



**ELECTRICAL WORKERS REGISTRATION BOARD**

**SUMMARY OF**

**SEPTEMBER 2007 EXAMINATION ROUND**

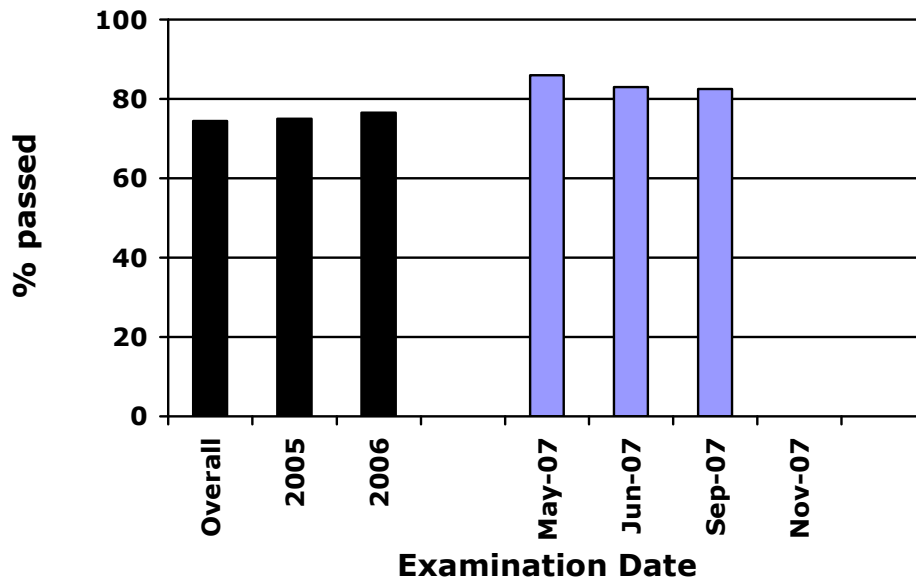
**John Sickels  
Manager/Registrar**

# 1. Summary of Examinations

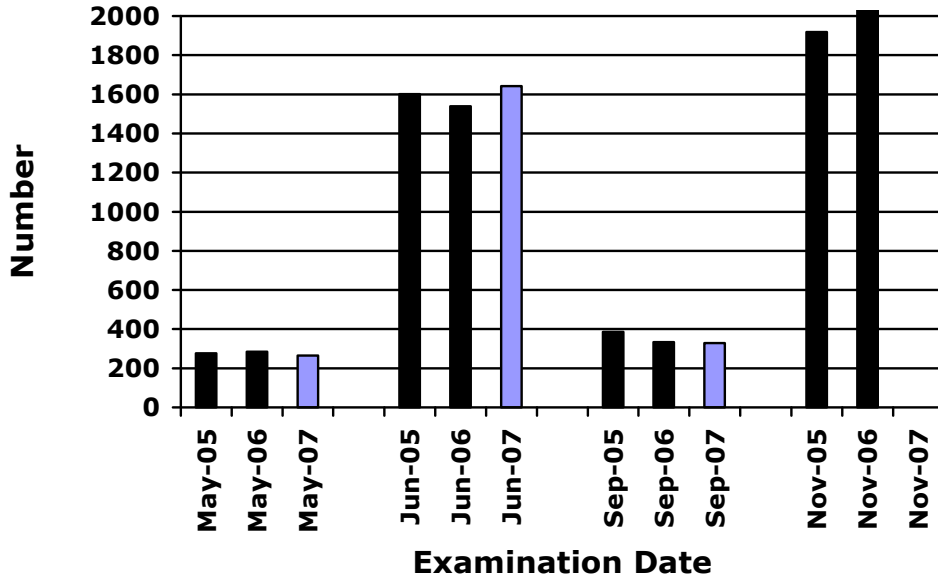
## 1.1 Overall

	Number candidates	of	Number candidates passed	of who	Percentage passed
<b>ESTA</b>	215		181		84
<b>ESTB</b>	112		89		79.5
<b>Elec. Regulations</b>	0		0		0
<b>Elec. Theory</b>	0		0		0
<b>TEWC</b>	1		1		100
<b>Elec. Inspector</b>	0		0		0
<b>E Security</b>	2		2		100
<b>September 2007</b>	<b>330</b>		<b>273</b>		<b>82.5</b>

**2007 - PASS RATES - OVERALL**



## 2007 - CANDIDATE NUMBERS - OVERALL



### Mark Ranges

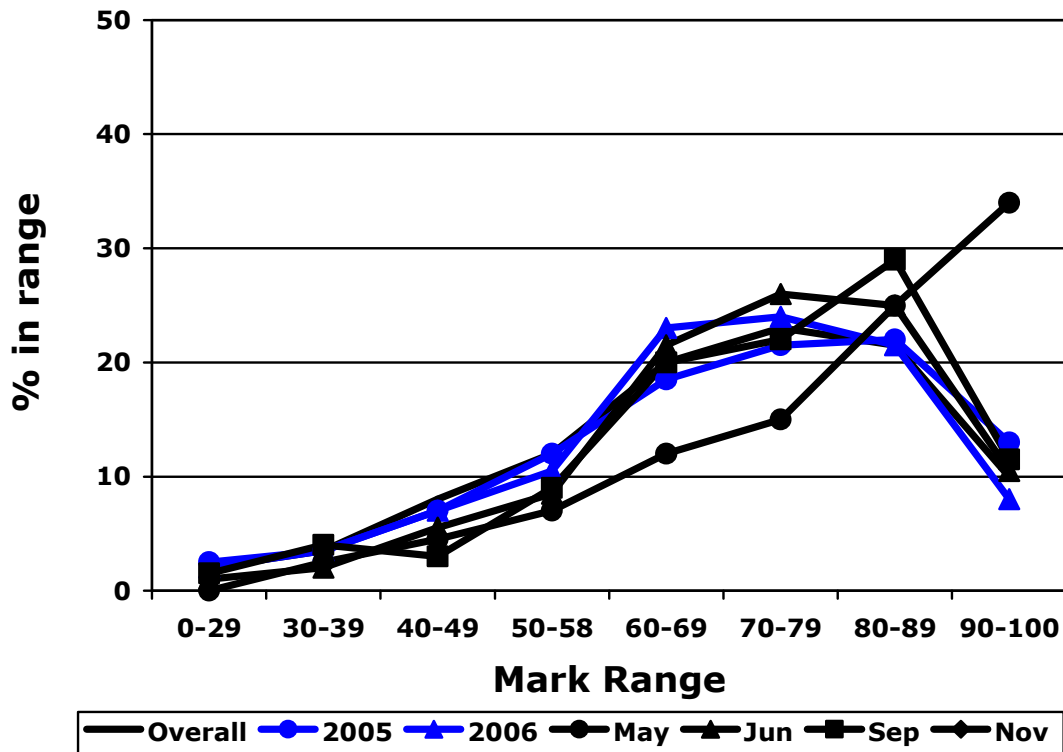
#### Number of candidates

Range	ESTA	ESTB	ER	ET	TEWC	EI	ES	September 2007	
<b>90 - 100</b>	30	8	0	0	0	0	0	<b>38</b>	<b>candidates</b>
<b>80 - 89</b>	67	25	0	0	1	0	2	<b>95</b>	<b>candidates</b>
<b>70 - 79</b>	43	30	0	0	0	0	0	<b>73</b>	<b>candidates</b>
<b>60 - 69</b>	41	26	0	0	0	0	0	<b>67</b>	<b>candidates</b>
<b>50 - 58</b>	15	14	0	0	0	0	0	<b>29</b>	<b>candidates</b>
<b>40 - 49</b>	7	3	0	0	0	0	0	<b>10</b>	<b>candidates</b>
<b>30 - 39</b>	8	4	0	0	0	0	0	<b>12</b>	<b>candidates</b>
<b>0 - 29</b>	4	2	0	0	0	0	0	<b>6</b>	<b>candidates</b>
	<b>215</b>	<b>112</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>330</b>	

#### % of candidates

Range	ESTA	ESTB	ER	ET	TEWC	EI	ES	September 2007	
<b>90 - 100</b>	14	7	0	0	0	0	0	<b>11.5%</b>	<b>of candidates</b>
<b>80 - 89</b>	31	22.5	0	0	100	0	100	<b>29%</b>	<b>of candidates</b>
<b>70 - 79</b>	20	27	0	0	0	0	0	<b>22%</b>	<b>of candidates</b>
<b>60 - 69</b>	19	23	0	0	0	0	0	<b>20%</b>	<b>of candidates</b>
<b>50 - 58</b>	7	12.5	0	0	0	0	0	<b>9%</b>	<b>of candidates</b>
<b>40 - 49</b>	3	3	0	0	0	0	0	<b>3%</b>	<b>of candidates</b>
<b>30 - 39</b>	4	3.5	0	0	0	0	0	<b>4%</b>	<b>of candidates</b>
<b>0 - 29</b>	2	1.5	0	0	0	0	0	<b>1.5%</b>	<b>of candidates</b>

## 2007 MARK RANGE - OVERALL



## 1.2 Comments

There were two sets of examinations for Electrical Service Technician A and Electrician Service Technician B. The approach taken in the June examinations when the same numbered question in each paper was the same topic (albeit different questions) was used for the September examinations.

