ELECTRICAL WORKERS REGISTRATION BOARD

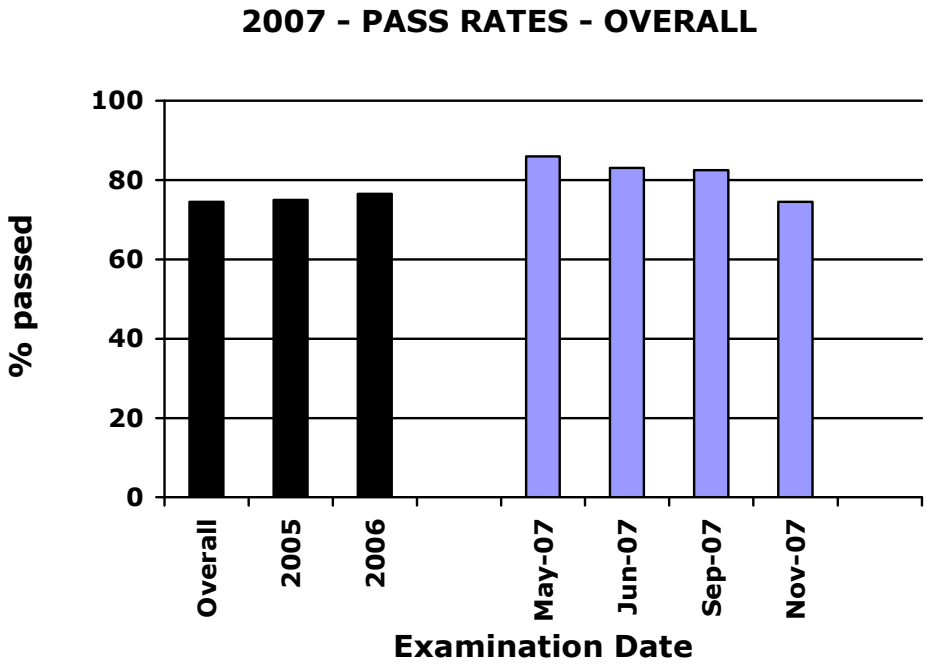
SUMMARY OF

NOVEMBER 2007 EXAMINATION ROUND

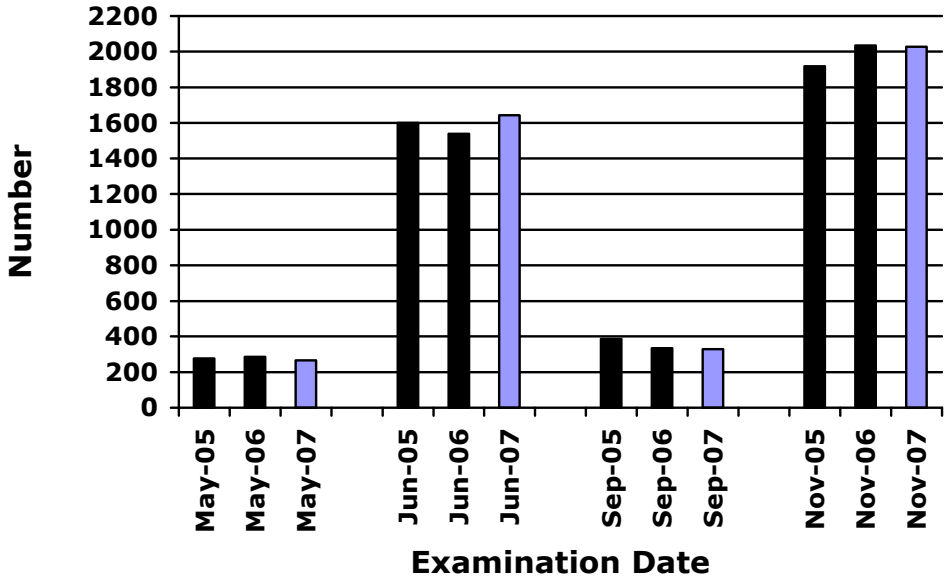
John Sickels
Registrar

1. Summary of Examinations

	Number of candidates	Number of candidates who passed	Percentage passed
ESTA	384	295	77
ESTB	181	138	76
Elec. Regulations	640	431	67.5
Elec. Theory	685	527	77
Elec. Inspector	129	111	86
TEWC	2	2	100
E Security	6	6	100
November 2007	**2027**	**1510**	**74.5**



2007 - CANDIDATE NUMBERS - OVERALL



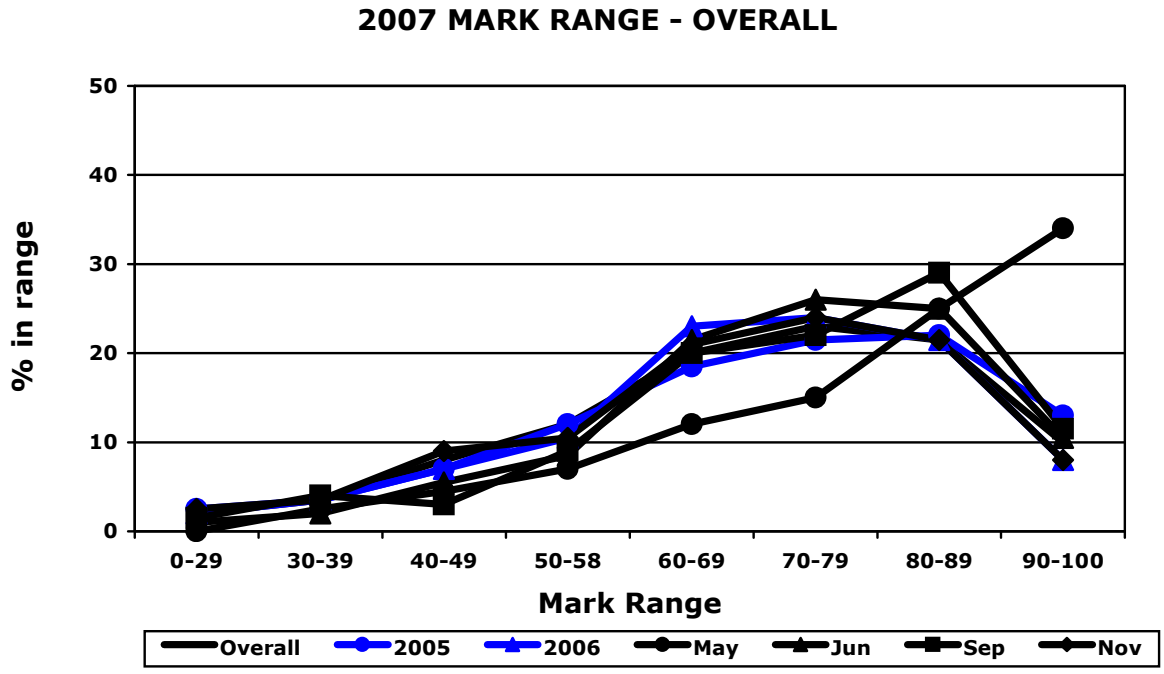
Mark Ranges

Number of candidates

Range	ESTA	ESTB	ER	ET	EI	TEWC	ES	**November 2007**	
90 – 100	73	7	**33**	50	1	0	3	**167**	**candidates**
80 – 89	112	41	**97**	154	24	1	1	**430**	**candidates**
70 – 79	60	60	**145**	181	40	1	2	**489**	**candidates**
60 – 69	50	30	**156**	142	46	0	0	**424**	**candidates**
50 – 58	27	17	**87**	67	11	0	0	**209**	**candidates**
40 – 49	33	19	**71**	52	7	0	0	**182**	**candidates**
30 – 39	13	5	**30**	23	0	0	0	**71**	**candidates**
0 – 29	16	2	**21**	16	0	0	0	**55**	**candidates**
	384	**181**	**640**	**685**	**129**	**2**	**6**	**2027**	

% of candidates

Range	ESTA	ESTB	ER	ET	EI	TEWC	ES	**November 2007**
90 – 100	19	4	3	7	0.5	0	50	**8% of candidates**
80 – 89	29	23	13.5	22.5	18.5	50	16.5	**21.5% of candidates**
70 – 79	16	33	22.5	26.5	31	50	33.5	**24% of candidates**
60 – 69	13	16	26	21	36	0	0	**21% of candidates**
50 – 58	7	9.5	14	10	8.5	0	0	**10.5% of candidates**
40 – 49	9	10.5	12.5	8	5.5	0	0	**9% of candidates**
30 – 39	3	3	5	3	0	0	0	**3.5% of candidates**
0 – 29	4	1	3.5	2	0	0	0	**2.5% of candidates**


2007 MARK RANGE - OVERALL
% in range
50
40
30
20
10
0
0-29
30-39
40-49
50-58
60-69
70-79
80-89
90-100
Mark Range
Overall
2005
2006
May
Jun
Sep
Nov

2. General Comments

The overall pass rate was slightly down on previous examination rounds, but at 74.5% it is still satisfactory.

Questions relating to phase/neutral transpositions have been set regularly over the past two years and it was pleasing to see high pass rates in the Electrician Theory and Electrical Inspector Examinations for this type of question. Candidates now seem to have a good understanding of this topic. All credit to the training providers who seem to have put a lot of effort into teaching this important aspect.

The pass rate for the Electrician Regulations examination was lower than previous. This may be due to the fact that two questions could have been constructed better. However, the performance in some of the questions was poor, considering that exact same parts had been presented in previous papers (which most candidates would have done as practice papers.)

The two main issues arising out of this examination round are the construction of questions and moderation.

