



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

TRADESPERSON ELECTRICAL WORK CERTIFICATE EXAMINATION

9 May 2009

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.

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 3019:2004 **or** AS/NZS 3019:2007; AS/NZS 3760:2003 and Amendment 1.

**PLEASE HAND THIS PAPER TO THE SUPERVISOR BEFORE LEAVING THE ROOM
(turn over)**

Question 1

- (a) (i) State the term used for the electrical output of an appliance. (1 mark)

- (ii) State another common term used to describe the "phase" conductor. (1 mark)

- (b) A Class I, 230V, portable electrical appliance with a phase to framework fault is being used outdoors. State **TWO** types of protection device that will disconnect the electricity supply. (2 marks)

(1) _____

(2) _____

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

- (d) 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:

(turn over)

Question 1 continued

(e) State **TWO** characteristics an insulating material must possess to be suitable for use as insulation in a flexible cord.

(2 marks)

(1) _____

(2) _____

(f) The Electricity Regulations state that four subjects that must be covered in refresher courses for the holders of a Tradespersons Electrical Work Certificate. Two of those subjects are CPR and basic first aid. Refer to the Electricity Regulations and state the other **TWO** subjects.

(2 marks)

(1) _____

(2) _____

Ref:

(g) Work is being carried out on a 230V plug-in electrical appliance. The only instrument available is an ohmmeter which gives a reading of 32 ohms when connected to the appliance's flexible cord plug.

Calculate the power (in watts) the appliance will consume.

(2 marks)

(turn over)

Question 1 continued

(h) The label of an HRC fuse cartridge states information about its manufacture and operating characteristics. A new fuse includes the following information:

- 415 Volts
- AC 46

Briefly describe the meaning of each of these items of information.

(2 marks)

415 volts _____

AC 46 _____

(i) Briefly explain how an isolating transformer protects the user of a Class I electrical appliance from receiving an electric shock, when a phase to earth fault occurs.

(2 marks)

(j) State the maximum permitted resistance of the protective earthing conductor when measured between the earth pin of the supply plug and the metal framework of a Class I electrical appliance.

(2 marks)

(turn over)

Question 2

(a) Draw and label a circuit diagram of a 230V, Class I heater. The internal components of the heater are:

- Two load resistors, one of 27 ohms and the other of 54 ohms.
- A two-position selector switch to connect the supply to either of the load resistors.
- A fuse that protects the whole circuit.

Your diagram must show the phase, neutral and earth connections.

(6 marks)

(turn over)

Question 2 continued

(b) Calculate the maximum power consumed by the heater.

(2 marks)

(c) Calculate the minimum current drawn by the heater.

(2 marks)

(turn over)

Question 3

- (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 3 continued

- (b) A replacement flexible cord is being fitted to a single phase double insulated electrical appliance. List **THREE** technical factors that must be considered when selecting the flexible cord.

(3 marks)

(1) _____

(2) _____

(3) _____

(turn over)

Question 4

- (a) A Residual Current Device (RCD) - either a portable type or permanently connected type - is live even if no load is connected to the circuit in which it is installed.

State the **main** reason why the Residual Current Device (RCD) does not trip, even though it is live.

(1 mark)

- (b) Briefly explain how the internal mechanism of a Residual Current Device (RCD) detects an earth fault and disconnects the supply from a faulty Class I electrical appliance.

(4 marks)

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

(1 mark)

(turn over)

Question 4 continued

(d) Refer to NZS 3019 and state:

- (i) The maximum time in which an RCD used for personal protection must operate at its rated residual current.

(1 mark)

Ref:

- (ii) The maximum time in which an RCD used for personal protection must operate at five times its rated residual current.

(1 mark)

Ref:

- (e) Briefly explain why a Portable Residual Current Device (PRCD) is "voltage dependent". That is, if the electricity supply to the device fails, the device trips.

(2 marks)

(turn over)

Question 5

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 5 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 6 continued

(b) Refer to AS/NZS 3760 and state the insulation resistance permitted between the live supply conductors and earthed exposed metal parts of a Class I portable isolating transformer. State a reference to support your answer.

(1 mark)

Ref:

(c) A polarity test should be carried out on a plug-in Class I electrical appliance after a replacement flexible cord has been fitted. The appliance is controlled by a single-pole switch. What **FOUR** important points will this polarity test confirm?

(4 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(turn over)

Question 7

- (a) Describe how you would carry out a protective earthing conductor test on the Class I, 230 volt, plug-in electrical appliance. The answer must include the type of meter used, any test voltage that is applicable, and the maximum or minimum acceptable values.

(3 marks)

- (b) Describe how you would carry out an insulation resistance test on the Class I, 230 volt, plug-in electrical appliance. The answer must include the type of meter used, any test voltage that is applicable, and the maximum or minimum acceptable values.

(5 marks)

(turn over)

Question 7 continued

- (c) Briefly explain why a multimeter set on the low ohms scale should not be used to carry out an insulation resistance test on a portable electrical appliance.

(2 marks)

(turn over)

Question 8

An isolating switch supplying a 230V a.c. single phase induction motor in a gas boiler has been replaced. The motor has both RCD and MCB protection.

What would be the effect if:

- (a) The phase and neutral were accidentally interchanged at the supply side of the isolating switch.

(3 marks)

- (b) The neutral and earth were accidentally interchanged at the supply side of the isolating switch.

(1 mark)

(turn over)

Question 8 continued

- (c) The phase and earth were accidentally interchanged at the supply side of the isolating switch and the RCCB failed to operate.

(4 marks)

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

(2 marks)

(1) _____

(2) _____

(turn over)

Question 9

(a) The prove-test-prove method of testing is used for checking that isolation has been achieved.

(i) What are the **TWO** conditions that the prove-test-prove method is intended to verify?

(2 marks)

(1) _____

(2) _____

(ii) Explain how prove-test-prove method of testing is carried out.

(3 marks)

(b) (i) Explain the **main** purpose of using a Danger Tag system.

(1 mark)

(turn over)

Question 9 continued

- (ii) Describe the main information that a worker must enter onto a danger tag

(2 marks)

- (iii) When would you use a danger tag?

(2 marks)

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		
4		
5		
6		
7		
8		
9		
TOTAL		