This was considered to be the best approach based on the outcomes of the June examination. In June, where two examination papers were set for the same type of examination, the pass rates in both examinations were very similar. This approach ensured that the two moderated papers were of a similar degree of difficulty.

### 1.2.1 Moderation

All examinations were moderated through secure email and teleconferences.

All moderators participated as expected. Once again, a lot of work went into ensuring that both papers for the Electrical Service Technician A and Electrical Service Technician B papers were fair and relatively the same degree of difficulty.

### **1.2.2 Marking**

The marking went very well. The two examinations for Electrical Service Technician A and Electrical Service Technician B meant an uneven distribution of papers to markers. In both cases the majority of papers were marked by the markers for the second examinations.

### **1.2.3 Candidate performance**

The number of candidates sitting in September was consistent with previous years. The pass rate of 82.5% was also consistent with the May and June examinations where pass rates were above 80%

#### **Electrical Service Technician A**

Candidate numbers were similar to the same time last year and the pass rate of 84% for this examination was pleasing. This is despite given the wide difference in candidate numbers between the two examinations (32 for ESTA 1031 and 182 for ESTA 1032) the difference in pass rates was 0.5%.

Generally, where candidate numbers fall below about 70, results tend to be skewed. In the ESTA 1031, examination 60% of candidates passed with marks of 80% or higher. This figure dropped to 43% for the same ranges in the ESTA 1032 examination

Candidate performance across the two papers was similar except for questions 4 and 5.

- Question 4 Testing and inspection

ESTA 1031 related to reasons for carrying out PEC, Polarity and IR tests and IR testing of appliances containing semi-conductors. ESTA 1032 related to IR testing of appliances containing semi-conductors and testing for a faulty PEC.

In both papers 75% of candidates could display a basic knowledge. However, only 29% of candidates displayed a sound knowledge in the ESTA 1032 paper compared to 41% in the ESTA 1031 paper.

- Question 5 System theory

These questions were very similar in that both related to sine waves, defining Hertz and describing how a PEC contributes to safety. The main difference being that in ESTA 1031, candidates had to name the parts of a sine wave, while in ESTA 1032, they had to draw and label the sine wave.

In ESTA 1031, 25% were able to display a basic knowledge of the topic, while 66% were able to display a sound knowledge. In ESTA 1032, 31% were able to display a basic knowledge of the topic, but only 49% were able to display a sound knowledge

Candidates performed very well in question 1 (multi-choice questions), question 2 (colour coding), question 6 (drawing circuits and calculating current flow etc.) and question 8 (registration and practising licences).

An abridged analysis is contained in Appendix 1 of this paper. The full analysis is contained in Attachment 1.

### **Electrical Service Technician B**

Candidate numbers were similar to the same time last year and the pass rate of 79.5% for this examination was slightly down on previous efforts but still pleasing. As with the Electrical Service Technician A examination there was a wide difference in candidate numbers between the two examinations (20 for ESTB 2022 and 92 for ESTB 2023) the difference in pass rates was 5.5%, with the lower pass rates in the ESTB 2022 examination.

Candidate performance across the two examination papers was similar except for questions 5 and 8.

- Question 5 Testing and inspection

ESTB 2022 related to effect of the wrong connections of instrument meters and safety precautions when connecting meters. ESTB 2023 related to the tests to be carried out when reconnecting a motor repaired by another person.

In ESTB 2022, 30% of candidates displayed a basic knowledge and 50% a sound knowledge. In ESTB 2023, 48% of candidates displayed a basic knowledge, but only 16% a sound knowledge. This tends to indicate that candidates continue to struggle with the more detailed testing processes.

- Question 8 Selection, starting and protection of motors.

These questions were very similar in that both involved 230V motor control circuits and motor protection. The main difference being that ESTB 2022 required the drawing and labelling of the circuit, while ESTB 2023 required candidates to name the numbered parts of the circuit.

In ESTB 2022, 25% of candidates displayed a basic knowledge of the topic, with 50% displaying a sound knowledge. In ESTB 2023, 23% displayed basic knowledge, while 72% displayed a sound knowledge.

These results indicate that while many candidates know the different parts of a motor control circuit (ESTB 2023) half of all candidates have little appreciation of how parts are connected or work (ESTB 2022).

The main concern arising out of these examinations is the poor results for question 3 – equipment and personal safety. ESTB 2022 related to precautions after disconnecting an appliance, why the prove-test-prove method is used and continuing isolation. While 65% of candidates displayed a basic knowledge of the topic, only 15% displayed a sound knowledge.

ESTB 2023 related to how the prove-test-prove method is carried out, the difference between switching and isolation and continued isolation. While 43.5% could display a basic knowledge, only 38% displayed a sound knowledge.

Given that these questions relate to basic safety (both personally and for others) and basic safety concepts the numbers displaying a sound knowledge of this topic are too low to provide any degree of comfort. Certainly, the fact that 1 in 5 candidates in both examinations had a very poor knowledge in this area is a major concern.

An abridged analysis is contained in Appendix 2 of this paper. The full analysis is contained in Attachment 2.

### **Electrician Regulations**

There was no Electrician Regulations examination in September 2007

### **Electrician Theory**

There was no Electrician Theory examination in September 2007

### **Tradespersons Electrical Work Certificate**

One candidate sat this examination and passed with a mark of 82.

A partial analysis is contained in Appendix 5.

### **Electrical Inspector**

There was no Electrical Inspector examination in September 2007

### **Electronic Security Alarm Installer**

Two candidates sat this examination and both passed with a mark of 81.

A partial analysis is contained in Appendix 7.

# Appendix 1

## Electrical Service Technician A

### 7, 8 and 22 September 2007

ESTA 1031, a moderated paper, was used for the examination of 8 September 2007.  
 ESTA 1032, a moderated paper, was used for the examination of 22 September 2007.  
 ESTA 1033, a composite paper, was used for the examination of 7 September 2007.

