2 marks)

_____

_____

_____

_____

(ii) The neutral and earth

(1 mark)

_____

_____

_____

_____

(iii) The phase and earth

(3 marks)

_____

_____

_____

_____

_____

_____

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

(2 marks)

(1) _____

(2) _____

(turn over)

Question 13 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 14

(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 14 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) _____

_____

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**	
Section 1		
1		
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Total Section 1		
Section 2		
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Section 3		
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14		
Total section 3		
TOTAL SECTIONS 1 & 2		
OR		
TOTAL SECTIONS 1 & 3		