- Construction of questions

  Questions 2 and 7 in the Electrician Regulations papers highlighted this issue. Question 2(a) related to functional and isolation switches for room heaters and information was contained in a preamble as well as the two questions. To answer the two questions, information had to be obtained from the preamble and the question. However, it was clear that while candidates read the entire question, they concentrated only on the information in the question.

  In question 7 – relating to testing and certification of three installations with differing characteristics – all information was contained in a preamble and the majority of the questions spread over the following two pages. Markers considered that candidates found it difficult and time consuming to move back and forth to obtain the correct information.

  It was thought that it would have been more helpful if the question was split into three distinct parts based on each installation. This would have made the question repetitive, but it would have been easier to answer.

  In future, moderators will be requested to look at questions that contain a preamble to see if it can be rewritten or reformatted to make it easier to answer.

- Moderation

  Markers made only a few comments regarding the standard of moderation of the papers. The main issue was more about how papers are moderated rather than the standard of moderation per se.

  Question 2 of the Electrician Regulations examination, in which part (a) was new, highlighted the difficulty of navigating through AS/NZS 3000. The question related to functional and isolation switches for room heaters. The correct information was derived via the AS/NZS 3000 index item "room heaters". However, the correct information could not be sourced from the index items "functional switches" or "isolation switches".

  Note: This question raises issues with AS/NZS 3000 in that the way some issues are presented diminishes their importance. Markers and moderators did not attach any significance to room heaters (nor, I suspect, did candidates). They did consider that functional and isolation switches controlling a group of appliances is an important issue. The question arises – "why room heaters?"

  Markers had copies of the Electrician Regulations examination paper and answer schedule the Monday following the examination and they had problems with this question even before they commenced marking. They considered that if the moderators only had access to the draft marking schedule after sitting the examination they may have had a different perspective on this question.

  Therefore, in the May examination round where moderation is done by secure email, moderators will be sent the draft answer schedule only after they have sat the examination. It is hoped this may raise additional issues that require resolution.

3. Moderation

The moderation went well with all moderators having valuable input into the examination papers. All papers for the main examinations were moderated in meetings. The additional Electrical Service Technician A examination held on 24 November was moderated by secure email.

4. Marking

The marking went very well. As expected there were changes to all marking schedules. In this examination round the markers also raised issues as to how papers are moderated and the construction of questions

5. Electrical Service Technician A

Another solid pass rate for Electrical Service Technician A candidates. Candidate numbers were similar to those at the same time last year.

It is interesting to note that while the pass rates have declined slightly over the calendar year (from 89% in May to 77% in November); the mark range (The 90+ mark range aside) has remained largely consistent across the 4 examinations. This tends to indicate that the standard of tuition has been good throughout the year.

Candidate performance in questions 1, 3, 4, 5, 7, 8 and 9 was very good with between 55% and 69% of candidates displaying a sound knowledge in each of the topics (that is, candidates were able to gain at least three-quarters of the marks for each question). In each of these questions approximately 20% of candidates could not display at least a basic knowledge of the topic (that is they were not able to gain more than 4.5 marks for each question)

Candidates struggled with questions 2 and 6, both of which related to personal safety. Only 42% and 33% respectively were able to display a sound knowledge of these topics. Once again, approximately 20% of candidates could not display an even basic knowledge. This would tend to indicate that candidates are less confident when dealing with concepts such as the difference between switching off and isolating and the precautions needed when connecting test instruments.

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

6. Electrical Service Technician B

The pass rate for the Electrical Service Technician B examination was slightly down on the previous results for the calendar year, but it is still a satisfactory result. Candidate numbers were slightly less than for November 2006.

Candidate performance in question 1 (short answers), question 4 (damp areas), question 6 (three-phase motors) and question 7 (flexible cords) was very good with between 60.5% and 79.5% able to display a sound knowledge in each topic (that is, candidates were able to gain at least three-quarters of the marks for each question). The number of candidates displaying an inadequate knowledge of these topics was every low at 6%, 5%, 14.5% and 6% respectively.

In question 2, most candidates were able to identify the parts of a sine wave and the values applying to each part. However, most were unable to satisfactorily set out how they would test and repair a single-phase Class I electrical appliance that showed a high resistance reading between the earth pin of the plug and the frame of the appliance.

In question 5 – relating to identifying faults on a single phase circuit - only 20% of candidates had little concept of what was required. Most could identify at least one of the faults and how to remedy the situation.

Question 3 – relating to testing for and identifying faults on a three-phase planer – was the question candidates found the most difficult. Only 10% of candidates showed a sound knowledge of fault location and testing techniques, while 51% displayed a basic knowledge. Most candidates do not seem to be able manage situations that are slightly more complex than normal.

Question 8 related to personal safety – precautions when connecting two multi-meters, the prove-test-prove method and how to ensure continued isolation. Only 23% of candidates displayed sound knowledge of this topic, while 51% displayed a basic knowledge. These results are very disappointing, given that the prove-test-prove method and isolation techniques are fundamental to servicing work. It could be expected that most candidates would at least get the full 6 marks for these parts; however, 71 of 180 candidates (39%) gained 5 marks or less.

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

7. Electrician Regulations

The pass rate of 67.5% is down slightly on previous examinations, although not markedly so. Between 2004 and June 2007, the pass rates for this examination have been 87%, 69%, 73%, 79%, 69% and 79% respectively.

The candidate numbers for this examination continue to fluctuate. The number sat is 283 less than in June of this year and 139 less than in November 2006.

Candidate performance in question 4 (RCDs), question 5 (general testing and inspection requirements), and question 6 (maximum demand and cable calculation), was very good. Between 52% and 77.5% of candidates were able to display a sound knowledge in each topic (that is, candidates were able to gain at least three-quarters of the marks for each question). The number of candidates displaying an inadequate knowledge of these topics ranged between 6.5% and 29.5%. The result for question 6 is pleasing as it was the first time both maximum demand and cable calculations have been included in the one question.

Candidates experienced some difficulty with question 1 (short answers) and question 3 (installing an underground cable near overhead lines) with 45% and 44% respectively able to demonstrate a sound knowledge of each topic. Only 10% and 20% respectively displayed an inadequate knowledge. For question 3, markers commented that many candidates did not seem to have a copy of NZECP 34 and this may explain the low marks.

Question 2 (control of room heaters – isolating and functional switches), question 7 (PEW, certification and testing for three installations), question 8 (damp areas) and question 9 (cable size calculations) caused most problems for candidates.

The first part of question 2 was new and this seemed to disconcert candidates. The question related to functional and isolating switches for room heaters and the correct information could be obtained via the index to AS/NZS 3000. However, the correct information was derived from the index listing for "room heaters" and not from the listings for "functional switches" or "isolating switches". The second part of this question has been asked in previous examinations.

Further, the markers raised concerns about how question 2 and question 7 were constructed. For part (a)(i), of question 2, candidates had to use information from the preamble and the question itself. Most candidates seemed to concentrate on the information in the question and ignored the preamble.

In question 7, the preamble contained all of the information while the majority of the questions were on two following pages. Candidates had to move back and forth between the preamble and questions which markers considered time consuming.

Question 8 was in two parts, the first relating to swimming pools, the second to a bathroom. Both parts have been asked in previous examinations (although not together) so it is difficult to understand why slightly more than a third of candidates were able to display a sound knowledge of the topic. 29% of candidates had an inadequate knowledge of this topic

Candidate performance in question 9 was similar to previous years with 38.5% of candidates showing a sound knowledge of the topic. Over half the candidates displayed an inadequate knowledge. In this question 2 marks were available for taking information out of the tables provided and for a formula. 190 of the 634 candidates (30%) could not even reach this attainment.

An abridged analysis is contained in Appendix 3 of this paper. The full analysis is contained in Attachment 3.

8. Electrician Theory

Another good result for Electrician Theory candidates with a pass rate of 77%. This is consistent with the pass rates for the last 2 years. Candidate numbers are starting to show signs of the fluctuation experienced in the Electrician Regulations examination. The number sat is 319 more than in June and 111 more than in November 2006.

Candidate performance in question 1 (short answers), question 2 (characteristics of protection devices), question 5 (calculate fault currents and effect on protection of high resistance faults), question 6 (motor control circuits), question 7 (transpositions in mains), question 8 (transformer calculations) and question 9 (danger and out-of-service and their uses) was very good.

Between 51% and 61.5% of candidates were able to display a sound knowledge in each topic (that is, candidates were able to gain at least three-quarters of the marks for each question). The number of candidates displaying an inadequate knowledge of these topics ranged between 12% and 22.5%.

The results for question 7 are pleasing. Training providers have really put a lot of effort into giving candidates a good grounding of the effects of phase/neutral transpositions in mains and how to test for transpositions. 61% of candidates in this examination and in the November 2006 examination were able to demonstrate a sound knowledge of this topic. This is compared to only 14% in the November 2005 examination.

Candidates also did quite well on question 3 (testing a three-phase motor so connections can be made). 42% of candidates displayed a sound knowledge, while 40.5% of candidates displayed an adequate knowledge.

Question 4 (tests on the there-phase planer to make sure it was safe to connect etc.) gave most problems to candidates with only 33% displaying a sound knowledge of the topic. Most candidates do not seem to be able manage situations that are slightly more complex than normal. The candidates in the Electrical Service Technician B examination had similar difficulties with a similar question.

An abridged analysis is contained in Appendix 4 of this paper. The full analysis is contained in Attachment 4.

9. Electrical Inspector

This was a very good result from Electrical Inspector Examination candidates in an examination that was considered to be difficult. The moderators considered questions 2 to 9 of the examination to have a high degree of difficulty to the extent that they amended question 1 to be 10, 2 mark questions instead of 20, 1 mark questions.