#### A1.1 - Overall Candidate Performance

	Number candidates	of	Number candidates passed	of who	Percentage passed
<b>ESTA 1031</b>	32		27		84.5
<b>ESTA 1032</b>	182		153		84
<b>ESTA 1033</b>	1		1		100
<b>September 2007</b>	<b>215</b>		<b>181</b>		<b>84</b>

#### Candidate performance – ESTA 1031

<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
<b>32</b>	<b>27</b>	Average pass mark	76 %
		Median mark	82.5
	<b>84.5%</b>	<u>Those who passed</u>	
		Average pass mark	82 %
		Median mark	83

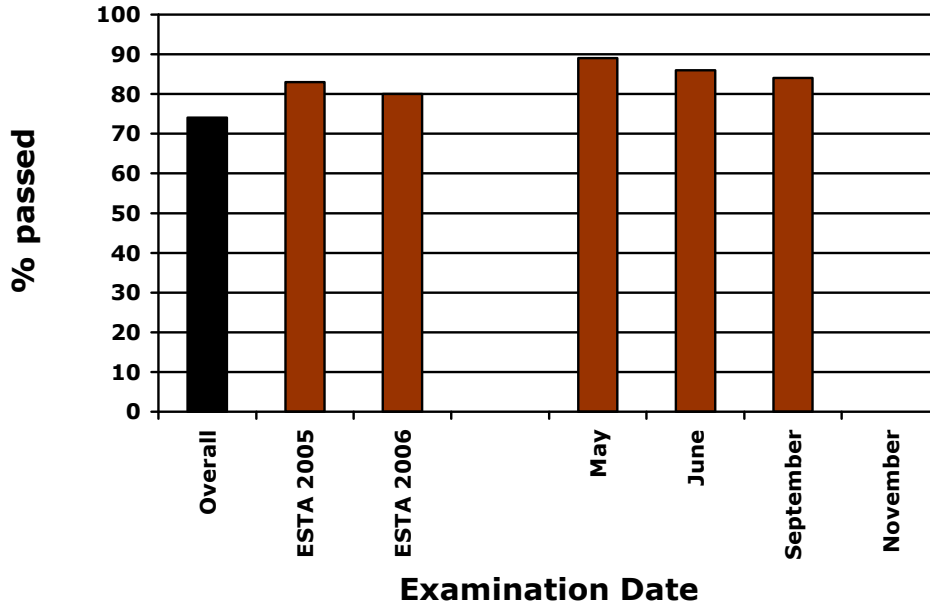
3 Candidates gained 95 or more marks.

#### Candidate performance – ESTA 1032

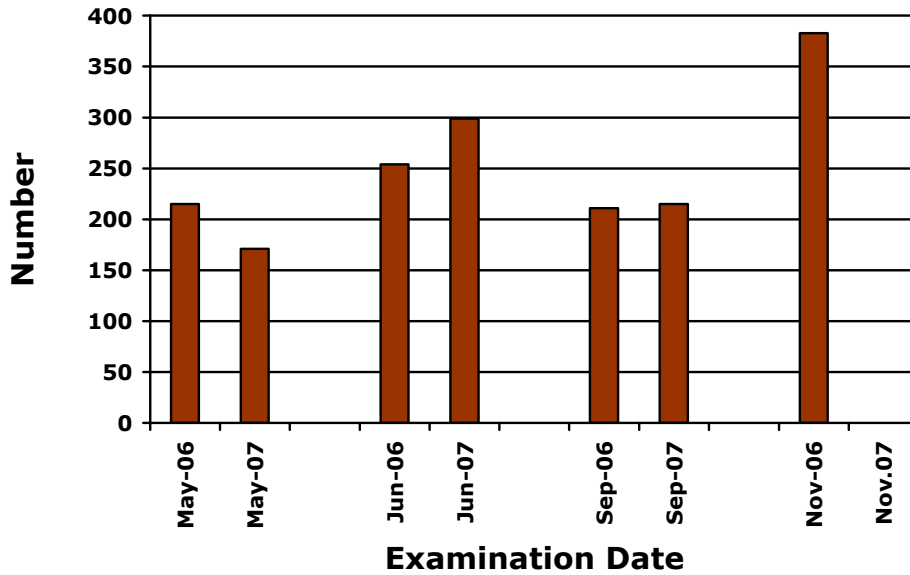
<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
<b>182</b>	<b>153</b>	Average pass mark	72.5%
		Median mark	77
	<b>84%</b>	<u>Those who passed</u>	78
		Average pass mark	80%
		Median mark	

7 Candidates gained 95 or more marks. One candidate gained 100 marks

### 2007 PASS RATES - ESTA



### 2007 - CANDIDATE NUMBERS - ESTA



## Mark Ranges

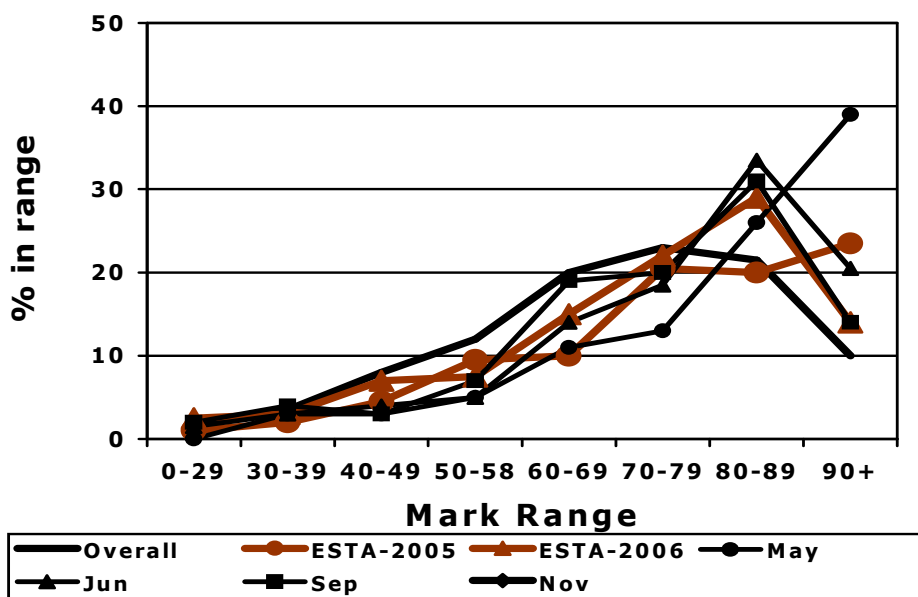
Number of candidates

Range	ESTA 1031	ESTA 1032	ESTA 1033	September 2007	
<b>90 – 100</b>	7	23	0	<b>30</b>	<b>candidates</b>
<b>80 – 89</b>	12	55	0	<b>67</b>	<b>candidates</b>
<b>70 – 79</b>	4	38	1	<b>43</b>	<b>candidates</b>
<b>60 – 69</b>	4	37	0	<b>41</b>	<b>candidates</b>
<b>50 – 58</b>	3	12	0	<b>15</b>	<b>candidates</b>
<b>40 – 49</b>	0	7	0	<b>7</b>	<b>candidates</b>
<b>30 – 39</b>	1	7	0	<b>8</b>	<b>candidates</b>
<b>0 – 29</b>	1	3	0	<b>4</b>	<b>candidates</b>
	<b>32</b>	<b>182</b>	<b>1</b>	<b>215</b>	

% of candidates

Range	ESTA 1031	ESTA 1032	ESTA 1033	September 2007	
<b>90 – 100</b>	22	13	0	<b>14%</b>	<b>% of candidates</b>
<b>80 – 89</b>	37.5	30	0	<b>31%</b>	<b>% of candidates</b>
<b>70 – 79</b>	12.5	21	100	<b>20%</b>	<b>% of candidates</b>
<b>60 – 69</b>	12.5	20	0	<b>19%</b>	<b>% of candidates</b>
<b>50 – 58</b>	9.5	6.5	0	<b>7%</b>	<b>% of candidates</b>
<b>40 – 49</b>	0	4	0	<b>3%</b>	<b>% of candidates</b>
<b>30 – 39</b>	3.5	4	0	<b>4%</b>	<b>% of candidates</b>
<b>0 – 29</b>	3.5	1.5	0	<b>2%</b>	<b>% of candidates</b>

## 2007 MARK RANGE - ESTA



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## A1.2 - Overall Marking Analysis

### Performance by topic

Candidates who gained between 75% and 100% of the marks (15 to 20 marks for question 1 and 7.5 to 10 marks for any other question) are considered to have a sound knowledge of a topic. The table below shows the percentage of candidates in each range for a topic. It also compares the performance with some similar questions from previous examination papers.

