



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

ELECTRICAL SERVICE TECHNICIAN “A” EXAMINATION

19 June 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 box provided above. Your name must NOT appear anywhere in this paper.

Answer all questions.

The pass mark for this examination is 60 marks and you must get at least 25 marks in section 2

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 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 (including amendments 1 and 2); 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

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 2

What is the minimum current rating for an HRC fuse protecting a 230V subcircuit supplying a fixed wired electrical appliance rated at 2000W at 230V?

- a 16A
- b 10A
- c 6A
- d 20A

Question 3

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

(turn over)

Question 4

What current will be drawn by an electric dryer rated at 920 watts at 230 volts when operating at the rated voltage?

- a 2.5 amps
- b 4 amps
- c 0.25 amps
- d 0.4 amps

Question 5

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.

Question 6

Before carrying out repairs on a single phase plugged-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 7

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 8

Which of the following documents specifies the tests to be carried out on an electrical appliance which is for hire or lease?

- a AS/NZS 3000
- b ECP 50
- c AS 1939
- d AS/NZS 3760

Question 9

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

(turn over)

Question 10

What power is dissipated by an electrical appliance with a resistance of 80 ohms when drawing a current of 5 amps?

- a 0.4 kW
- b 2 kW
- c 16 kW
- d 3.2 kW



SECTION TWO

Question 11

- (a) A polarity test should be carried out on a Class 1 electrical appliance after a replacement flexible cord has been fitted. The appliance is controlled by a single-pole switch. What important points will this polarity test confirm? (3 marks)

- (b) (i) What type of test instrument would you use to test for polarity? (1 mark)

- (ii) What range would you select on the test instrument? (1 mark)

Question 12

(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)

Question 12 continued

- (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) _____

(turn over)

Question 13

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

- Protective earthing conductor (earth continuity conductor) resistance of 16.7Ω.
- 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 15A 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 14

An isolating transformer is constructed with two socket outlet terminals to permit the use of two or more electrical appliances. The socket outlet earth terminals are required to be bonded together, but they must not be earthed.

- (a) Give **TWO** reasons why the bonding is necessary to prevent electric shock to the users of the appliances.

(4 marks)

(1) _____

(2) _____

- (b) Refer to AS/NZS 3760 and state the minimum insulation resistance between and primary and secondary windings of the transformer.

(1 mark)

Ref:

(turn over)

Question 15

When carrying out insulation resistance tests to earth on an electrical appliance, special precautions must be taken to avoid damage to semi-conductors used in the circuitry.

Assuming it is impractical to disconnect the semi-conductors, state **TWO** ways that the insulation resistance test can be carried out without causing damage to the semi conductors.

(5 marks)

(turn over)

Question 16

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)

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

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

(turn over)

Question 17

When inspecting a portable electrical appliance for defects a **visual** check should be carried out in addition to the prescribed electrical tests. Refer to AS/NZS 3760 and briefly describe **FIVE** of the specific checks that should be carried out visually.

(5 marks)

- (1) _____

- (2) _____

- (3) _____

- (4) _____

- (5) _____

(turn over)

Question 18

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)

(turn over)

Question 19

An electrical short circuit fault has caused burns to a workmate's hands and arms.

- (a) What first aid treatment should be administered to the hands and arms after the workmate has been removed from the danger area?

(2 marks)

- (b) (i) What further action should be taken in respect to treating the burnt areas before seeking advice from a medical professional?

(1 mark)

- (ii) What should be avoided when treating the area around the burn?

(2 marks)

(turn over)

Question 20

- (a) Other than obtaining an incorrect reading, explain why a voltmeter should not be connected in series with an electrical appliance to measure the supply voltage. (4 marks)

- (b) When using the voltmeter to measure an unknown voltage in an appliance, which meter range should be selected first? (1 mark)

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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