



<b>Candidate Code No.</b>	
<b>For Board Use Only</b>	
Result	Result
Date	Date
Int	Int

## **ELECTRONIC SECURITY** **THEORY/REGULATIONS EXAMINATION**

**15 November 2008**

### **QUESTION AND ANSWER BOOKLET**

Time Allowed: 3 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.**

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 reprint dated 19 August 2005.
- The Electricity Regulations 1997 reprint dated 5 September 2005.
- AS 1939 supplement 1 – 1990 or AS 60529
- AS/NZS 3000:2000 (including amendments 1, 2, 3 and A) or AS/NZS 3000:2007;
- 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 – THEORY

### Question 1

- (a) A residual current device (RCD) has operated. The RCD protects a circuit and a fixed-wired Class I security alarm panel. What has the RCD detected that would cause it to operate?

(2 marks)

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- (b) State **TWO** advantages that HRC fuses have when compared to rewirable fuses.

(2 marks)

(1) \_\_\_\_\_

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(2) \_\_\_\_\_

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- (c) Briefly describe how earthing the metal frame of a Class I electrical appliance prevents electric shock hazards under fault conditions.

(2 marks)

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**(turn over)**

## Question 1 continued

- (d) (i) Under what circuit conditions is the electro-magnetic mechanism of an MCB specifically designed to operate (trip)?

(1 mark)

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- (ii) Under what circuit conditions is the thermal overload mechanism of an MCB specifically designed to operate (trip)?

(1 mark)

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- (e) What type of document is required to be issued by a security alarm installer after the completion and testing of new wiring for an electronic security system?

(2 marks)

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**(turn over)**

## Question 2

- (a) You need to take a fixed wired security alarm panel away for repair. You have isolated the panel and have disconnected the flexible cord at the panel. The flexible cord is still connected to the permanent connection unit.

State **TWO** precautions which must be taken to ensure the safety of persons and property after you have completed the isolation and disconnection

(2 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (b) How is "isolating" a security alarm control panel different from just "switching off" the panel?

(3 marks)

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**(turn over)**

## Question 2 continued

- (c) Describe **THREE** different methods of safely ensuring the continued isolation of a fixed wired security alarm control panel.

(3 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(3) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (d) State the **TWO** reasons why the prove-test-prove method of testing for isolation is used.

(2 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

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\_\_\_\_\_

**(turn over)**

### Question 3

- (a) What is meant by the term "testing" when applied to electrical installations and appliances?

(2 marks)

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- (b) A single phase socket-outlet has been installed for a new security alarm panel. A new cable has been run between an existing socket-outlet and the new outlet – but it is not yet connected to the existing outlet.

Describe in detail how each of the following tests/checks should be carried out during the connection of the new cable. Include in your answer, where applicable, the type of meter used and any minimum or maximum test result values that are acceptable.

- (i) Visual check

(1 mark)

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- (ii) Protective earth continuity

(3 marks)

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**(turn over)**

### Question 3 continued

(iii) Insulation resistance

(3 marks)

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(iv) Polarity

(1 mark)

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**(turn over)**

## Question 4

You have to fit a new three-pin plug to a three-core PVC sheathed flexible cord supplying a Class I security alarm panel.

- (a) Briefly state the main sequence of actions involved in fitting the cord to the three-pin plug.

(2 marks)

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- (b) State the visual inspections you would make before fitting the cover to the plug.

(2½ 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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- (c) State the visual inspection you would make after fitting the cover to the plug.

(½ mark)

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**(turn over)**



## Question 5

- (a) Explain the meaning of the term **discrimination** as applied to protective devices.

(2 marks)

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- (b) An HRC fuse is marked 60A - 440V - AC40. What is the meaning of these **THREE** sets of figures and letters?

(3 marks)

60A \_\_\_\_\_

440V \_\_\_\_\_

AC40 \_\_\_\_\_

- (c) Under what circumstance must back-up protection be installed in addition to normal circuit protection?

(2 marks)

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**(turn over)**

## Question 5 continued

- (d) What is meant by the term inverse time-current characteristic in relation to fuses and circuit breakers?

(2 marks)

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- (e) Sketch a typical inverse time-current characteristic as applied to fuses.

(1 mark)

**(turn over)**

## SECTION 2 – SAFETY AND LEGISLATION

### Question 6

- (a) Refer to the Electricity Regulations and state **TWO** practical steps relating to personal protective equipment that an employee must take before work and when carrying out work.

(2 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Ref: .....

- (b) Refer to AS/NZS 3000 and state the requirements for flexible cords used as fixed wiring.

(2 marks)

\_\_\_\_\_

\_\_\_\_\_

Ref: .....

**(turn over)**

**Question 6 continued**

- (c) A trainee may assist in prescribed electrical work subject to supervision. Refer to the Electricity Regulations and state **ONE** category of person who can provide this supervision.

(2 marks)

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Ref: .....

- (d) Refer AS/NZS 3000 and state **TWO** of the methods of providing protection against indirect contact.

(2 marks)

(1) \_\_\_\_\_  
\_\_\_\_\_

(2) \_\_\_\_\_  
\_\_\_\_\_

Ref: .....

- (e) Refer to the Electricity Regulations and state **TWO** situations where "fittings" are deemed not to be electrically safe (that is they do not comply with Regulation 69(1)).

(2 marks)

(1) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(2) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Ref: .....

**(turn over)**

## Question 7

(a) The Electricity Act requires that a registered electrical service technician who works for payment of reward must hold an additional type of licence. Refer to the Act and state:

(i) The name of the licence? (1 mark)

\_\_\_\_\_

Ref: .....