The questions in bold are from ESTA 1031

The questions in bold/italic are from ESTA 1032

	<b>Topic No.</b>	<b>Topic</b>	<b>Year</b>	<b>Q.No.</b>	<b>Subject</b>	<b>75-100% (%)</b>	<b>50 – 70% (%)</b>	<b>0 – 45% (%)</b>
<b>Q 1</b>	-	<b>10, 2 mark questions</b>				<b>75</b>	<b>22</b>	<b>3</b>
<b><i>Q 1</i></b>	-	<b><i>10, 2 mark questions</i></b>				<b>65</b>	<b>29.5</b>	<b>5.5</b>

	<b>Topic No.</b>	<b>Topic</b>	<b>Year</b>	<b>Q.No.</b>	<b>Subject</b>	<b>75-100% (%)</b>	<b>50 – 70% (%)</b>	<b>0 – 45% (%)</b>
<b>Q 2</b>	<b>H3d.41</b>	<b><u>Cables and Cords Specifications</u></b>			<b>Core &amp; colour coding of cords, volt drop in cords</b>	<b>75</b>	<b>19</b>	<b>6</b>
<b>Q 2</b>	<b>H3d.41</b>	<b><u>Cables and Cords Specifications</u></b>			<b>Core &amp; colour coding of cords, cord wound on drum</b>	<b>93</b>	<b>5</b>	<b>2</b>
			Sep 2004	14	Core & colour coding of cords	86.5	12.5	1
			Nov 2004	13	Core & colour coding of cords, max. PEC resistance	86.5	11	2.5
			Jun 2005	13	Core & colour coding of cords	96	3	1
			Sep 2005	12	Core & colour coding of cords	93.5	3.5	3
			Jun 2006	4	Selection criteria for cord, colour coding, and current ratings	40	50	10
			Nov 2006	7	Colour coding of replacement cords, care of extension leads	66	23	11
			May 2007	3	Colour coding of replacement cords, care of extension leads	90.5	6	3.5
			May 2007	7	Why volt drop in cord, effect of volt drop, cord current ratings. Selection of flexible cord	65.5	16.5	18
			Jun 2007	7	Cord current ratings, colour coding	37	40	23

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	H10.66	<u>Fault diagnosis</u>			Faulty vacuum cleaner. Calculate fault current, whether fuse will blow, power dissipated.	50	34	16
Q 3	H10.66	<u>Fault diagnosis</u>			<b>Faulty heater. Draw circuit diagram, calculate fault current, whether fuse will blow. Phase, neutral transpositions.</b>	<b>56.5</b>	<b>20.5</b>	<b>23</b>
			Sep 2006	7	Faulty heater, danger to person using it, calculate current in PEC and shock voltage, effect of transposition	17.5	46.5	36
			Nov 2006	3	Faulty washing machine, calculate current, , power dissipated in PEC and whether fuse will operate, cause of neutral to be switched in an appliance	56	30	14
			May 2007	2	Effect of transposition of neutral. Faulty washing machine - calculate current and power in PEC and whether fuse would blow	73	12	15
			Jun 2007	3	Faulty heater, calculate current and shock voltage, explain danger to user, effect of transposition	41.5	40	18.5
			Jun 2007	3	Faulty dishwasher, calculate current and power in PEC and whether fuse would operate, effect of transpositions	64	22.5	13.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 4	K4.46	<u>Testing and inspection methods</u>			Reason for carrying out PEC, Polarity and IR tests, Why PEC test before IR test. IR test of appliance with semi-conductor devices	40.5	34.5	25
Q 4	K4.46	<u>Testing and inspection methods</u>			<b>IR test of appliance with semi-conductor devices, faulty PEC</b>	<b>29</b>	<b>47</b>	<b>24</b>
			Nov 2005	18	PEC and insulation resistance testing of concrete mixer	29	33	38
			May 2006	8	PEC test and insulation resistance test on concrete mixer	62.5	27.5	10
			May 2006	9	Reason for PEC, polarity and insulation resistance tests. Polarity testing	39	33	28
			Sep 2006	6	IR test not damage semi-conductors, IR test on concrete mixer, IR test on appliance with MOV surge protection	47.5	35	17.5
			Nov 2006	6	Reason for PEC, polarity and insulation resistance tests. WHY PEC test before IR test, Polarity testing	57	23	20
			Jun 2007	4	Why ohmmeter not used for IR test, PEC testing, connecting ammeter in parallel	58.5	30	11.5
			Jun 2007	4	IR testing, testing appliance with MOV fitted	52.5	33.5	14

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	D1.12 D3.21	<b><u>System theory</u> - 3 – phase systems <u>System theory</u> - Earthing of installations fittings and appliances</b>			<b>Name parts of sine wave, define Hertz. How PEC contributes to safety, testing faulty PEC</b>	<b>66</b>	<b>25</b>	<b>9</b>
Q 5	D1.12 D3.21	<b><u>System theory</u> - 3 – phase systems <u>System theory</u> - Earthing of installations fittings and appliances</b>			<b><i>Define Hertz, draw and label sine wave. How PEC contributes to safety, testing faulty PEC</i></b>	<b>49</b>	<b>31</b>	<b>20</b>
			Dec 2003	12	Define Hertz, sketch & label one cycle	67	18	15
			Nov 2004	15	Define Hertz, sketch & label one cycle	54	22	24
			May 2005	13	PEC – max resistance, how it contributes to safety, action if PEC is 15Ω	54	20	26
			May 2005	14	Describe earthed situation, danger if appliances used in earthed situation	29	31	40
			Nov 2005	15	Testing high res. PEC, danger if appliances used in earthed situation	58	23	19
			Nov 2006	2	Define Hertz, sketch & label one cycle, define standard low voltage, low voltage direct contact, isolated and indirect contact	56	30	14
			May 2007	9	Voltage waveform, name components, define Hertz, PEC conductors, repair of appliance PEC	55.5	28.5	16

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	A5.5	<u>Theory</u> - Simple circuits			Draw 230V circuit supplying 2 elements in series and 2 in parallel, Calculate ammeter reading, effect if resistance open circuited.	62.5	22	15.5
Q 6	A5.5	<u>Theory</u> - Simple circuits			<i>Draw 230V circuit supplying 2 elements in series and 2 in parallel, Calculate ammeter reading, power dissipated.</i>	<b>67</b>	<b>14</b>	<b>19</b>
			Sep 2006	4	Circuit of three resistances two in parallel and in series with another – calculate power, current and volt drop across series resistor	67	5	28
			Nov 2006	8	Draw circuit with 3 resistances in parallel, calculate current and power	62	11	27
			May 2007	6	Draw circuit with 3 resistances in series/parallel, calculate current and power	71	6	23
			Jun 2007	5	Draw 230V circuit supplying 3 resistors, calculate current, effect if one resistor open-circuited	77	9	14
			Jun 2007	5	Draw 230V circuit for heater supplying 2 elements, calculate current, maximum power, difference if elements connected in series	66	22	12

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 7	H3d.41	<u>Cables and Cords Specifications</u>			Fitting plug to flexible cord. Appliance controlled by thermostat, What makes simmerstat and thermostat operate	56	38	6
Q 7	H3d.41	<u>Cables and Cords Specifications</u>			<i>Why PEC should be longer in plug, why cord from Class II appliance not used on a Class I appliance. Three qualities of insulation , What makes simmerstat and thermostat operate</i>	34.5	38	27.5
			May 2007	8	Fitting plug to flexible cord, testing of portable oven and RCDs	65.5	23.5	11
			Jun 2007	7	Why PEC should be longer in plug, why cord from Class II appliance not used on a Class I appliance, why earth pin longer, factors in cord selection	78	14	8
Q 8	P2.13 P3.13	<u>Legislation</u> Registration <u>Legislation</u> Practising licences			<b>Name of licence, date of expiry, where application made. Three classes of worker can do PEW. Refresher courses</b>	<b>75</b>	<b>19</b>	<b>6</b>
Q 8	P2.13 P3.13	<u>Legislation</u> Registration <u>Legislation</u> Practising licences			<i>Name of licence, date of expiry, where application made. Three classes of worker can do PEW. Refresher courses</i>	65.5	15.5	19
			Sep 2006	8	Practising licences, classes permitted to do PEW, refresher courses	47	24	29

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	H1b.28 H1c.31	<b><u>Protection and Control</u></b> RCD characteristics <b><u>Protection and Control</u></b> Selection of control and protection equipment			How RCD operates on fault, meaning of PRCD. Three disadvantages of rewirable fuses. Why not permitted to use fuse wire on HRC fuse	47	22	31
Q 9	H1b.28 H1c.31	<b><u>Protection and Control</u></b> RCD characteristics <b><u>Protection and Control</u></b> Selection of control and protection equipment			<i>How RCD operates on fault, meaning of PRCD. Three disadvantages of rewirable fuses. Why not permitted to use fuse wire on HRC fuse</i>	42.5	36	21.5
			Nov 2006	4	Characteristics of HRC fuses, advantages of HRC fuses over rewirable fuses, why not permitted to bridge HRC fuse carrier with fuse wire	55	31	14
			Jun 2007	2	Four characteristics for replacement HRC fuse, under-rated and over-rated fuses, technical advantages of HRC over rewirable fuses	78	14	8
			Jun 2007	2	How RCD operates on fault, meaning of PRCD, why not permitted to use fuse wire on HRC fuse	37	40	23

## **A1.3 - ESTA 1031**

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### **A1.3.1 - Moderation**

There were two moderators for ESTA 1031.