The pass rates have been rising since 2005 and the candidate numbers are the highest recorded since 2003. The November 2003 results aside, the spread of marks in the examinations have been remarkably similar, with the majority of passes in the 60 to 80 mark range. Once again this is a good reflection on the standard of tutoring and the candidates.

Candidate performance in question 1 (short answers), question 2 (MVA and PSSC calculations, pF correction etc.), question 3 (RCDs), and question 5 (phase/neutral transpositions), was very good. Between 51% and 84% of candidates were able to display a sound knowledge in each topic (that is, candidates were able to gain at least three-quarters of the marks for each question). The number of candidates displaying an inadequate knowledge of these topics was 0.5%, 22%, 8.5% and 2% respectively.

It is exceptionally pleasing to see a very good result in question 5 – phase/neutral transposition with 81% of candidates showing a sound knowledge of the topic and only 2% displaying an inadequate knowledge. Of the 105 candidates who displayed a sound knowledge, only 8 failed the entire examination.

Candidates had some difficulty with question 4 (cable size calculation), question 6 (connectable installation and pleasure vessels) and question 8 (hazards of open-circuited screen, fault loop etc.). Between 42% and 46% of candidates were able to display a sound knowledge in each topic (that is, candidates were able to gain at least three-quarters of the marks for each question). During marking the main issue raised with questions 4 and 8 was that candidate performance may be affected by the manner in which the questions are constructed.

Question 9 (maximum demand) caused real problems for candidates, with only 3% of candidates able to display a sound knowledge and 80% showing an inadequate knowledge. Of the 129 candidates who sat, 70 gained 1 mark or less for this question. The question was closely modelled on an example in AS/NZS 3000. The layout of these questions has changed to give a better indication of what is required. For example, the question clearly indicates how many load groups are involved. It is difficult to know what else can be done in this area. As with other examinations, candidates see a question that is different from previous questions and seem to assume and an entirely new approach is required.

An abridged analysis is contained in Appendix 5 of this paper. The full analysis is contained in Attachment 5.

10. Tradespersons Electrical Work Certificate

Two candidates sat and passed this examination. One candidate gained 85 marks, the other 76 marks.

A partial analysis is contained in Appendix 6.

11. Electronic Security Alarm Installer

Six Candidates sat this examination and all passed.

A partial analysis is contained in Appendix 7.

Appendix 1

Electrical Service Technician A

17 and 24 November 2007

ESTA 1034, a moderated paper, was used for the examination of 17 November 2007.
ESTA 1035, a moderated paper, was used for the examination of 24 November 2007.

A1.1 - Overall Candidate Performance

	Number of candidates	**Number of candidates who passed**	**Percentage passed**
ESTA 1034	369	286	77.5
ESTA 1035	15	9	60
November 2007	**384**	**295**	**77**

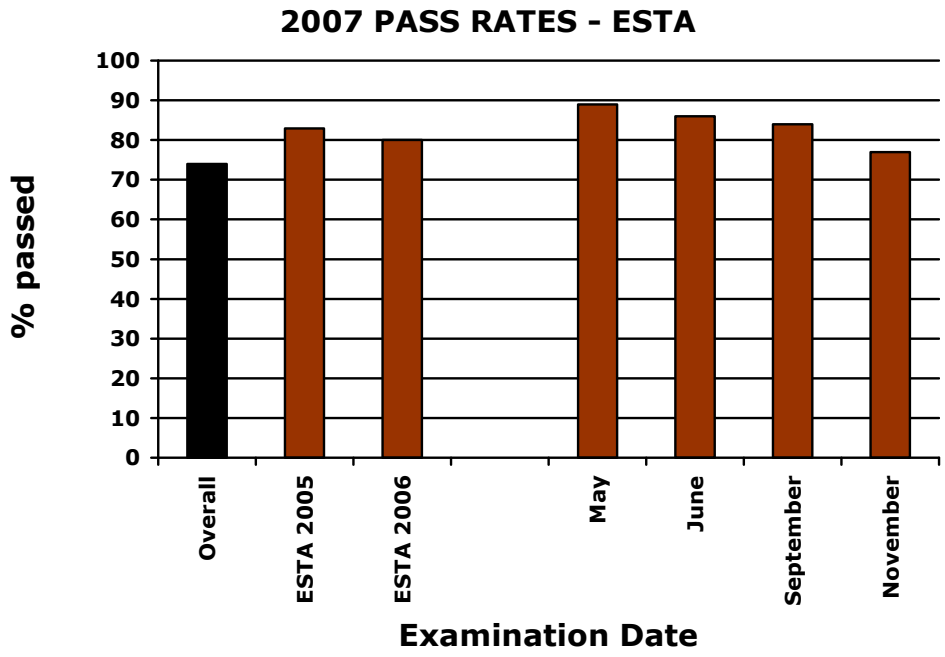
Candidate performance – ESTA 1034

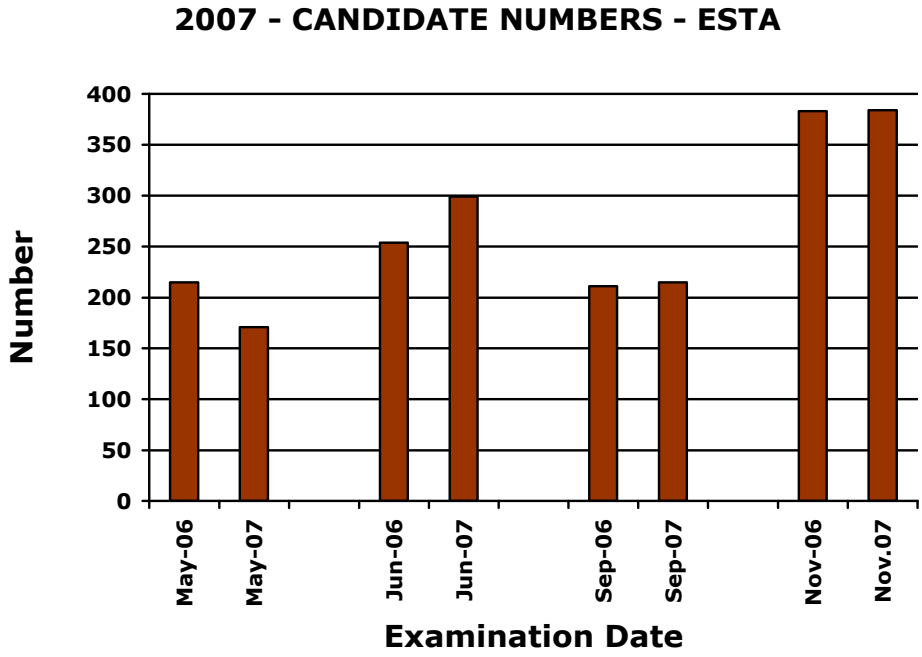
Candidates	**Candidates Passed**	All candidates	
		Average pass mark	79 %
		Median mark	72.5
369	**286**		
		Those who passed	
	77.5%	Average pass mark	81 %
		Median mark	83

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

Candidate performance – ESTA 1035

Candidates	**Candidates Passed**	All candidates	
		Average pass mark	62%
		Median mark	61.5
15	**9**		
		Those who passed	
	60%	Average pass mark	73%
		Median mark	78


2007 PASS RATES - ESTA
% passed
100
90
80
70
60
50
40
30
20
10
0
Overall
ESTA 2005
ESTA 2006
May
June
September
November
Examination Date


2007 - CANDIDATE NUMBERS - ESTA
Number
400
350
300
250
200
150
100
50
0
May-06
May-07
Jun-06
Jun-07
Sep-06
Sep-07
Nov-06
Nov.07
Examination Date

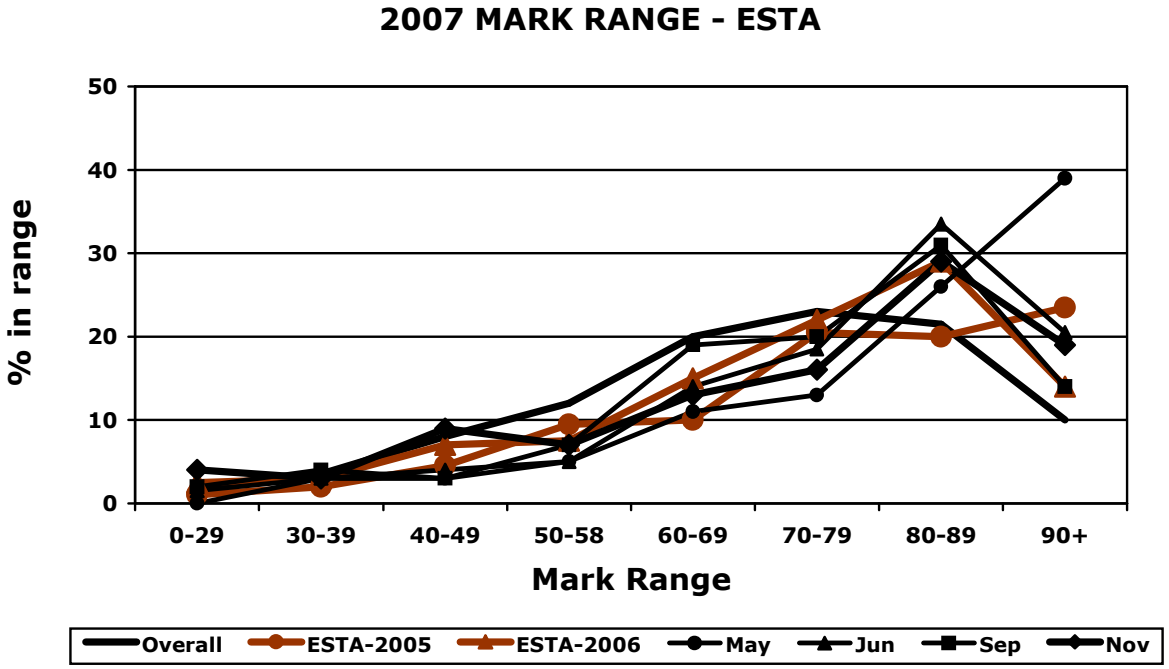
Mark Ranges

Number of candidates

Range	ESTA 1034	ESTA 1035				November 2007	
90 – 100	73	0				**73**	**candidates**
80 – 89	108	4				**112**	**candidates**
70 – 79	59	1				**60**	**candidates**
60 – 69	46	4				**50**	**candidates**
50 – 58	26	1				**27**	**candidates**
40 – 49	29	4				**33**	**candidates**
30 – 39	13	0				**13**	**candidates**
0 – 29	15	1				**16**	**candidates**
	369	**15**				**384**	

