



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

TRADESPERSON ELECTRICAL WORK CERTIFICATE EXAMINATION

054

25 June 2005

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 may need to use the following documents in this examination:

- The Electricity Regulations 1997 and the Electricity Amendment Regulations 1999, Electricity Amendment Regulations 2002 and the Electricity Amendment Regulations 2003; or
The Electricity Regulations Compilation 2003 and the Electricity Amendment Regulations 2003; or
The Integrated Electricity Regulations 1997 and the Electricity Amendment Regulations 2003.
- AS 1939 supplement 1 – 1990; AS/NZS 3000:2000 (including amendments 1, 2, 3 and A); 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) State **TWO** factors which affect the severity of electric shock upon the human body. (2 marks)

- (b) The sheath of a flexible cord supplying an electrical appliance has been damaged exposing the basic insulation.

- (i) State the action that needs to be taken. (1 mark)

- (ii) Explain the reason why the action has been taken. (1 mark)

- (c) What voltage should be indicated when taking a voltage reading at a standard low voltage single phase socket outlet? (2 marks)

- (d) Calculate the current that will be drawn by a water heater element rated at 1.2kW, 230V. (2 marks)

(turn over)

Question 1 continued

- (e) A new fuse needs to be inserted into a fuse carrier to replace a blown fuse on a switchboard. Briefly explain the **TWO** main safety reasons why the main switch should be turned off before removing the fuse carrier from, or replacing it into, the fuse base.

(2 marks)

(1) _____

(2) _____

- (f) A circuit fuse blows every time the correct fuse link is inserted. If the fuse link is replaced with one of a higher current rating, state **TWO** undesirable effects that may occur.

(2 marks)

(1) _____

(2) _____

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

(2 marks)

(1) _____

(2) _____

(turn over)

Question 1 continued

- (h) Work is being carried out on a 230V plug-in electrical appliance. The only instrument available is an ohmmeter which gives a reading of 23 ohms when connected to the appliance's flexible cord plug. Calculate the power (in watts) the appliance will use when it is supplied at 240V.

(2 marks)

- (i) State **ONE** typical application for each of the following electrical control devices:

- (i) A solenoid valve.

(1 mark)

- (ii) A pressure switch.

(1 mark)

- (j) A fuse has blown on a switchboard circuit supplying a single phase plug-in appliance. The appliance has been disconnected and taken away to be tested for faults.

When the fuse is replaced and the main switch is turned on, the fuse blows again. What is the probable cause of the fault and what action should be taken to rectify it?

(2 marks)

(turn over)

Question 2

(a) A replacement flexible cord is being fitted to a single phase Class I electrical appliance.

(i) How many cores must there be in the flexible cord?

(1 mark)

(ii) What colour coding is required for the cores of the flexible cord?

(3 marks)

(b) 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) _____

(c) State **ONE** primary characteristic that determines the maximum current a flexible cord can conduct safely without overheating.

(1 mark)

(turn over)

Question 3

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

(i) State what is meant by **Utilisation category (fusing factor)**. (3 marks)

(ii) How does the **Utilisation category (fusing factor)** influence the fuse operation? (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)

(c) State why is it important when selecting a fuse link to ensure that the correct category of duty is chosen. (2 marks)

(turn over)

Question 4

- (a) Sketch and label the circuit diagram of a 230V, single phase circuit, controlled by a single pole switch and protected by a fuse that supplies three resistors (R_1 , R_2 , R_3) connected in parallel.

Include an ammeter to measure the total circuit current and a voltmeter to measure the voltage across the resistors. The correct polarity supply must be shown.

(3 marks)

- (b) The combined resistance of the parallel resistances is 50 ohms.

- (i) Show by calculation, the reading on the ammeter?

(2 marks)

- (ii) What is the reading on the voltmeter?

(1 mark)

(turn over)

Question 4 continued

(iii) Calculate the total power used by the resistors.

(2 marks)

(iv) Calculate the total power used by the resistors if the circuit voltage was 240V.

(2 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.

(2 marks)

- (c) Describe the work the Supervisor requested you to do.

(1 mark)

- (d) 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 IP rating. An **IP rating** consists of the initials IP followed by two numbers. Refer to AS1939 or AS/NZS 3000 and answer the following:

(i) What is an IP rating? (2 marks)

Ref:

(ii) Explain what the first number after the letters IP indicates. (2 marks)

Ref:

(iii) Explain what does the second number after the letters indicates. (2 marks)

Ref:

(b) If an electrical appliance or fitting is labelled “**IP 23**”.

(i) What level of protection is specified by the number 2? (1 mark)

(turn over)

Question 6 continued

(ii) What level of protection is specified by the number 3?

(1 mark)

Ref:

(c) In accordance with AS/NZS 3000 what is a **damp situation**?

(2 marks)

Ref:

(turn over)

Question 7

(a) Before a Class I electrical appliance is returned to service after being repaired, AS/NZS 3760 requires that it must be inspected and also tested in two ways. Refer to AS/NZS 3760 and:

(i) State the type of inspection required. (2 marks)

Ref:

(ii) Complete the following:

Name of test: _____ (½ mark)

Type of instrument: _____ (½ mark)

Acceptable test result: _____ (1 mark)

Ref:

Name of test: _____ (½ mark)

Type of instrument: _____ (½ mark)

Acceptable test result: _____ (1 mark)

Ref:

(turn over)

Question 7 continued

(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:

(c) Describe **TWO** ways of identifying a double insulated appliance.

(2 marks)

(1) _____

(2) _____

(turn over)

Question 8

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: -

(a) The phase and neutral

(4 marks)

(b) The neutral and earth

(2 marks)

(c) The phase and earth

(3 marks)

(d) State **ONE** test that would detect the interchange of the phase and earth conductors?

(1 mark)

(turn over)

Question 9

- (a) State the electrical tests or checks you would normally carry out on a gas fired boiler before it is returned to service after a repair.

(5 marks)

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

(5 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		
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7		
8		
9		
<u>Total</u>		