



Candidate Code No.	
For Board Use Only	
Result	Result
Date	Date
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ELECTRICAL WORKERS REGISTRATION BOARD

ELECTRICAL SERVICE TECHNICIAN “A” EXAMINATION

13 March 2004

QUESTION AND ANSWER BOOKLET

Time Allowed: 1.5 Hours

INSTRUCTIONS – READ CAREFULLY

You have 10 minutes to read this paper but do not start writing until instructed to do so by the supervisor.

Write your Candidate Code Number in the space provided above. Your name must NOT appear.

Attempt all the questions in this paper. **To pass this examination you must get at least 25 marks from section 2 and at least 60 marks in total.**

Drawing instruments may be used when diagrams are required. Marks are allocated on the basis of correctness.

Use a pen for writing your answer. You may use a pencil for diagrams. Do not use correcting fluid or correcting tape.

Warning – You could get 0 marks for any question, or part of a question, if you show anything hazardous or dangerous in your answer.

Approved calculators may be used. However, for calculation questions all workings must be shown to gain full marks.

You will need to use the following documents in this examination:

The Electricity Act 1992 and amendments
 The Electricity Regulations 1997 and the 1999 and 2002 Amendments or
 The Electricity Regulations Compilation 2003
 AS 1939 supplement 1 – 1990; AS/NZS 3000:2000; AS/NZS 3001:2001; AS/NZS
 3004:2002; NZS 3019 (Int):2002; AS/NZS 3760:2001

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

SECTION 1

Each question in this section is worth 5 marks

Write your answer for each question in the box provided

Question 1

In a parallel circuit, the section which has the lowest resistance also has the:

- a Greatest voltage drop
- b Lowest current
- c Highest heating effect
- d Smallest voltage drop

Question 2

The current drawn by an electric soldering iron rated at 92 watts when operating from a 230 volt supply is:

- a 0.4 amps
- b 0.25 amps
- c 4 amps
- d 0.5 amps

Question 3

Which of the following wiring changes would reverse the direction of rotation of a single phase a.c. induction motor:

- a Reverse the phase and neutral supply conductor connections at the motor terminal block.
- b Reverse the connections of the start windings and the run windings
- c Reverse the connections of the start windings or the run windings
- d None of the above, as the direction of rotation can not be changed on this type of motor.

(turn over)

Question 4

Under which of the following circuit conditions is a thermal overload specifically designed to operate (trip):

- a A sustained overload
- b A small overload of short duration
- c A high motor starting current
- d A short circuit condition

Question 5

An HRC type fuse is used in a circuit **primarily** to:

- a Disconnect a large fault current
- b Reduce the possibility of electric shock
- c Prevent an unauthorised increase in fuse rating
- d Disconnect an overload

Question 6

Which of the following three core flexible cords has the least conductor resistance:

- a 5 metres of 0.75mm² cord
- b 10 metres of 1.0mm² cord
- c 5 metres of 1.0mm² cord
- d 10 metres of 0.75mm² cord

(turn over)

Question 7

When the medium position is selected on a three-heat switch controlling heating elements, it will connect:

- a Two elements in series with the supply
- b One element only across the supply
- c Two elements in parallel across the supply
- d One element in series with a suitable resistance

Question 8

When turned to the low position, the three heat switch controlling a small domestic oven will connect the electrical supply to:

- a Two elements in series
- b Two elements in parallel
- c One element only
- d One element in series with a suitable resistor

Question 9

Before carrying out repairs on a single phase plug-in electrical appliance, which of the following actions would be the **most effective** in ensuring personal safety:

- a Tag the electrical appliance as unsafe
- b Turn off the main switch at the switchboard
- c Withdraw the appliance flexible cord plug from the socket
- d Remove the fuse that protects the plug socket

(turn over)

Question 10

To comply with the Electricity Regulations 1997, the maximum voltage to earth which can be used to supply a handheld electrical appliance is:

- a 250 Volts
- b 32 Volts
- c 400 Volts
- d 230 Volts



(5 marks)

SECTION TWO

Question 11

- (a) Explain why the voltage at the load end of a flexible cord extension set supplying current to an electrical appliance is less than that at the supply end of the cord.

(3 marks)

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- (b) State **TWO** ways in which the effect in (a) above can be reduced.

(2 marks)

(1)

(2)

Question 12

(a) When fitting a three core flexible cord 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) Give **ONE** reason why it is recommended that the protective earth conductor should be left longer than the phase and neutral conductors.

(1 mark)

(ii) Briefly explain what could happen if the protective earth conductor was **shorter than** the phase and neutral conductors.

(2 marks)

(b) Give **TWO** reasons why a bayonet cap adaptor must not be used to supply a Class I appliance

(2 marks)

(1)

(2)

(turn over)

Question 13

Briefly state **FIVE** reasons why it is not permitted to bridge the terminals of HRC fuse carriers with fuse wire of the same current rating as the blown cartridge.

(5 marks)

(1)

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(2)

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(3)

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(4)

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(5)

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(turn over)

Question 14

The test report for a class I, 230V, 2000W fan heater states the following:

- Protective earthing conductor (earth continuity conductor) resistance of 18.5.
- Insulation resistance
 - with the switch on - phase to frame short circuit.
 - with the switch off - phase to frame short circuit.

The heater is plugged into a live socket outlet with the heater switch off. The socket outlet is protected by a 10A HRC fuse with a 1.5 Utilisation category (fusing factor).

- (a) Calculate the current flowing in the protective earthing (earth continuity) conductor.

(2 marks)

- (b) Explain the sequence of technical events that will happen when the heater is plugged in.

(3 marks)

(turn over)

Question 15

- (a) Sketch the circuit diagram of a single phase circuit protected by a fuse, controlled by a double pole switch and supplying three resistors connected in parallel.

Include an ammeter to measure the total circuit current and a voltmeter to measure the voltage across the resistors.

(3 marks)

- (b) If each resistor is 150Ω and the voltmeter reads 230V, what is:

(i) The reading on the ammeter?

(1 mark)

(ii) The total power dissipated by the resistors?

(1 mark)

(turn over)

Question 16

- (a) Explain why a voltmeter should not be connected in series with an electrical appliance to measure the supply voltage.

(4 marks)

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- (b) When using the voltmeter to measure an unknown voltage in an appliance, which meter range should be selected first?

(1 mark)

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(turn over)

Question 17

Resistance measurements taken by an analogue ohmmeter need to be accurate.

- (a) Give **TWO** technical reasons why is it necessary to zero-calibrate an analogue ohmmeter to obtain accurate resistance measurements.

(2 marks)

(1)

(2)

- (b) Briefly explain the procedures for zero calibrating the analogue ohmmeter.

(3 marks)

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(turn over)

Question 18

You are required to carry out an earthing test on a Class I 230V plug-in electrical appliance.

- (a) State the instrument that should be used and the range selected for this test. (2 marks)

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— _____

- (b) Briefly explain how the test should be carried out. (2 marks)

— _____
— _____
— _____
— _____
— _____

- (c) What is the minimum acceptable resistance for this test? (1 mark)

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(turn over)

Question 20

(a) Refer to the Electricity Regulations and state:

(i) What is meant by the term **personal protective equipment**? (1 mark)

(ii) The **TWO** practical steps an employee must take when carrying out work requiring personal protective equipment. (2 marks)

(1) _____

(2) _____

(turn over)

- (c) List **FOUR** items of personal protective equipment an electrical service technician should have when carrying out repairs to a battery charger mounted above a set of wet-cell batteries used for a battery-powered vehicle. (2 marks)

(1)

(2)

(3)

(4)

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	
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