% of candidates

Range	ESTA 1034	ESTA 1035				November 2007
90 – 100	20	0				**19% of candidates**
80 – 89	29	26.5				**29% of candidates**
70 – 79	16	7				**16% of candidates**
60 – 69	12.5	26.5				**13% of candidates**
50 – 58	7	7				**7% of candidates**
40 – 49	8	26				**9% of candidates**
30 – 39	3.5	0				**3% of candidates**
0 – 29	4	7				**4% of candidates**



A1.2 - Overall Marking Analysis- ESTA 1034

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.

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 1	**-**	**10, 2 mark questions**				**66**	**29**	**5**
Q 2	**L1.40/54**	**Isolation Equipment and Personal safety**			**Check before turning off main switch, define PPE, switching off and isolating, precautions when connecting test instruments**	**42**	**38**	**20**
			May 2005	20	Isolation and switching off, continued isolation	48	26	26
			May 2006	7	Isolation and switching off, continued isolation. Safety reasons why need to turn off main switch before inserting fuse. PPE	46	33	21
			Jun 2006	6	Protective devices for personal safety, replacing a blown fuse, repairing appliance with high PEC reading	41	38	21
			May 2007	5	Safety, replacing a blown fuse, continued isolation, switching off and isolating, PPE and its use	54	31	15

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	**P2.13** **P3.13**	**<u>Legislation</u>** **Registration** **<u>Legislation</u>** **Practising licences**			**Name of licence, date of expiry, where application made. Three classes of worker can do PEW. Refresher courses**	**63**	**15**	**22**
			Sep 2004	5	3 requirements for registration, practising licences and refresher courses	67	15	18
			Sep 2006	8	Practising licences, classes permitted to do PEW, refresher courses	47	24	29
			Sep 2007	8	Name of licence, date of expiry, where application made. Three classes of worker can do PEW. Refresher courses	75	19	6
			Sep 2007	8	Name of licence, date of expiry, where application made. Three classes of worker can do PEW. Refresher courses	65.5	15.5	19

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 4	**H10.66**	**<u>Fault diagnosis</u>**			**Faulty heater. Calculate fault current, whether fuse will blow, power dissipated. Phase, neutral transpositions.**	**62.5**	**16**	**21.5**
			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
			Sep 2007	3	Faulty vacuum cleaner. Calculate fault current, whether fuse will blow, power dissipated.	50	34	16
			Sep 2007	3	Faulty heater. Draw circuit diagram, calculate fault current, whether fuse will blow. Phase, neutral transpositions.	56.5	20.5	23

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	**H1a.27** **H1b.28**	**<u>Protection and Control</u>** **Protection characteristics** **<u>Protection and Control</u>** **RCD characteristics**			**What thermal overload detects, HRC fuse characteristics, how RCD operates, define PRCD**	**57**	**24**	**19**
			Jun 2006	8	Explain RCD operation on fault, what is a PRCD. HRC advantages, not bridging HRC fuses	35	36.5	28.5
			Nov 2006	4	Characteristics of HRC fuses, advantages of HRC fuses over rewireable fuses, why not permitted to bridge HRC fuse carrier with fuse wire	55	31	14
			Jun 2007	2	Four characteristics of replacement HRC fuse, under-rated and over-rated fuses, technical advantages of HRC over rewireable 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
			Sep 2007	9	How RCD operates on fault, meaning of PRCD. Three disadvantages of rewireable fuses. Why not permitted to use fuse wire on HRC fuse	47	22	31
			Sep 2007	9	How RCD operates on fault, meaning of PRCD. Three disadvantages of rewireable fuses. Why not permitted to use fuse wire on HRC fuse	42.5	36	21.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	**L1.40/54**	**<u>Isolation</u> Equipment and Personal safety**			**Why recommend main switch turned off, cause of fault, isolating transformers, protective devices**	**35**	**44**	**21**
			May 2005	19	Safety reasons why need to turn off main switch before inserting fuse	61	25	14
			May 2005	20	Isolation and switching off, continued isolation	48	26	26
			May 2006	7	Isolation and switching off, continued isolation. Safety reasons why need to turn off main switch before inserting fuse. PPE	46	33	21
			May 2007	5	Safety, replacing a blown fuse, continued isolation, switching off and isolating, PPE and its use	54	31	15

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 7	**K2.38**	**Statutory testing and inspection requirements**			**Polarity testing, testing to AS/NZS 3760, testing portable RCDs.**	**69**	**17**	**14**
			Sep 2005	15	Checks and tests on repaired heater	71	21	8
			May 2006	4	Checks and tests on repaired portable oven. Current rating of flexible cord	77	16	7
			Jun 2006	7	Testing portable oven, reasons for PEC, polarity and insulation tests, why PEC test before insulation resistance test	35	46	19
			Sep 2006	9	Testing portable oven, reasons for PEC, polarity and insulation tests, reason for PEC, polarity and IR tests, why PEC test before insulation resistance test	54	25	21
			Nov 2006	5	Five visual checks required by Standard, PEC test in class I appliance	82	14	4
			May 2007	4	Five visual checks required by Standard, use of micro-gap switch, why earth pin longer, why bayonet cap must not be used	86	11	3
			Jun 2007	4	Testing portable oven to AS/NZS 3760, polarity testing	40.5	34.5	25

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	**H3d.41**	**<u>Cables and Cords</u> Specifications**			**Cord wound on drum, why voltage drops in cord, current ratings**	**56**	**27**	**17**
			May 2007	3	Colour coding of replacement cords, care of extension leads	90.5	6	3.5
			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
			Jun 2007	7	Cord current ratings, colour coding	37	40	23
			Sep 2007	2	Core & colour coding of cords, vd in cords	75	19	6
			Sep 2007	2	Core & colour coding of cords, cord wound on drum	93	5	2
			Sep 2007	7	Fitting plug to flexible cord. Appliance controlled by thermostat, What makes simmerstat and thermostat operate	56	38	6
			Sep 2007	7	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	34.5	38	27.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	K4.46	Testing and inspection methods			**IR testing and semi-conductors. IR testing appliance. Testing appliance with MOV fitted.**	**55**	**26**	**19**
			May 2006	3	Why voltmeter should not be connected in series. Why ammeter should not be connected in parallel. Safety precautions when connecting instruments	40	30	30
			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

A1.3 - Moderation

Three moderators were used for ESTA 1034 and ESTA 1035

ESTA 1034 was moderated via a meeting. ESTA 1035 was moderated by secure email.

A1.4 - Marking

Four markers were used for ESTA 1034

Teleconferences were held with the markers on 26 November and 3 December.

Version 2 of the answer schedule was sent to markers on 26 November.

Version 3 of the answer schedule was sent to markers on 3 December.

The marker for ESTA 1035 was Godfrey Nesus.

Comments – ESTA 1034

There was no indication that the paper was too long or difficult. The questions covered a good range of the syllabus and provided a fair insight into the candidate's ability to work in a safe manner.

In some cases it was obvious that a candidate was having trouble understanding the question and by the written examples it was obvious that English was not the candidates' first language. In some cases marks were not awarded because the answer was illegible.

A1.5 - Amendments to ESTA 1034

The significant amendments to ESTA 1034 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
Cover	Instruction changed – candidates will need to use some of the document referenced.	-	-
H1(i)	-	Answer corrected	-
2(a)	-	-	Question considered too vague. Instruction to accept any reasonable answer included.
2(c)(i)	Rewritten to make intention clearer	Amended accordingly	Amended to be more specific
2(c(ii)		-	Additional option added
2(d)	Editorial amendment	Reference corrected	2nd bullet point deleted as being not applicable to question
3(c)	Editorial amendment	-	-
4(a)	Preamble – deleted reference to "earth continuity conductor"	-	-
4(b)	-	Amended to remove duplication	Additional option added
5(a)	Rewritten to make intention clearer	-	-
5(b)	-	Deleted reference to "Class" – term obsolete	-
6(a)(i)	Reduced from 4 marks to 2 marks	Amended accordingly	-
6(b)	-	-	Rewritten to make more specific
6(c)	New part relating to protective devices	Amended accordingly	-
7(c)	Editorial amendment	-	-
7(d`)	Editorial amendment	-	-
8(a)(i)	-	Amended to be more specific	-
8(a)(ii)	Term "operational" deleted as being too confusing	Editorial amendment	-
8(b)	Rewritten to make intention clearer	-	Additional options added
8(c)(ii)	Cross-reference corrected	-	-
9(a)	Editorial amendment	-	Additional option added

Appendix 2

Electrical Service Technician B

23 and 24 November 2007

ESTB 2024, a moderated paper, was used for the examination of 24 November 2007.
ESTB 2025, a composite paper, was used for the examination of 23 November 2007.

