



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

ELECTRONIC SECURITY
THEORY/REGULATIONS EXAMINATION
17 November 2007
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; 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)

SECTION 1 – THEORY

Question 1

- (a) Briefly describe how earthing the metal frame of a Class I electrical appliance prevents electric shock hazards under fault conditions. (2 marks)

- (b) 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)

- (c) State **TWO** advantages that HRC fuses have when compared to rewirable fuses. (2 marks)

(1) _____

(2) _____

- (d) State **ONE** reason why the neutral conductor is earthed in an MEN system. (2 marks)

(turn over)

Question 1 continued

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

(2 marks)

(turn over)

Question 2

- (a) A fuse has blown on a switchboard circuit supplying a single-phase plug-in electrical appliance. The appliance has been taken away to be tested. For safe working the main switch on the switchboard should be turned off before repairing the fuse. What important check at the switchboard should be made before turning off the main switch?

(1 mark)

- (b) Other than environmental, list **TWO** factors that determine the cross-sectional area of a flexible cable used to supply a security alarm panel.

(2 marks)

(1) _____

(2) _____

- (c) (i) What is the essential safety difference between switching an electrical appliance off and isolating an electrical appliance?

(2 marks)

- (ii) Describe a method of safely ensuring the continued isolation of a plug-in electrical appliance.

(1 mark)

(turn over)

Question 2 continued

- (d) You are connecting test instruments to measure voltage and current values of a live 230V security alarm panel. When doing this work it is important to observe set procedures to ensure personal safety. Briefly describe **FOUR** important electrical precautions relating to the test instruments that will promote personal safety.

- Note:
1. All the necessary safety equipment (overalls, rubber mats etc.) is available.
 2. Set procedures are available.
 3. All conductive items (e.g., rings) have been removed.

(4 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(turn over)

Question 3

(a) Danger tags and out-of-service tags are designed to promote safety in the workplace.

(i) Give a brief description of the circumstances when a Danger Tag is used.

(2 marks)

(ii) Give a brief description of the circumstances when an Out-of-Service Tag is used.

(2 marks)

(iii) List **THREE** precautions to be taken when attaching a danger tag to an isolating switch.

(3 marks)

(1) _____

(2) _____

(3) _____

(turn over)

Question 3 continued

(b) Describe how the prove-test-prove method of isolation is used

(3 marks)

(turn over)

Question 4

(a) The test report for a Class I, 230V, 20W security alarm panel states that:

- The protective earthing conductor resistance is 7Ω .
- The insulation resistance test shows that there is a phase to frame fault with the panel switch off.

The panel is plugged into a live socket outlet without being repaired and the panel switch is off.

- (i) Calculate the current flowing in the protective earthing conductor. Assume that there is no resistance in the fault.

(2 marks)

- (ii) The socket outlet is protected by a 10A HRC fuse with a 1.5 Utilisation category (fusing factor). Explain with the aid of calculations the effect on the operation of the fuse.

(2 marks)

(turn over)

Question 4 continued

(b) A 230V, Class I, plug-in security alarm panel appliance is controlled by a single pole switch. Following repairs, the internal conductors were transposed, with the neutral conductor connected to the switch instead of the phase conductor.

(i) State **ONE** effect on the safe operation of the panel appliance this transposition could create.

(2 marks)

(ii) Describe **FOUR** other situations that would cause the neutral to be switched instead of the phase in such a panel.

(4 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(turn over)

Question 5

- (a) A thermal overload has operated. What has the thermal overload detected that would cause it to operate?

(1 mark)

- (b) When replacing an HRC cartridge fuse which has blown, the replacement must have characteristics the same as the original. State **FOUR** electrical characteristics to be checked for similarity.

(4 marks)

- (c) Briefly explain how a Residual Current Device (RCD) operates to provide safety to the user of an electrical appliance when an earth leakage fault occurs.

(4 marks)

(turn over)

Question 5 continued

(d) What does the term "PRCD" stand for?