(ii) The date in any year the licence expires? (1 mark)

\_\_\_\_\_

Ref: .....

(iii) To whom must application be made for the licence? (1 mark)

\_\_\_\_\_

Ref: .....

(b) No electronic security alarm installer shall assist to carry out prescribed electrical work unless they have refresher courses in **FOUR** specific subjects within the previous 24 months. Refer to the Electricity Regulations and state those **FOUR** subjects.

(4 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

(3) \_\_\_\_\_

\_\_\_\_\_

(4) \_\_\_\_\_

\_\_\_\_\_

Ref: .....

**(turn over)**

## Question 7 continued

- (c) Refer to the Electricity Regulations and state **THREE** details of an electrical accident that must included in a report to the Secretary.

(3 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(3) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Ref: .....

**(turn over)**

## Question 8

AS/NZS 3760 contains the tests and inspections that must be carried out on a Class I, 230V plug-in security alarm panel after it has been repaired.

(a) Refer to AS/NZS 3760 and answer the following:

- (i) State the type of test that is carried out to check whether the Class I, 230V plug-in security alarm panel is effectively earthed?  
(½ mark)

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Ref: .....

- (ii) What type of instrument would you use to carry out the test you have stated in (a)(i)  
(½ mark)

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Ref: .....

- (iii) What is the acceptable test result for the test you have stated in (a)(i). State whether the result is a minimum or maximum value.  
(1 mark)

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Ref: .....

**(turn over)**

## Question 8 continued

(b) Refer to AS/NZS 3760 and answer the following:

- (i) State the **TWO** types to tests, either of which can be carried out to test the integrity of the insulation of the Class I, 230V plug-in security alarm panel.

(1 mark)

(1) \_\_\_\_\_

(2) \_\_\_\_\_

Ref: .....

- (ii) For the test you have stated in (b)(i)(1) above state:

- (1) The type of instrument you would use to carry out the test  
(½ mark)

\_\_\_\_\_

Ref: .....

- (2) The acceptable test result for the test. State whether the result is a minimum or maximum value.

(1 mark)

\_\_\_\_\_

Ref: .....

- (iii) For the test you have stated in (b)(i)(2) above state:

- (1) The type of instrument you would use to carry out the test  
(½ mark)

\_\_\_\_\_

Ref: .....

- (2) The acceptable test result for the test. State whether the result is a minimum or maximum value.

(1 mark)

\_\_\_\_\_

Ref: .....

**(turn over)**

## Question 8 continued

- (c) Refer AS/NZS 3760 and state **TWO** specific visual checks (inspections) that should be carried out on the flexible cord of the Class I, 230V plug-in security alarm panel.

(2 marks)

**Note:** The visual checks must relate specifically to the flexible cord of the Class I, 230V plug-in security alarm panel.

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Ref: .....

- (d) Refer AS/NZS 3760 and state **TWO** specific visual checks (inspections) that should be carried out on the Class I, 230V plug-in security alarm panel (not the cord or plug).

(2 marks)

**Note:** The visual checks must relate specifically to the Class I, 230V plug-in security alarm panel.

(1) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Ref: .....

**(turn over)**

## Question 9

- (a) A fundamental principal of AS/NZS 3000 is that persons and livestock shall be protected against dangers that may arise from contact with parts which are live in normal service (direct contact) or exposed conductive parts which may become live under fault conditions (indirect contact).

Refer to AS/NZS 3000 and answer the following:

- (i) State the **FOUR** permitted methods of protection against direct contact.

(4 marks)

(1) \_\_\_\_\_

(2) \_\_\_\_\_

(3) \_\_\_\_\_

(4) \_\_\_\_\_

Ref: .....

- (ii) State **TWO** minimum degrees of protection permitted when providing protection against direct contact by barriers or enclosures.

(2 mark)

(1) \_\_\_\_\_

(2) \_\_\_\_\_

Ref: .....

**(turn over)**

**Question 9 continued**

(iii) Barriers or enclosures are required to be constructed so that they cannot be opened or removed unless certain conditions apply. State **THREE** alternative conditions that can be used regarding the opening or removal of barriers or enclosures.

(3 marks)

(1) \_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_

(3) \_\_\_\_\_

\_\_\_\_\_

Ref: .....

(b) What is the minimum number of conductors required in a flexible cord supplying a Class II electrical appliance?

(1 mark)

\_\_\_\_\_

**(turn over)**

## Question 10

Refer to AS/NZS 3000 and answer the following:

- (a) List **FOUR** mandatory checks using test instruments that are required for the testing of electrical work after that work has been carried out on a low voltage electrical installation

(2 marks)

(1) \_\_\_\_\_

(2) \_\_\_\_\_

(3) \_\_\_\_\_

(4) \_\_\_\_\_

Ref: .....

- (b) State the main reason for carrying out insulation resistance tests on electrical work carried out in a low voltage electrical installation

(2 marks)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Ref: .....

- (c) State the required voltage of the insulation resistance tester when testing a low voltage electrical installation.

(1 mark)

\_\_\_\_\_

Ref: .....

**(turn over)**

**Question 10 continued**

(d) State the performance criteria for an insulation resistance tester. (2 marks)

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Ref: .....

(e) State **ONE** reason why it is necessary to ensure correct circuit connections. (1 mark)

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Ref: .....

(f) State the **TWO** reasons for testing the continuity of a protective earthing conductor. (2 marks)

(1) \_\_\_\_\_

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(2) \_\_\_\_\_

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Ref: .....

### 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		
10		
<b>TOTAL</b>		