A2.1 - Overall Candidate Performance

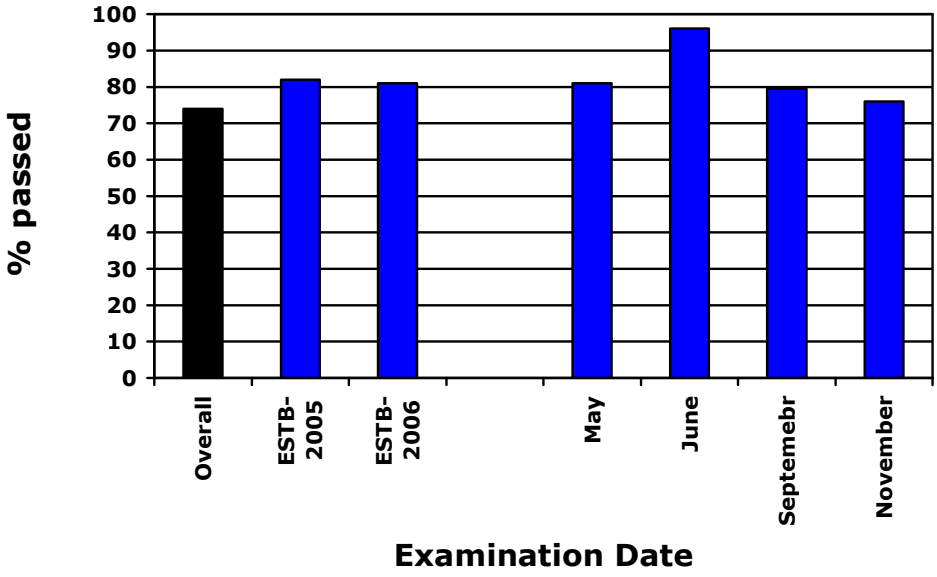
	Number of candidates	**Number of candidates who passed**	**Percentage passed**
ESTB 2024	180	137	76
ESTB 2025	1	1	100
November 2007	**181**	**138**	**76**

Candidate performance – ESTB 2024

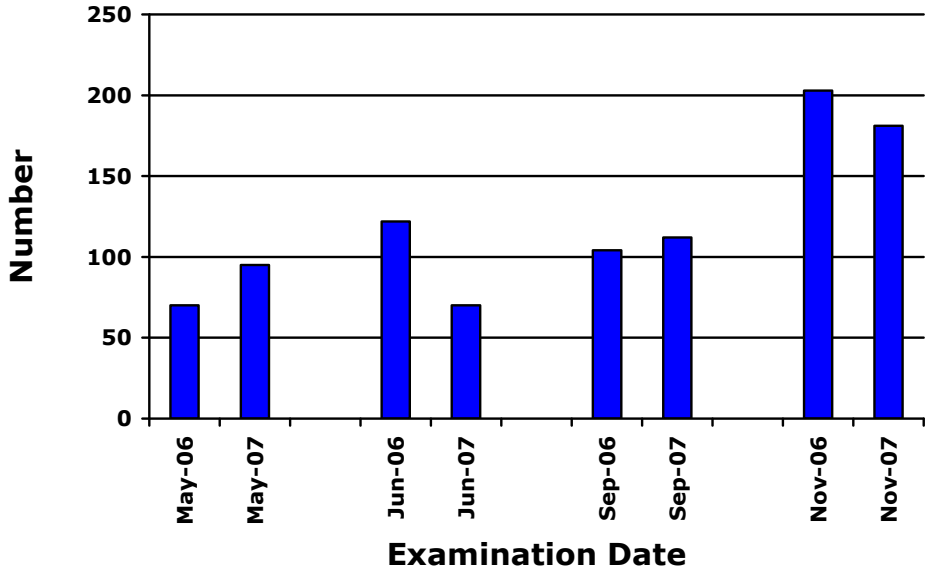
Candidates	**Candidates Passed**	All candidates	
		Average pass mark	69%
		Median mark	72
180	**137**		
		Those who passed	
	76%	Average pass mark	76%
		Median mark	76

3 candidates gained 95 marks or more.

2007 PASS RATES - ESTB



2007 CANDIDATE NUMBERS - ESTB



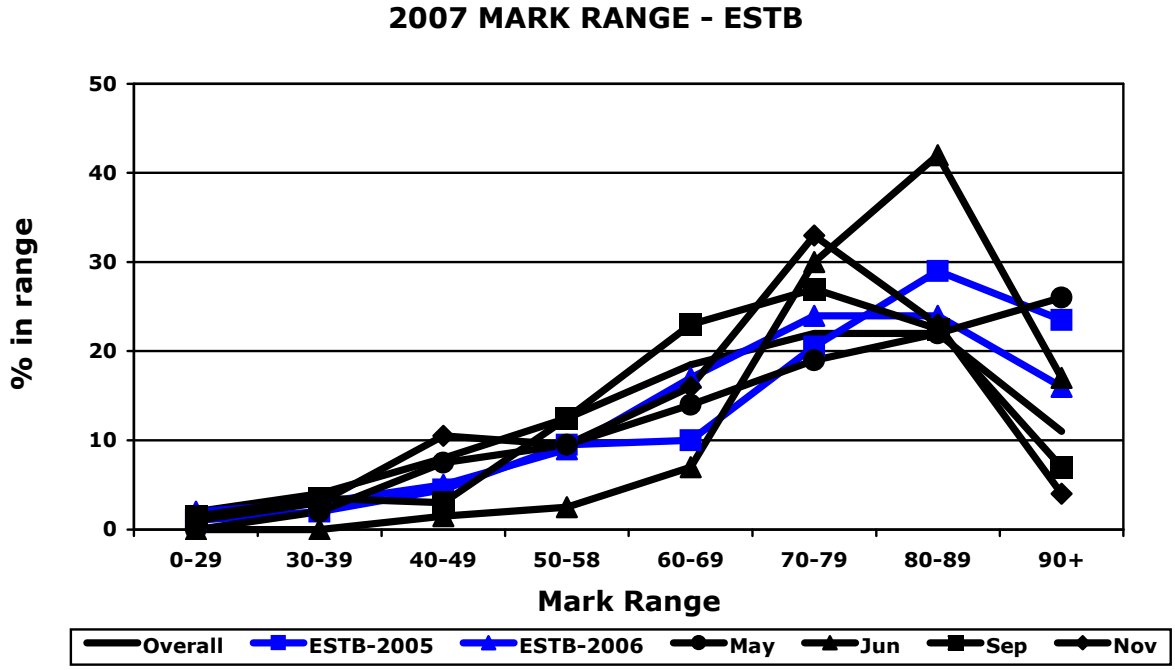
Mark Ranges

Number of candidates

Range	ESTB 2024	ESTB 2025		November 2007	
90 – 100	7	0		**7**	**candidates**
80 – 89	41	0		**41**	**candidates**
70 – 79	59	1		**60**	**candidates**
60 – 69	30	0		**30**	**candidates**
50 – 58	17	0		**17**	**candidates**
40 – 49	19	0		**19**	**candidates**
30 – 39	5	0		**5**	**candidates**
0 – 29	2	0		**2**	**candidates**
	180	**1**		**181**	

% of candidates

Range	ESTB 2024	ESTB 2025		November 2007
90 – 100	4	0		**4% of candidates**
80 – 89	23	0		**23% of candidates**
70 – 79	33	100		**33% of candidates**
60 – 69	16	0		**16% of candidates**
50 – 58	9.5	0		**9.5% of candidates**
40 – 49	10.5	0		**10.5% of candidates**
30 – 39	3	0		**3% of candidates**
0 – 29	1	0		**1% of candidates**



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.

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 1	**-**	**10, 2 mark questions**				**68**	**26**	**6**
Q 2	**D1.12**	**System theory - 3 – phase systems**			**Name parts of sine wave, define Hertz. How PEC contributes to safety, testing faulty PEC**	**34**	**43**	**23**
Q 3	**K4.46**	**Testing and inspection methods**			**Three-phase planer, tests to establish the fault, causes of fault, making machine operationally safe**	**10**	**51**	**39**
			Jun 2004	4	Insulation resistance testing of 3 phase motor with thermistors	7	60	33
			Jun 2004	6	PEC test and insulation resistance testing of faulty single phase machine	51	37	12
			Nov 2004	6	Insulation resistance testing of single phase machine, other tests and checks	28	43	29
			Jun 2005	9	Insulation resistance testing of single phase machine, other tests and checks	71	21	8
			Sep 2006	4	3 phase motor – IR test, PEC test, recommissioning	62.5	31.5	6

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q4	**J.33**	**Damp and wet areas**			**Define IP rating, 1st an 2nd numbers on an IP rating, describe protection of IP 34 fitting, IP rating of apparatus near swimming pool**	**79.5**	**14.5**	**6**
			Jun 2004	8	Damp situations and IP ratings	66.5	28	5.5
			Sep 2004	7	IP ratings, replacement of towel rail and switch in bathroom	79	20	1
			Jun 2005	3	Damp situations and IP ratings	94	5	1
			Sep 2005	7	Damp situations and IP ratings	92	7	1
			Jun 2006	5	IP ratings, replacement of towel rail in bathroom	72	24	4
			Jun 2007	5	Define damp situation, IP rating, 1st an 2nd numbers on an IP rating, IP rating of apparatus in bathroom	95	5	0
			Jun 2007	5	Define IP rating, 1st an 2nd numbers on an IP rating, describe protection of IP 56 fitting, IP rating of apparatus in bathroom	71	10	19