This paper and ESTA 1032 were “parallel” papers. That is, the same topic (albeit different questions) was covered in the same numbered question in both papers. Moderation was conducted by secure email and the content of both papers was considered reasonable in terms of content and time. Both papers presented a similar degree of difficulty.

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### **A1.3.2 - Marking**

There were two markers for ESTA 1031.

Teleconferences were held with the markers on 17 and 24 September.

Version 2 of the answer schedule was sent to markers on 20 September.

#### Comments

Comments were requested regarding the moderation of the paper. Candidates seemed to have difficulty interpreting question 3(b)(i) and to a lesser extent question 6(c) and 7(c). Some wording changes seemed to be required to facilitate understanding. This should have been picked up during the moderation process.

Overall, the paper provided a good test of the candidates’ knowledge applicable to the class of work covered by their registration with most obtaining very good marks.

Most papers were readable. There was only one paper where the spelling and handwriting were so bad that often a guess had to be made about the meaning of an answer.

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### A1.3.3 - Amendments to ESTA 1031

<b>The significant amendments to <u>ESTA 1031</u> arising from the moderation and marking were as follows:</b>			
<b>No.</b>	<b>Question (Moderation)</b>	<b>Answer (Moderation)</b>	<b>Answer (Marking)</b>
I(b)	Changed to make a clearer distinction between options	-	
2(a)(i)	-	-	Reference to "earth continuity" added
3(b)(i)	-	-	Additional options added
4(a)(i)	Deleted reference to earth continuity conductor	-	
4(c)	Amended preamble to make intention clearer	-	
5(a)(ii)	-	Amended to remove options. All answers in schedule were required	Reference to "maximum value" included
6(b)	Amended to add reference to the drawing done by candidate in (a)	Answer corrected	
6(c)	Editorial amendment	-	
7(c)	Parts (i) and (ii) rewritten to make intention clearer	-	Answer corrected
9(a)	-	1 <sup>st</sup> bullet point amended to make answer clearer	

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## **A1.4 - ESTA 1032**

### **A1.4.1 - Moderation**

There were two moderators for ESTA 1032.

The paper and ESTA 1031 were “parallel” papers. That is, the same topic (albeit different questions) was covered in the same numbered question in both papers. Moderation was conducted by secure email and the content of both papers was considered reasonable in terms of content and time. Both papers presented a similar degree of difficulty.

### **A1.4.2 - Marking**

There were two markers for ESTA 1032.

Teleconferences were held with the markers on 3 and 8 October.

The amendments comprising version 2 of the answer schedule were sent to markers on 3 October.

#### Comments

This was an easy paper. Some questions like Question 9(b) and (c) were very similar, but otherwise a good variety of questions.

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### A1.4.3 – Amendments to ESTA 1032

<b>The significant amendments to ESTA 1032 arising from the moderation and marking were as follows:</b>			
<b>No.</b>	<b>Question (Moderation)</b>	<b>Answer (Moderation)</b>	<b>Answer (Marking)</b>
3(a)	Amended to make intention clearer	-	-
3(b)(i)	-	Answer corrected	-
3(b)(ii)	-	Answer corrected	-
4(a)(i)	Editorial amendment	-	-
4(a)(ii)	Editorial amendment	Amended to make answer more specific	-
5(b)	Editorial amendment	-	-
5(c)	Deleted reference to "earth continuity conductor"	-	-
5(c)(i)	Editorial amendment	-	-
6(b)(i)	Editorial amendment	-	-
6(b)(ii)	-	Answer corrected	Correct answer inserted
7(d)	Parts (i) and (ii) rewritten to make intention clearer	-	-
9(b)	-	-	6 <sup>th</sup> bullet point corrected

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## Appendix 2

### Electrical Service Technician B

#### 15 and 29 September 2007

ESTB 2022, a moderated paper, was used for the examination of 15 September 2007.  
ESTB 2023, a moderated paper, was used for the examination of 29 September 2007.

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#### A2.1 - Overall Candidate Performance

	Number candidates	of	Number candidates passed	of who	Percentage passed
<b>ESTB 2022</b>	20		15		75
<b>ESTB 2023</b>	92		74		80.5
<b>September 2007</b>	<b>112</b>		<b>89</b>		<b>79.5</b>

##### Candidate performance – ESTB 2022

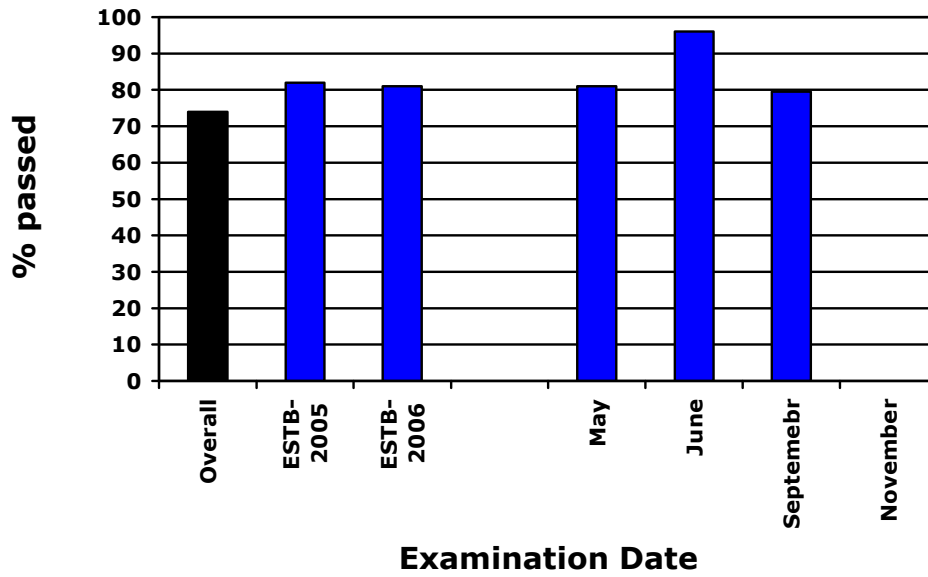
<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
<b>20</b>	<b>15</b>	Average pass mark	72%
		Median mark	79
	<b>75%</b>	<u>Those who passed</u>	
		Average pass mark	79%
		Median mark	81

##### Candidate performance – ESTB 2023

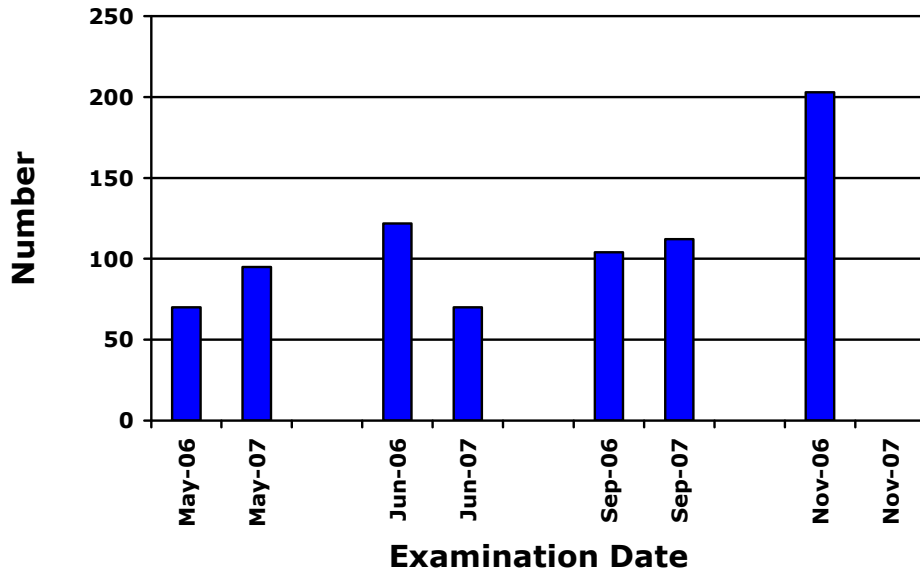
<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
<b>92</b>	<b>74</b>	Average pass mark	69.5%
		Median mark	72.5
	<b>80.5%</b>	<u>Those who passed</u>	
		Average pass mark	75%
		Median mark	76

2 candidates gained more than 95 marks.

