



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

ELECTRONIC SECURITY **THEORY/REGULATIONS EXAMINATION**

23 June 2007

QUESTION AND ANSWER BOOKLET

Time Allowed: 3 Hours

INSTRUCTIO

NS – 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 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. Show answers to THREE significant figures.

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 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

Each part of this question is worth 2 marks.

- (a) Why is it important that an RCD is tripped before every use?

- (b) After completing repairs to a Class I, plug-in, security alarm panel, the following tests need to be carried out. State the value for each test and whether that value is a minimum or maximum value.

- (i) Insulation resistance test between live supply conductors and accessible metal parts.

(1 mark)

- (ii) A protective earthing conductor test between the earth pin of the supply plug and the earthed accessible metal.

(1 mark)

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

(1) _____

(2) _____

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

(turn over)

Question 1 continued

- (e) Briefly explain why an ohmmeter is not suitable for carrying out an insulation resistance test on the internal wiring of a single phase security control panel.

(turn over)

Question 2

- (a) Describe the operation of an RCD when there is a phase to earth fault on the circuit the RCD protects.

(4 marks)

- (b) What is the residual current rating of an RCD used for personal protection?

(1 mark)

- (c) An RCD is a safeguard designed to operate if current from a faulty appliance flows through a person's body to earth. Why, then, doesn't that person receive a severe or fatal shock from the faulty appliance?

(2 marks)

- (d) A Residual Current Circuit Breaker (RCCB) is installed in a single phase circuit to provide protection only for phase to earth faults. State one other type of fault for which another protective device is required to be installed.

(1 mark)

(turn over)

Question 2 continued

- (e) Briefly explain why Portable Residual Current Devices (PRCDs) used in New Zealand are required to be voltage dependent.

(2 marks)

(turn over)

Question 3

A 20A HRC fuse protects a circuit consisting of two socket outlets supplying various operating electrical appliances including a security alarm panel. The fuse has blown. When the fuse is replaced, it blows again when the supply is restored to the circuit.

You have established that the fuse is not faulty and is correctly rated for the circuit.

(a) State the **THREE** possible causes of the fuse blowing the second time. (3 marks)

(1) _____

(2) _____

(3) _____

(b) For each of the possible causes you have stated in (a), state:

- What action you would take to establish that this is the cause.
- The action you would take to fix the problem. (7 marks)

(i) Possible cause (1)

Action taken to establish that this is the cause.

Remedial action taken or recommended

(turn over)

Question 3 continued

(ii) Possible cause (2)

Action taken to establish that this is the cause.

Remedial action taken or recommended

(iii) Possible cause (3)

Action taken to establish that this is the cause.

Remedial action taken or recommended

(turn over)

Question 4

- (a) A fixed wired security alarm panel supplied from a permanent connection unit is to be disconnected and replaced at a later date. This will involve the disconnection of the flexible cable from the panel.

State **FOUR** precautions which must be taken to ensure the safety of persons, animals and property before and after the disconnection is carried out.

(4 marks)

- (1) _____

- (2) _____

- (3) _____

- (4) _____

- (b) What is the difference between switching off a security control panel and isolating a security control panel?

(3 marks)

(turn over)

Question 4 continued

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

(3 marks)

(1) _____

(2) _____

(3) _____

\

(turn over)

Question 5

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

(2 marks)

- (b) A single phase socket outlet 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 connected to the existing outlet.

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

- (i) Insulation resistance

(3 marks)

- (ii) Polarity

(1 mark)

(turn over)

Question 5 continued

(iii) Protective earth continuity

(3 marks)

(iv) Visual check

(1 mark)

(turn over)

SECTION 2 – SAFETY AND LEGISLATION

Question 6

Each part of this question is worth 2 marks.

(a) Refer to the Electricity Regulations and state briefly what is meant by each of the following terms.

(i) Earthed

(1 mark)

(ii) Isolated

(1 mark)

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 AS/NZS 3000 and state **TWO** alternative protection methods for the protection of wiring systems that are located within 50 mm from the underside of any roofing material.

(1) _____

(2) _____

Ref:

(d) The Electricity Act lists **SEVEN** classes of person who may do, or assist in doing prescribed electrical work. List **FOUR** of these classes.

(1) _____

(2) _____

(3) _____

(4) _____

Ref:

(e) Refer to the Electricity Regulations state, briefly, **TWO** types of prescribed electrical work on low voltage installations which do not have to be certified on a certificate of compliance.

(1) _____

(2) _____

Ref:

(turn over)

Question 7

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 7 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:

(turn over)

Question 8

(a) You have repaired a Class I plug-in security alarm panel. You have carried out a protective earthing (earth continuity) test and the result is 15Ω . Refer to AS/NZS 3760 and answer the following:

(i) State the maximum resistance value permissible for the protective earthing conductor of a Class I plug-in security alarm panel.

(1 mark)

Ref:

(ii) State **ONE** reason why the resistance of the protective earthing conductor must be no greater than the value stated in (a)(i)

(2 marks)

Ref:

(iii) Briefly describe the corrective action or procedure you would take to ensure the resistance of the earthing of the security alarm panel complies with AS/NZS 3760.

(3 marks)

(turn over)

Question 8 continued

- (b) The flexible cord has been replaced on a single phase 230V Class I, plug-in security alarm panel. State the colour coding which applies to the cord conductors.

(3 marks)

(i) Phase (Active) _____

(ii) Neutral _____

(iii) Earth _____

Ref:

- (c) What is the minimum number of conductors required in a flexible cord supplying a Class II security alarm panel?

(1 mark)

(turn over)

Question 9

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 primary 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 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 a protective earthing conductor. (2 marks)

(1) _____

(2) _____

Ref:

(turn over)

Question 10

A registered security alarm installer has installed a security alarm system which included the installation of a 1.5 mm² twin and earth TPS cable between an existing socket outlet and a new socket outlet for the alarm panel. With reference to the Electricity Regulations answer the following:

- (a) (i) What is the name of the document the security alarm installer is required to complete.

(1 mark)

Ref:

- (ii) When must this document be completed?

(1 mark)

Ref:

- (iii) To whom must a copy of this document be given?

(1 mark)

Ref:

- (iv) When must the document be given to that person?

(1 mark)

Ref:

- (v) For how long must the security alarm installer retain a copy of this document?

(1 mark)

Ref:

(turn over)

Question 10 continued

(vi) What action must be taken if the security alarm installer does not wish to retain the copy of the document?

(1 mark)

Ref:

(vii) Name **ONE** other person who can issue this type of document.

(1 mark)

Ref:

(b) (i) The testing of this installation must be carried out in accordance with which section of which document?

(1 mark)

Ref:

(ii) When must this testing be carried out?

(2 marks)

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		
3		
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TOTAL		