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	**H10.66**	**<u>Fault diagnosis</u>**			**Locate fault on MCB circuit supplying appliances, describe remedial action for each fault**	**42**	**36**	**22**
			May 2006	3	Safely isolate MCB circuit supplying appliances, locate faults, describe remedial action	53	28.5	18.5
			Sep 2005	5	Faulty three phase hot water cylinder – isolation, reason for fault, testing to locate fault	65	23	12
			May 2007	4	Replacement hot water cylinder, tests before connection, safety precautions before connection	59	20	21
			Jun 2007	6	Faulty hot water cylinder, safely isolate, why cylinder operates on 1 fuse, testing an description of faults	26	58	16

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	**E2.16**	**<u>3ph-Motor/Alternators</u> Selection, starting, protection**			**Draw and label circuit diagram of 230V motor control circuit, finding motor winding, connecting motor**	**60.5**	**25**	**14.5**
			Jun 2004	5	Motor terminal connection, 230V control circuit	43	30	27
			Nov 2005	3	230V control circuit, terminal block connections	46	22	32
			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
			Sep 2007	8	Draw and label circuit diagram of 230V motor control circuit, protection other than thermal overload, two causes for fault.	50	25	25
			Sep 2007	8	Name numbered parts of 239V motor control circuit, two typical operating voltages, how thermal overload and HRC fuse protects motor, reveal of supply to motor	72	23	5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 7	**H3d.41**	**<u>Cables and Cords</u> Specifications**			**Flexible cords - volt drop, reduce effect of volt drop, colour coding**	**69**	**26**	**5**
			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.	82	16	2
			May 2007	9	Factors in selecting cord, colour coding, volt drop in cords, current rating of cords	75	20	5
			Sep 2007	6	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.	80	20	0
			Sep 2007	6	Six factors when selecting cord, colour coding of single phase cord. Two ways of identifying double insulated appliance	83	14	3

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	**L1.40/54**	**<u>Isolation</u> Equipment and Personal safety**			**Precautions when connecting meter, Why prove-test-prove is used and how it is carried out, ensuring continued isolation**	**23**	**51**	**26**
			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
			Sep 2007	3	Four precautions after disconnecting an appliance, why prove-test-prove is used, fours way of ensuring continued isolation	15	65	20
			Sep 2007	3	Why prove-test-prove is used and how it is carried out, difference between switching off and isolation fours way of ensuring continued isolation	38	43.5	18.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	**H10.66**	**<u>Fault diagnosis</u>**			**Faulty single phase cleaner, calculate fault current, whether fuse will blow, power dissipated, transpositions**	**30**	**37**	**33**
			Nov 2006	7	Single-phase motor with RCCB and MCB protection, isolator replaced. Effect of phase neutral, neutral earth and phase earth transpositions. Tests for transposition	25	44	31
			May 2007	8	Single-phase motor with RCCB and MCB protection, isolator replaced. Effect of phase neutral, neutral earth and phase earth transpositions. Tests for transposition	38	27	35
			Jun 2007	6	Faulty washing machine, calculate current and power in PEC, whether fuse would operate, phase/neutral transpositions	63	26.5	10.5

A2.3 - Moderation

Three moderators were used for ESTB 2024.

ESTB 2024 was moderated via a meeting.

A2.4 - Marking

Two markers were used for ESTB 2024.

Teleconferences were held with the markers on 4 and 10 December.

The changes comprising version 2 of the answer schedule was sent to markers on 4 December.

The changes comprising version 3 of the answer schedule was sent to markers on 10 December.

Comments

This Electrical Service Technicians B examination would have been well received by candidates with the majority attempting to answer all nine questions.

An area of moderation that may draw comment was Question 3. The original marking schedule did not seem to take into account that the fault could be in either the motor OR in the wiring to the motor from the DOL starter.

A2.5 - Amendments to ESTB 2024

The significant amendments to ESTB 2024 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
Cover	Changed to state that candidates will need to use some of the documents	-	-
1(a)	Changed "course of instruction" to "refresher course"	-	-
1(d)	-	-	Additional option added
1(h)	Editorial amendment	-	-
2(a)(ii)	Editorial amendment	Reformatted to show where marks are awarded	-
2(c)	Deleted reference to "earth continuity conductor".	-	-
3	Preamble – amended 1st bullet point to make intention clearer	-	
3(a)	Rewritten to make intention clearer. Marks reduced from 7 to 4	Amended accordingly	Additional option added relating to circuit continuity test
3(b)	Replaced with question relating to likely causes of fault.	Amended accordingly	Additional option added relating to circuit continuity test
3(c)	New part relating to steps to make planer operationally safe.	Amended accordingly	-
4(a)(i)	Rewritten to make intention clearer	-	-
4(a)(iii)	Amended to align with 4(a)(ii)	-	-
4(c)	Rewritten to make intention clearer	-	
5(b)	-	-	Additional option added for the remedy to circuit fault
6(a)	-	Marks allocated across answer	-
6(b)	Preamble rewritten to make intention clearer	-	-
6(b)(i)	Rewritten to make intention clearer	-	-
8(a)	-	Additional option added	2nd and 5th bullet point deleted as not being relevant to question
8(c)	-	Editorial amendment	Additional option added

Appendix 3

Electrician Regulations

23, 24 and 26 November 2007

ER 27, a moderated paper, was used for the examination of 24 November 2007.
ER 28, a composite paper, was used for the examination of 26 November 2007.
ER 29, a composite paper, was used for the examination of 23 November 2007.

A3.1 - Overall Candidate Performance

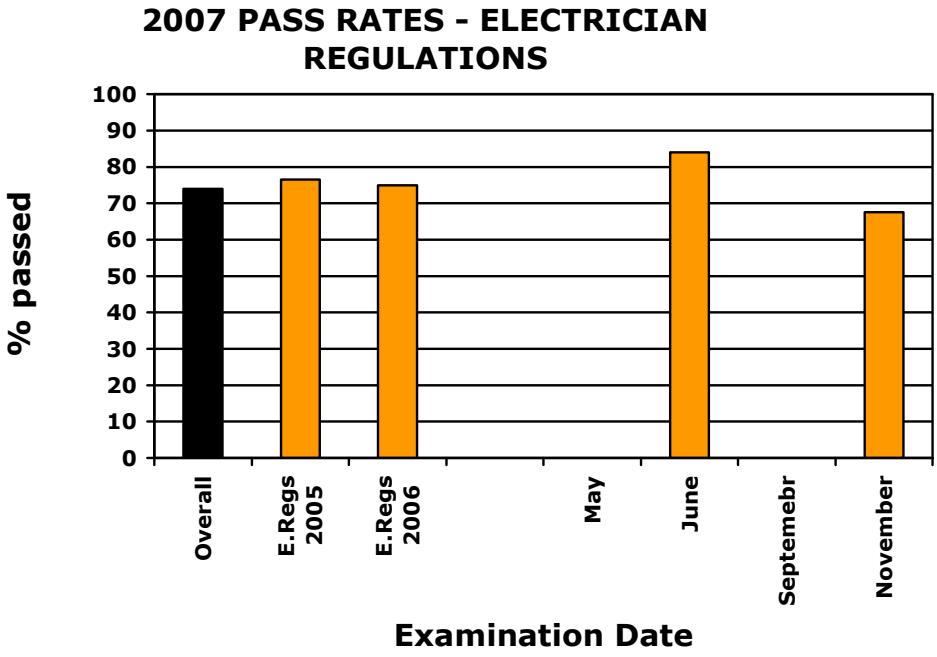
	Number of candidates	**Number of candidates who passed**	**Percentage passed**
ER 27	634	428	67.5
ER 28	4	1	25
ER 29	2	2	100
November 2007	**640**	**431**	**67.5**

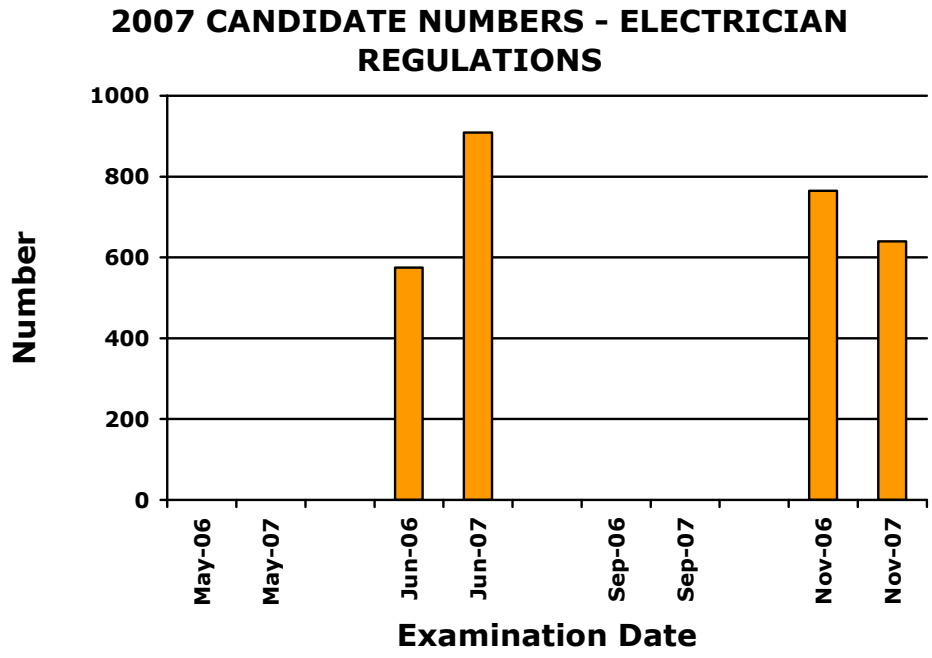
17 candidates gained 95 or more marks.