### 2007 PASS RATES - ESTB



### 2007 CANDIDATE NUMBERS - ESTB



## Mark Ranges

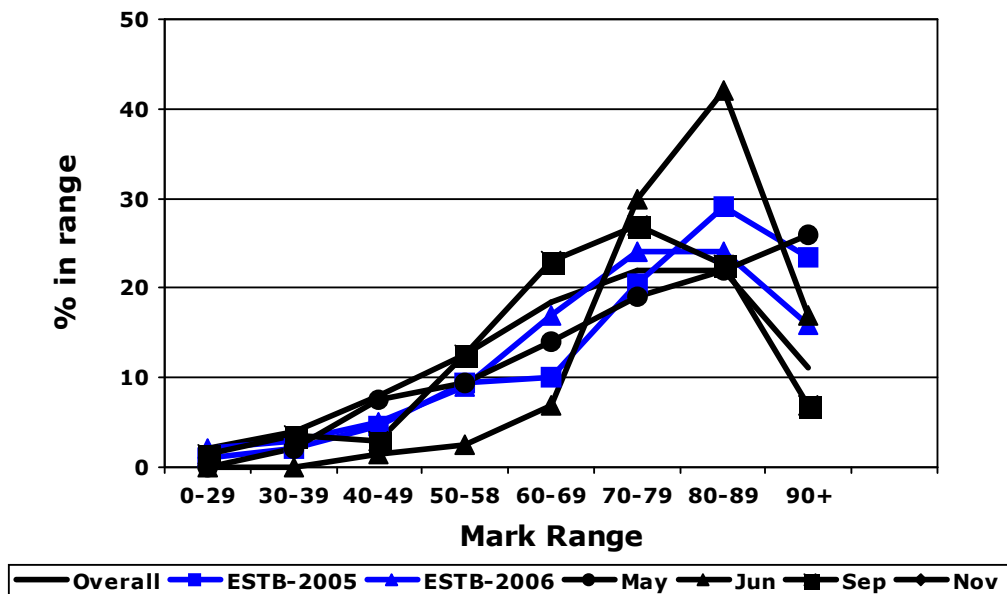
Number of candidates

Range	ESTB 2022	ESTB 2023	September 2007	
90 – 100	1	7	8	candidates
80 – 89	8	17	25	candidates
70 – 79	2	28	30	candidates
60 – 69	4	22	26	candidates
50 – 58	4	10	14	candidates
40 – 49	0	3	3	candidates
30 – 39	1	3	4	candidates
0 – 29	0	2	2	candidates
	<b>20</b>	<b>92</b>	<b>112</b>	

% of candidates

Range	ESTB 2022	ESTB 2023	September 2007	
90 – 100	5	7.5	7%	of candidates
80 – 89	40	18.5	22.5%	of candidates
70 – 79	10	30.5	27%	of candidates
60 – 69	20	24	23%	of candidates
50 – 58	20	11	12.5%	of candidates
40 – 49	0	3.25	3%	of candidates
30 – 39	5	3.25	3.5%	of candidates
0 – 29	0	2	1.5%	of candidates

### 2007 MARK RANGE - ESTB



## A2.2 - Overall Marking Analysis

### Performance by topic

Candidates who gained between 75% and 100% of the marks (15 to 20 marks for question 1 and 7.5 to 10 marks for any other question) are considered to have a sound knowledge of a topic. The table below shows the percentage of candidates in each range for a topic. It also compares the performance with some similar questions from previous examination papers.

The questions in bold are from ESTB 2022

The questions in bold/italic are from ESTB 2023

	<b>Topic No.</b>	<b>Topic</b>	Year	Q.No.	<b>Subject</b>	<b>75-100% (%)</b>	<b>50 – 70% (%)</b>	<b>0 – 45% (%)</b>
<b>Q 1</b>	-	<b>10, 2 mark questions</b>				<b>95</b>	<b>5</b>	<b>0</b>
<b>Q 1</b>	-	<b>10, 2 mark questions</b>				<b>63</b>	<b>30.5</b>	<b>6.5</b>
<b>Q 2</b>	<b>E4.18</b>	<b><u>3ph- Motor/Alternators</u> Fault diagnosis</b>			<b>Detail tests before reconnection to be made to motor repaired by another person</b>	<b>35</b>	<b>45</b>	<b>20</b>
<b>Q 2</b>	<b><i>E4.18</i></b>	<b><i><u>3ph- Motor/Alternators</u> Fault diagnosis</i></b>			<b><i>Two conditions that would cause overload, two causes for faults, reason for using reduced voltage starters</i></b>	<b>31.5</b>	<b>42.5</b>	<b>26</b>
			Sep 2004	9	Faults on motors and starters	18	48.5	33.5
			Nov 2004	10	PEC tests on 3 phase motor, other check and tests	27.5	46	26.5
			Jun 2005	7	Faults on motors and starters	42	43	15

	<b>Topic No.</b>	<b>Topic</b>	Year	Q.No.	<b>Subject</b>	<b>75-100% (%)</b>	<b>50 – 70% (%)</b>	<b>0 – 45% (%)</b>
<b>Q 3</b>	<b>L1.40/54</b>	<b><u>Isolation</u> Equipment and Personal safety</b>			<b>Four precautions after disconnecting an appliance, why prove- test-prove is used, fours way of ensuring continued isolation</b>	<b>15</b>	<b>65</b>	<b>20</b>
<b>Q 3</b>	<b>L1.40/54</b>	<b><u>Isolation</u> Equipment and Personal safety</b>			<b><i>Why prove-test-prove is used and how it is carried out, difference between switching off and isolation fours way of ensuring continued isolation</i></b>	<b>38</b>	<b>43.5</b>	<b>18.5</b>
			Mar 2004	5	4 safety precautions when disconnecting appliance, isolation and switching off, continued isolation	34	43	23
			Nov 2004	5	Why prove-test-prove method is used, how it is carried out	50	30	20
			May 2005	7	4 safety precautions when disconnecting appliance, isolation and switching off, continued isolation	60	15	25
			Sep 2006	7	Additional precautions to secure isolation, switching off and isolating, explain prove-test-prove method, PPE	71	21	8

	<b>Topic No.</b>	<b>Topic</b>	<b>Year</b>	<b>Q.No.</b>	<b>Subject</b>	<b>75-100% (%)</b>	<b>50 – 70% (%)</b>	<b>0 – 45% (%)</b>
<b>Q 4</b>	<b>H1a.27</b>  <b>H1c.31</b>	<b><u>Protection and Control</u></b> <b>Protection characteristics</b> <b><u>Protection and Control</u></b> <b>Selection of control and protection equipment</b>			<b>Why important to thread fuse wire through tortuous path, What is utilisation category (fusing factor) and how it influences fuse operation, why important to select correct rupturing capacity, calculate fuse current rating</b>	<b>30</b>	<b>40</b>	<b>30</b>
<b>Q 4</b>	<b>H1a.27</b>  <b>H1c.31</b>	<b><u>Protection and Control</u></b> <b>Protection characteristics</b> <b><u>Protection and Control</u></b> <b>Selection of control and protection equipment</b>			<b>Main purpose of a fuse and RCD, how does combined MCB operate on overload and short circuit, define current rating of fuse, phase failure relay</b>	<b>40</b>	<b>32</b>	<b>28</b>
			Mar 2004	7	Why fuses located on switchboards, over-rated and under-rated fuses, technical advantages of HRC fuses	91	9	0
			May 2005	6	Effect on circuit of using over-rated and under-rated fuses and relays. Describe operation of the 3 types of MCB	60	15	25
			Jun 2006	4	Purpose of fuse, MCB, RCD on switchboard, operation of magnetic/thermal RCD, current ratings, phase failure relays	33.5	41	25.5