(1 mark)

(turn over)

SECTION 2 – SAFETY AND LEGISLATION

Question 6

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

(2 marks)

(1) _____

(2) _____

Ref:

- (b) Refer to AS/NZS 3000 and state:

- (i) The colours permitted to identify the phase conductor of a single-phase circuit?

(1 mark)

Ref:

- (ii) The colours permitted to identify earthing conductors?

(1 mark)

Ref:

(turn over)

Question 6 continued

(c) 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:

(d) Refer to the Electricity Regulations and state what is meant by the term “personal protective equipment”?

(2 marks)

Ref:

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

(2 marks)

Ref:

(turn over)

Question 7

(a) The Electricity Act requires that a registered electronic security alarm installer who works for payment or 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 does the licence expire?

(1 mark)

Ref:

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

(1 mark)

Ref:

(b) With the licence you have stated in (a)(i), for how long does the licence remain current?

(1 mark)

Ref:

(c) Registered electricians who are electronic security alarm installers are one of **SEVEN** classes of persons listed in the Electricity Act who may do, or assist in doing prescribed electrical work. Refer to the Electricity Act and list **TWO** other classes of person who may do or assist in doing prescribed electrical work.

(2 marks)

(1) _____

(2) _____

Ref:

(turn over)

Question 7 continued

(d) A handheld electrical appliance used on a building or structure under construction must be used in conjunction with an appropriate safeguard. Refer to the Electricity Regulations and state **TWO** such safeguards. (4 marks)

(1) _____

Ref:

(2) _____

Ref:

(turn over)

Question 8

- (a) Refer to the Electricity Regulations and state the Standard to which a Class I, 230V plug-in security alarm panel must be tested following completion of repairs?

(1 mark)

Ref:

- (b) Refer to the Standard required in (a) above and complete the following table by stating:

- (i) The type of instrument required for each test,
(ii) The appropriate test result which is acceptable to comply. Also state whether the test result is a minimum or maximum value.

(4 marks)

(i) Type of test	(ii) Type of instrument	(iii) Test result

Ref:

(turn over)

Question 8 continued

- (c) Refer to the Standard required in (a) above and **briefly** describe **FIVE** of the specific checks that should be carried out visually of the Class I, 230V plug-in security alarm panel.

Note: The checks must be specific to the Class I, 230V plug-in security alarm panel

(5 marks)

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

Ref:

(turn over)

Question 9

You have installed a new socket outlet for a 230V, plug-in, Class I security alarm panel. Included is a new 2 core and earth TPS cable from an existing socket outlet. Refer to AS/NZS 3000 and answer the following:

- (a) List **FOUR** mandatory checks and tests that are required to be carried out on this electrical work.

(2 marks)

(1) _____

(2) _____

(3) _____

(4) _____

Ref:

- (b) State that main reason for carrying out an insulation resistance tests of the electrical work.

(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 9 continued

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

Ref:

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

Ref:

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

(1) _____

(2) _____

Ref:

(turn over)

Question 10

Refer to the Electricity Regulations and answer the following:

- (a) No person shall assist to carry out prescribed electrical work for the first time unless that person has satisfactorily completed safety tuition in **FOUR** specific subjects. What are those subjects?

(2 marks)

(1) _____

(2) _____

(3) _____

(4) _____

Ref:

- (b) At what intervals must a registered security alarm installer complete the tuition in the subjects in (a).

(2 marks)

Ref:

(turn over)

Question 10 continued

- (c) An employer may have employees who assist to carry out prescribed electrical work. What responsibility does the employer have with respect to the competency of the employees who are doing this work?

(2 marks)

Ref:

- (d) Whilst carrying out prescribed electrical work, a registered security alarm installer finds part of an installation which he/she believes on reasonable grounds, presents an immediate danger to life. In accordance with the electrical legislation, who is the security alarm installer required to advise of the danger?

(2 marks)

Ref:

- (e) State **TWO** of the details of an electrical accident that must be reported to the Secretary.

(2 marks)

(1) _____

(2) _____

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

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Questions Answered	Marks	
1		
2		
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