Candidate performance – ER 27

Candidates	**Candidates Passed**	All candidates	
		Average pass mark	64.5%
		Median mark	66
634	**428**		
		Those who passed	
	67.5%	Average pass mark	74%
		Median mark	74

8 candidates gained 95 or more marks.


2007 PASS RATES - ELECTRICIAN REGULATIONS
% passed
100
90
80
70
60
50
40
30
20
10
0
Overall
E.Regs 2005
E.Regs 2006
May
June
Septemebr
November
Examination Date


2007 CANDIDATE NUMBERS - ELECTRICIAN REGULATIONS
Number
1000
800
600
400
200
0
May-06
May-07
Jun-06
Jun-07
Sep-06
Sep-07
Nov-06
Nov-07
Examination Date

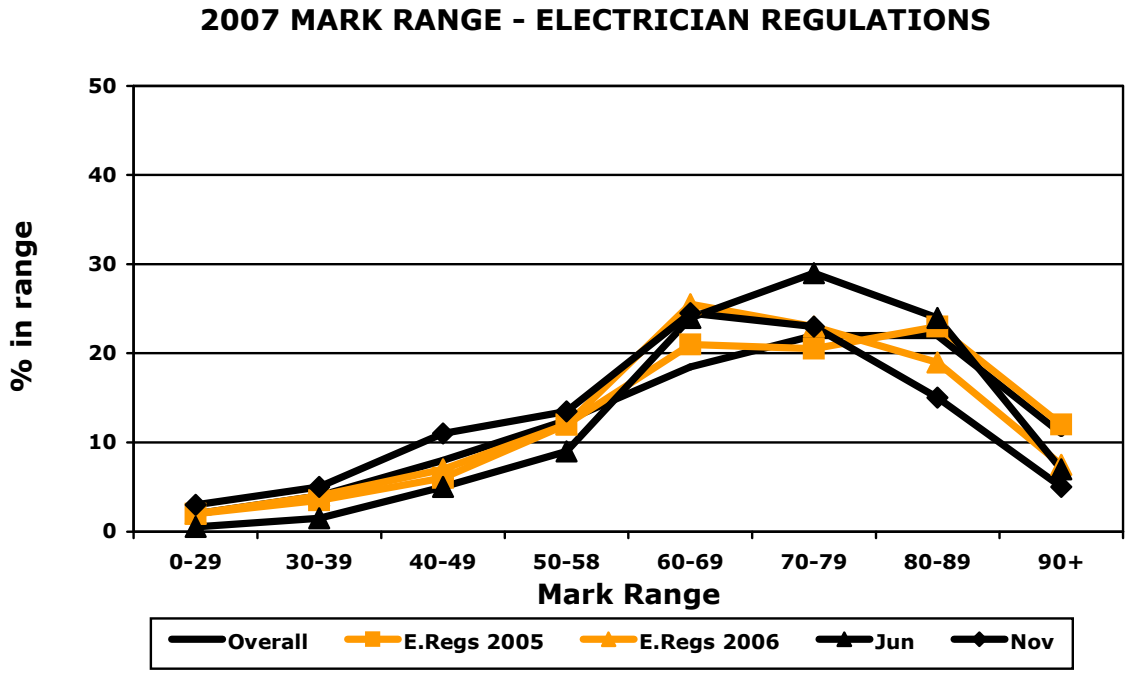
Mark Ranges

Number of candidates

Range	ER 27	ER 28	ER 29		November 2007	
90 – 100	33	0	0		**33**	**candidates**
80 – 89	95	1	1		**97**	**candidates**
70 – 79	144	0	1		**145**	**candidates**
60 – 69	156	0	0		**156**	**candidates**
50 – 58	86	1	0		**87**	**candidates**
40 – 49	70	1	0		**71**	**candidates**
30 – 39	30	0	0		**30**	**candidates**
0 – 29	20	1	0		**21**	**candidates**
	634	**4**	**2**		**640**	

% of candidates

Range	ER 27	ER 28	ER 29		November 2007
90 – 100	5	0	0		**5% of candidates**
80 – 89	15	25	50		**15% of candidates**
70 – 79	23	0	50		**23% of candidates**
60 – 69	24.5	0	0		**24.5% of candidates**
50 – 58	13.5	25	0		**13.5% of candidates**
40 – 49	11	25	0		**11% of candidates**
30 – 39	5	0	0		**5% of candidates**
0 – 29	3	25	0		**3% of candidates**



A3.2 – 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 similar questions from previous examination papers.

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 1	**-**	**10, 2 mark questions**				**45**	**45**	**10**
Q 2	**H1a.27**	**Protection and Control Protection characteristics**			**Room heaters – 3 general requirements for functional and isolation switches, position of isolating switches. Features of isolating and functional switches**	**28**	**38.5**	**33.5**
Q 3	**H3c.35**	**Cables and Cords Overhead and underground**			**Underground cable installed to house near 33 kV line. Requirements relating to overhead line, requirements relating to underground cable.**	**44**	**36**	**20**
			Jun 2004	25	Requirements for NS cable buried between buildings	77	12.5	10.5
			Nov 2004	24	o/h line to building, protection of u/g cable, clearance of o/h line	31	38.5	30.5
			Nov 2005	25	Requirements for u/g cables, spacing between u/g systems and other services	56	23	21

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 4	**H1b.28**	**<u>Protection and Control</u>** **RCD characteristics**			**Requirements for outlets in laundry, RCDs in commercial, industrial installations, installing RCDS in kitchen**	**56**	**25**	**19**
			Nov 2004	28	Installation of RCDs	44.5	33	22.5
			Jun 2005	20	Installation of RCDs	41	26	33
			Nov 2006	8	Installation of RCDs – hotel, with other protection, domestic installations	31	53	16
			Jun 2006	2	Installation of RCDs – domestic installations	21.5	27	51.5
			Jun 2006	2	Installation of RCDs – other installations, domestic installations	60.5	29.5	10

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	**K2.38**	**Statutory testing and inspection requirements**			**Two electrical installations, side-by-side – general requirements for testing, inspection and certification, mandatory tests and checks**	**77.5**	**16**	**6.5**
			Jun 2006	9	Reasons for testing in low voltage installations	79	9.5	11.5
			Jun 2007	6	Four mandatory inspections and tests, CoC for installation with IR of 100 Mohms, inspection of electrical equipment	46	29	25
			Jun 2007	6	Sequence of tests for an installation, reasons for carrying out earth continuity and IR tests, CoC for installation with IR less than 1 Mohm	92.5	5.5	2

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	**H3a.29**	**<u>Cables and Cords</u> Selection of mains and submains**			**Calculate maximum demand of low rise development, determine size of cable based on maximum demand**	**52**	**18.5**	**29.5**
			Nov 2003	22	Maximum demand of 230v domestic installation	59	23	18
			Jun 2004	27	Maximum demand of 230v domestic installation	59	25	16
			Jun 2005	24	Maximum demand of 230v domestic installation	36	38	26
			Nov 2005	18	Cable size of 3 phase development, volt drop and load	52.5	14	33.5
			Nov 2005	27	Maximum demand of 230v domestic installation	55	23	22
			Jun 2006	3	Cable size of 3 phase farm complex, volt drop and load	26	12	62
			Jun 2006	8	Define maximum demand, maximum demand of 230v domestic installation, other methods of calculating maximum demand	29	32	39
			Jun 2007	9	Maximum demand of 230 V domestic installation	78	14	8
			Jun 2007	9	Maximum demand of 230 V domestic installation	71	9	20

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 7	**K3.39**	**<u>Certification, verification, WOEF</u>**			**Three different installations, PEW requirements, certification requirements, types of tests**	**24.5**	**32.5**	**43**
			Nov 2003	28	Certification of work, testing of appliances	54	28	18
			Jun 2004	23	Certification of work, testing of appliances	66	23	11
			Nov 2004	19	Work on domestic installation – what needs COC and inspection	30	44	26
			Jun 2005	18	Work on domestic installation – what needs COC and inspection	47	30	23
			Jun 2005	27	Fittings not needing a COC, work requiring inspection, fittings installed without inspection	55.5	29	15.5
			Nov 2005	26	Work on domestic installation – what needs COC and testing	68	21	11
			Nov 2006	9	Work on LV installation – what needs COC and testing, inspections, issuing CoCs	68	20	12

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	J.33	Damp and wet areas			**Swimming pool – sock5t outlet requirements. Bathroom – zones and IP ratings**	**35**	**36**	**29**
			Nov 2003	27	Electrical equipment in fountains, o/h lines over and luminaires in swimming pools	52	26	22
			Jun 2004	19	Installing, towel rail, socket outlet and switch in bathroom	42.5	43.5	14
			Jun 2004	28	Electrical equipment in fountains, o/h lines over and luminaires in swimming pools	55	26	19
			Jun 2005	19	Pools - bonding and earthing, degree of protection	80	15	5
			Nov 2005	22	Bathroom –zone dimensions for shower, installing IPX7 equipment in zone 0 of bath	61	26	13
			Jun 2006	4	Determine zones and IP ratings of equipment in bathroom	49	25.5	25.5
			Jun 2007	4	Determine zones, IP ratings and installation requirements of equipment in bathroom	2	29	69
			Jun 2007	4	Swimming and spa pool – method of protection prohibited, socket outlets, wiring systems	54	32	14

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	**H3b.30**	**<u>Cables and Cords</u> Selection of final subcircuits**			**3 phase commercial development - determine cable size by calculating load and volt-drop**	**38.5**	**8.5**	**53**
			Jun 2004	21	3 phase oven in bakery, determine suitability of proposed cable – Vd and load	27.5	12.5	60
			Nov 2004	21	3 phase plaster mill in bakery, determine cable size – Vd and load	30	14	56
			Jun 2005	23	3 phase commercial freezer – confirm cable size – Vd and load	39	17.5	43.5
			Nov 2006	3	3 phase cable at crushing plant, calculate cable size – Vd and load for two installation options	30	16	54
			Jun 2007	5	3 phase outdoor metering unit - determine cable size by calculating load and volt-drop	27.5	7	65.5

A3.3 – Moderation

Three moderators were used for ER 27.