	<b>Topic No.</b>	<b>Topic</b>	Year	Q.No.	<b>Subject</b>	<b>75-100% (%)</b>	<b>50 – 70% (%)</b>	<b>0 – 45% (%)</b>
			Sep 2006	6	Describe operation of the 3 types of MCB, HRC back-up protection, rewirable fuses	84.5	9.5	6
			Nov 2006	4	Define and apply utilisation category (fusing factor, select fuse for rupturing capacity, markings on HRC fuse, main purpose of protection on switchboard	25	37	38
			May 2007	6	Purpose of fuses, RCD on switchboard, current ratings, HRC motor rated fuses, rewirable fuses	64	31	5
			Jun 2007	3	Purpose of fuse and RCD on switchboard, current rating of fuses, how internal mechanism operates on thermal and magnetic MCBs	95	5	0
			Jun 2007	3	Current rating of fuse, over-rated and under-rated fuses, use of phase failure and phase reversal relays, reloading rewirable fuses	90.5	6.5	3

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	K4.46	<u>Testing and inspection methods</u>			What happens if ammeter connected in parallel and voltmeter connected in series, four safety precautions when using test instruments	50	30	20
Q 5	K4.46	<u>Testing and inspection methods</u>			<b>Detail tests before reconnection to be made to motor repaired by another person</b>	<b>16</b>	<b>48</b>	<b>36</b>
			Jun 2005	9	Insulation resistance testing of single phase machine, other tests and checks	71	21	8
			Nov 2005	8	Insulation resistance testing of 3 phase motor with thermistors	49	25	26
			May 2006	5	Insulation resistance testing of 3 phase motor, test to confirm integrity of PEC	84	14.5	1.5
			Jun 2006	7	Insulation resistance testing of 3 phase motor, test to confirm integrity of PEC	45	39	16
			Jun 2006	9	Why voltmeter should not be connected in series, Why ammeter should not be connected in parallel, safety precautions when testing	28	39	33
			Sep 2006	4	3 phase motor – IR test, PEC test, recommissioning	62.5	31.5	6
			May 2007	5	Effect of connecting voltmeter in series, and ammeter in parallel, safety precautions when testing	43	28.5	28.5

	<b>Topic No.</b>	<b>Topic</b>	Year	Q.No.	<b>Subject</b>	<b>75-100% (%)</b>	<b>50 – 70% (%)</b>	<b>0 – 45% (%)</b>
<b>Q 6</b>	<b>H3d.41</b>	<b><u>Cables and Cords Specifications</u></b>			<b>Four physical factors when selecting cord, why voltage less and load end of cord, define current rating of cord, colours coding for three-phase cord.</b>	<b>80</b>	<b>20</b>	<b>0</b>
<b>Q 6</b>	<b>H3d.41</b>	<b><u>Cables and Cords Specifications</u></b>			<b>Six factors when selecting cords, colour coding of single phase cord. Two ways of identifying double insulated appliance</b>	<b>83</b>	<b>14</b>	<b>3</b>
			May 2005	3	Colour coding of conductors, factors in cord selection, plug polarity	27	46	27
			Sep 2005	3	Colour coding of conductors, factors in cord selection	75	22	3
			Sep 2006	2	Flexible cords - selection, colour coding, volt drop, current rating.	81	17	2
			May 2007	9	Factors in selecting cord, colour coding, volt drop in cords, current rating of cords	75	20	5

	<b>Topic No.</b>	<b>Topic</b>	<b>Year</b>	<b>Q.No.</b>	<b>Subject</b>	<b>75-100% (%)</b>	<b>50 – 70% (%)</b>	<b>0 – 45% (%)</b>
<b>Q 7</b>	<b>K2.38</b>	<b><u>Statutory testing and inspection requirements</u></b>			<b>Standard to which appliance must be tested, testing requirements and visual checks to Standard</b>	<b>45</b>	<b>45</b>	<b>10</b>
<b>Q 7</b>	<b>K2.38</b>	<b><u>Statutory testing and inspection requirements</u></b>			<b>Standard to which appliance must be tested, three checks and tests to be carried out, testing requirements of Standard, polarity testing</b>	<b>56</b>	<b>27</b>	<b>17</b>
			Mar 2004	9	Testing to AS/NZS 3760	83	8	9
			May 2005	9	Testing to AS/NZS 3760	81	15	4
			Jun 2005	4	Testing to AS/NZS 3760	88	10	2
			Nov 2005	7	Testing to AS/NZS 3760	76.5	5.5	18
			Nov 2006	5	Testing to AS/NZS 3760, polarity	84	13	3
			Jun 2007	4	Testing to AS/NZS 3760, visual checks	81.5	8	10.5
			Jun 2007	4	Testing to AS/NZS 3760, polarity tests	94	3	3

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	E2.16	<u>3ph-Motor/Alternators</u> Selection, starting, protection			Draw and label circuit diagram of 230V motor control circuit, protection other than thermal overload, two causes for fault.	50	25	25
Q 8	E2.16	<u>3ph-Motor/Alternators</u> Selection, starting, protection			<i>Name numbered parts of 230V motor control circuit, two typical operating voltages, how thermal overload and HRC fuse protects motor, reveal of supply to motor</i>	72	23	5
			Nov 2004	4	Reversal of supply line to 3 phase motor, reduced voltage starters, sketch 400V control circuit	46.5	23	30.5
			Nov 2005	3	230V control circuit, terminal block connections	46	22	32
			May 2006	8	400V control circuit for DOL starter, explain how circuit protects, explain how phase reversal protects	64	20	16
			Jun 2006	3	Draw 400V control circuit, reduced voltage starters	28	1	71
			Nov 2006	2	Reversal of supply line to 3 phase motor, reduced voltage starters, sketch 230V control circuit, how thermal overload protects motor	55	28	17
			May 2007	3	Parts of DOL starter, protection by thermal overload or thermistor, reversal of supply lines	70.5	22	7.5

	<b>Topic No.</b>	<b>Topic</b>	Year	Q.No.	<b>Subject</b>	<b>75-100% (%)</b>	<b>50 – 70% (%)</b>	<b>0 – 45% (%)</b>
<b>Q 9</b>	<b>H10.66</b>	<b><u>Fault diagnosis</u></b>			<b>Reconnection of single phase sewing machine, detail instrument checks before connection, ensuring own safety checks after reconnection.</b>	<b>55</b>	<b>35</b>	<b>10</b>
<b>Q 9</b>	<b>H10.66</b>	<b><u>Fault diagnosis</u></b>			<b><i>Faulty press, describe isolation procedure, testing to establish fault, likely cause of fault.</i></b>	<b>40</b>	<b>42.5</b>	<b>17.5</b>
			Sep 2005	5	Faulty three phase hot water cylinder - isolation, reason for fault, testing to locate fault	65	23	12
			Nov 2006	3	3 phase motor with broken isolator. , safe disconnection and isolation procedures, testing and diagnose fault.	54	34.5	11.5
			May 2007	4	Replacement hot water cylinder, tests before connection, safety precautions before connection	59	20	21
			Jun 2007	6	Faulty washing machine, calculate current and power in PEC, whether fuse would operate, phase/neutral transpositions	63	26.5	10.5

## 2.3 - ESTB 2022

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### A2.3.1 - Moderation

There were two moderators for ESTB 2022.

This paper and ESTB 2023 were “parallel” papers. That is, the same topic (albeit different questions) was covered in the same numbered question in both papers. Moderation was conducted by secure email and the content of both papers was considered reasonable in terms of content and time. To ensure the degree of difficulty was relatively the same in both papers, question 8 was swapped between papers.

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### A2.3.2 - Marking

There were two markers for ESTB 2022.

One teleconference was held with the markers on 1 October.

There were no amendments to the answer schedule, although any reasonable answer was accepted for question 9(c).

#### Comments

The paper covered a range of topics that a serviceperson would encounter in their employment and gives a fair assessment of their skills. The answers reflect the candidate’s ability to work in a safe manner.

However, it is still a concern that the answers often show rote learning. Answers follow a standard pattern and often do not follow variations that appear in the questions from time to time. For example, some answers for a question on testing related to testing the neutral even if there is no neutral. It seems candidates have studied text book answers and cannot adapt. It this what happens in practice?

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### A2.3.3 - Amendments to ESTB 2022

<b>The significant amendments to ESTB 2022 arising from the moderation and marking were as follows:</b>			
<b>No.</b>	<b>Question (Moderation)</b>	<b>Answer (Moderation)</b>	<b>Answer (Marking)</b>
1(c)	Editorial amendment	-	-
1(b)(i)	-	Editorial amendment	-
2	Amended to make intention clearer	-	-
3(a)	Rewritten to make intention clearer	Amended accordingly	-
4(b)(iii)	Rewritten to place emphasis on selecting the fuse	-	-
4(c)	Rewritten to make intention clearer	Amended accordingly	-
6(b)(ii)	Rewritten to ensure there is a connection to (b)(i)	-	-
6(d)	Editorial amendment	-	-
7(c)(i)	-	1st bullet point corrected	-
8(b)	Question not clear as to what is intended. Replaced with question relating to thermistors.	Amended accordingly	-
9	Question rewritten to place emphasis on reconnection not reconnection and recommissioning	Parts (a) and (c) amended accordingly	-

## **A2.4 - ESTB 2023**

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### **A2.4.1 - Moderation**

There were two moderators for ESTB 2023.

This paper and ESTB 2022 were “parallel” papers. That is, the same topic (albeit different questions) was covered in the same numbered question in both papers. Moderation was conducted by secure email and the content of both papers was considered reasonable in terms of content and time. To ensure the degree of difficulty was relatively the same in both papers, question 8 was swapped between papers.

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### **A2.4.2 - Marking**

#### ESTB 2023

There were two markers for ESTB 2023.

Teleconferences were held with the marker on 11 and 15 October.

Version 2 of the answer schedule was sent to markers on 11 October.

#### Comments

The papers were generally well answered by most candidates. There were not too many scripts with illegible handwriting.

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### A2.4.3 - Amendments to ESTB 2023

<b>The significant amendments to ESTB 2023 arising from the moderation and marking were as follows:</b>			
<b>No.</b>	<b>Question (Moderation)</b>	<b>Answer (Moderation)</b>	<b>Answer (Marking)</b>
1(a)	Rewritten to require both terms relating to the rating of the MCB	Amended accordingly	1 <sup>st</sup> bullet point amended to be more specific
1(b)	-	Editorial amendment	-
1(c)	-	Additional option added	-
1(d)(ii)	-	-	Additional option added
1(e)	-	Amended to make more specific	Expanded so the different options are distinct
1(f)	-	-	Alternative answer added to 2 <sup>nd</sup> bullet point Additional option added
1(i)	-	-	Amended to show the points from the regulations that are required to be covered in an answer
2(a)	Rewritten to make intention clearer	Amended accordingly	-
2(b)(ii)	-	-	2 <sup>nd</sup> bullet point deleted as being (essentially) the same as the 1st
3(a)	Rewritten to make intention clearer		
4(a)	Rewritten to ensure both parts are clearly defined	Amended accordingly	-
4(c)	-	Amended to make clear distinction between the two options	-
5	Preamble rewritten to give clearer direction to candidates	3 <sup>rd</sup> bullet point amended to be consistent with question.	-
8(a)	Rewritten to give clearer direction to candidates	Amended accordingly	Additional options added relating to circuits operating at extra-low voltage
8(b)(ii)	-	-	Amended to make answer more specific

## **Appendix 3**

### **Electrician Regulations**

There was no Electrician Regulations examination in September 2007.

## **Appendix 4**

### **Electrician Theory**

There was no Electrician Theory examination in September 2007.

## Appendix 5

### Tradesperson Electrical Work Certificate

**29 September 2007**

TEWC 144, a moderated paper, was used for the plumbers and gasfitters examination.

- Parts 1 and 2 (questions 1-9) are completed by plumbers.
- Parts 1 and 3 (questions 1-4 and 10-14) are completed by gasfitters.

Plumber/gasfitters complete TEWC 144A which comprised questions 1 to 4, 5, 7, 8, 13 and 14 of TEWC 144.

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#### **A5.1 - Moderation**

There were two moderators for TEWC 144.

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#### **A5.2. - Marking**

There was one marker for TEWC 144 and 144A.

##### Comments

One candidate sat this examination and passed with a mark of 82.

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### A5.3 - Amendments to TEWC 144

<b>The significant amendments to TEWC 144 arising from the moderation and marking were as follows:</b>			
<b>No.</b>	<b>Question (Moderation)</b>	<b>Answer (Moderation)</b>	<b>Answer (Marking)</b>
1(a)	Rewritten to make intention clearer	-	-
1(b)	-	Additional option added	-
1(d)(i)	Replaced with a more topical question	Amended accordingly	-
1(f)	-	Amended to be more specific	-
1(i)	Rewritten to make intention clearer	-	-
1(j)	-	Two additional options added	-
2(a)(ii)	Rewritten to ensure there is a clear relationship to (a)(i)	2 <sup>nd</sup> and 3 <sup>rd</sup> bullet points deleted as being the same the 4 <sup>th</sup> bullet point	-
3(b)	-	Additional option added	-
5(a)(ii)	-	1 <sup>st</sup> bullet point deleted as answer not relevant to question	-
6(c)	-	1 <sup>st</sup> bullet point amended to be more specific	-
7(a)(ii)	Amended to require whether the test result is a minimum or maximum value	-	-
8	-	2 <sup>nd</sup> bullet point amended to be consistent with the question.	-
10(a)(ii)	-	1 <sup>st</sup> bullet point deleted as answer not relevant to question	-
11(a)(ii)	Amended to require whether the test result is a minimum or maximum value	-	-
12	-	2 <sup>nd</sup> bullet point amended to be consistent with the question.	-
13(a)	Rewritten to make questions clearer	Amended accordingly	-

## **Appendix 6**

### **Electrical Inspector**

There was no Electrical Inspector Examination in September 2007.

**Appendix 7**  
**Electronic Security**  
**22 September 2007**

ES 12, a moderated paper, was used for this examination.

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**A7.1 - Moderation**

There were two moderators for ES 12.

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**A7.2. - Marking**

There was one marker for ES 12.

Comments

Two candidates sat this examination and both passed with a mark of 81.

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### A7.3 - Amendments to ES 12

<b>The significant amendments to ES 12 arising from the moderation and marking were as follows:</b>			
<b>No.</b>	<b>Question (Moderation)</b>	<b>Answer (Moderation)</b>	<b>Answer (Marking)</b>
1(a)	Rewritten to make intention clearer	Editorial amendment	
1(b)	Rewritten to place the emphasis only on the safety of the test instruments	Amended accordingly	-
1(c)	Amended to refer to a portable RCD	Additional option added	-
2(a)	Marks increased to 5	Mark added for a correctly connected Class I appliance	-
2(b)	Rewritten to make intention clearer	1 <sup>st</sup> bullet point rewritten to be more specific	-
2(c)	Replaced with a 1 mark question	Amended accordingly	-
3(a)	Rewritten to make intention clearer	Amended accordingly	-
3(b)	Rewritten to ensure there is a clearer distinction between the two questions asked	Amended accordingly	-
4	Preamble rewritten to make intention clearer		-
4(b)(ii)		Amended to ensure it is consistent with class of registration	
6(a)	Rewritten to ensure candidates are directed to the correct section of the act		-
6(e)	Replaced with a more topical question as the original question was not relevant to class of registration	Amended accordingly	-
7(a)(vii)	Editorial amendment		-
9(c)	Replaced with another question. Original a duplicate of one elsewhere in the paper	Amended accordingly	-
10(a)	Rewritten to make intention clearer		-
10(a)	Rewritten to make intention clearer		-