This paper was moderated via a meeting.

A3.4 – Marking

Seven markers were used for ER 27.

Teleconferences were held with the markers on 5 and 10 December.

Version 2 of the answer schedule was sent to markers on 5 December.

Version 3 of the answer schedule was sent to markers on 10 December.

Comments

This paper seemed long in terms of time, with some questions having more than one answer. If some questions were more specific the outcome could have been different.

However, the exam content was fair to all students, and those students who struggled with the exam generally did poorly in questions 2, 7 and 9. The paper had a good balance of complexity to test the candidates' understanding of testing, maximum demand, trenching, volt drop, compliance responsibility, and damp environments.

The examination required significant changes during the marking period. These changes made the exam tougher to mark, particularly question 2(a)(i), which started with four correct answers and ended up with twenty.

It may be time to introduce more topical item such as heat pumps and the associated electrical configuration. It may also be time to introduce a question regarding the completion of a Certificate of Compliance.

Comments specific to one marker:

Only 45% passed the exam and there were 60 failures out of 110 papers marked.

Only one candidate received more than 90%; seven got more than 80% and 21 more than 70%. The average mark of the 50 who passed was 71.88% which is a good average.

Of the 60 who failed, the average mark was 43.23%, with the overall average being only 55.78%. The papers were checked several times and better results could not be obtained.

Is it that the candidates have not prepared well for the examination or is the tutoring at fault? The scripts marked were from three examination centres - 014, 032 and 073.

Three hours was sufficient for the exam as demonstrated by the top candidate who gained 94.5% and the other 28 who gained more than 70%.

If candidates knew their way around AS/NZS 3000 and could do electrical calculations they coped well. Many candidates did not seem to have any concept of a functional switch (question 2) and this "tripped" them up. Also, there are not many candidates who are skilled with electrical calculations – particularly three-phase calculations.

A3.5 – Amendments to ER 27

The significant amendments to ER 27 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(b)	Editorial amendment	-	-
1(c)	-	Additional options added	Last two bullet points deleted as being irrelevant to question
1(d)	-	Editorial amendment	-
1(f)	Rewritten to make intention clearer	Amended accordingly	-
1(h)	Included reference to type of cable	Amended accordingly	Options added relating to aluminium earthing conductors
1(j)	-	-	Additional option added
2	Preamble incorporated in (a)	-	-
2(a)	(a), (b) and (c) rewritten and incorporated into (a)(i) and (ii) Marks reduced to 5	Amended accordingly	-
2(a)(ii)	-	-	Question broader than previously considered. 17 additional options added.
2(b)	New 5 mark question relating to the features of isolation and functional switched inserted	Amended accordingly	-
3(a)	Preamble incorporated in (a). (a)(i), (ii), (iii) and (iv) now (i)(1), (2), (3) and (4) (b)(i), (ii), and (iii) and (iv) now (i)(1), (2) and (3)	Amended accordingly	-
3(b)	Rewritten to make clearer. Was (b)(iv). Moved to separate paragraph as "stand alone" question	Amended accordingly	-
4(a)	Rewritten as answer can related to either a socket outlet or permanent connection unit	Amended accordingly	Additional options added to (i) and (ii)

The significant amendments to ER 27 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
4(c)	Rewritten to make intention clearer	Additional option added	-
5	Preamble rewritten to make intention clearer	-	-
5(a)(iii)	-	References added	-
6(a)	-	-	Additional solution added
6(b)	Additional information inserted Extracts from AS/NZS 3008.1.2 deleted. Instruction to use tables at end of paper (after question 9) inserted	-	Additional solution added
7	Preamble – 1st and 2nd bullet points relating to building 2 rewritten to make intention clearer	-	-
7(c)	-	Amended to align with changed preamble	-
7(d)(ii)	-	Amended to align exactly with the regulations	-
7(f)	Replaced with question relating to testing using test instruments	Amended accordingly	-
8(a)(iii)	-	Amended to align exactly with section 7.1 of AS/NZS 3000	Additional options added
8(b)(i)	-	Amended to align exactly with section 7.1 of AS/NZS 3000	Additional options added
8(b)(ii)	-	Amended to align exactly with section 7.1 of AS/NZS 3000	-
8(b)(iii)	-	Amended to align exactly with section 7.1 of AS/NZS 3000	-
8(b)(v)	Replaced with question relating to the zone and rating of light switch	Amended accordingly	-
9(a)	-	Correction made to calculation	References to tables corrected
9(b)	-	Correction made to calculation	-

Appendix 4

Electrician Theory

16 and 17 November 2007

ET 24, a moderated paper, was used for the examination of 17 November 2007.
ET 25, a composite paper, was used for the examination of 16 November 2007.

A4.1 - Overall Candidate Performance

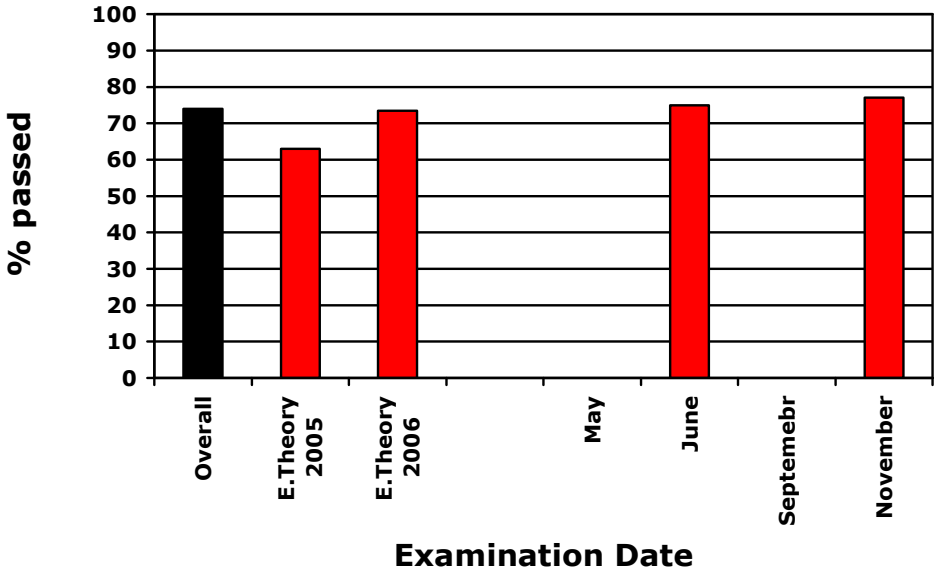
	Number of candidates	**Number of candidates who passed**	**Percentage passed**
ET 24	682	524	77
ET 25	3	3	100
November 2007	**685**	**527**	**77**

Candidate performance – ET 24

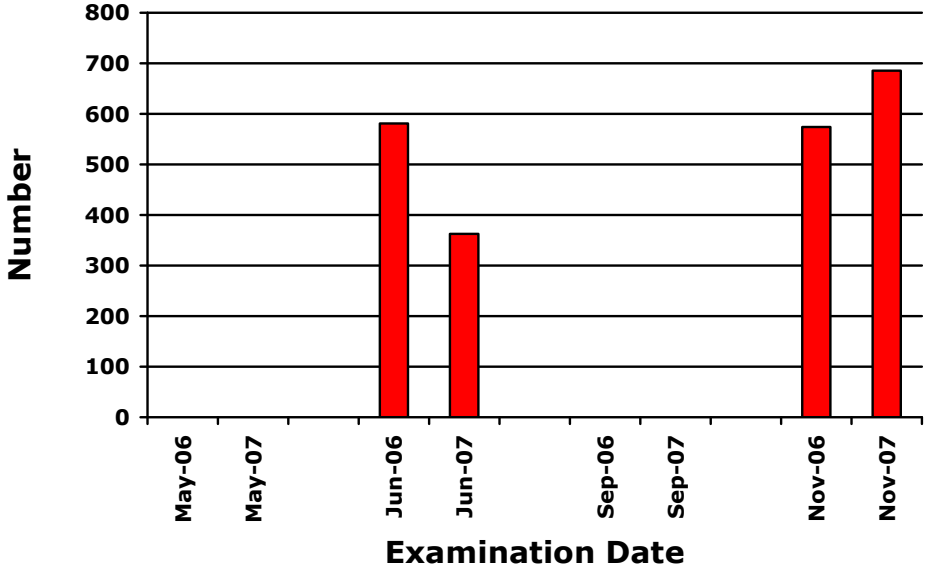
Candidates	**Candidates Passed**	All candidates	
		Average pass mark	69%
682	**524**	Median mark	71.5
		Those who passed	
	77%	Average pass mark	76%
		Median mark	76.5

14 Candidates gained 95 or more marks.

2007 PASS RATES - ELECTRICIAN THEORY



2007 CANDIDATE NUMBERS - ELECTRICIAN THEORY



Mark Ranges

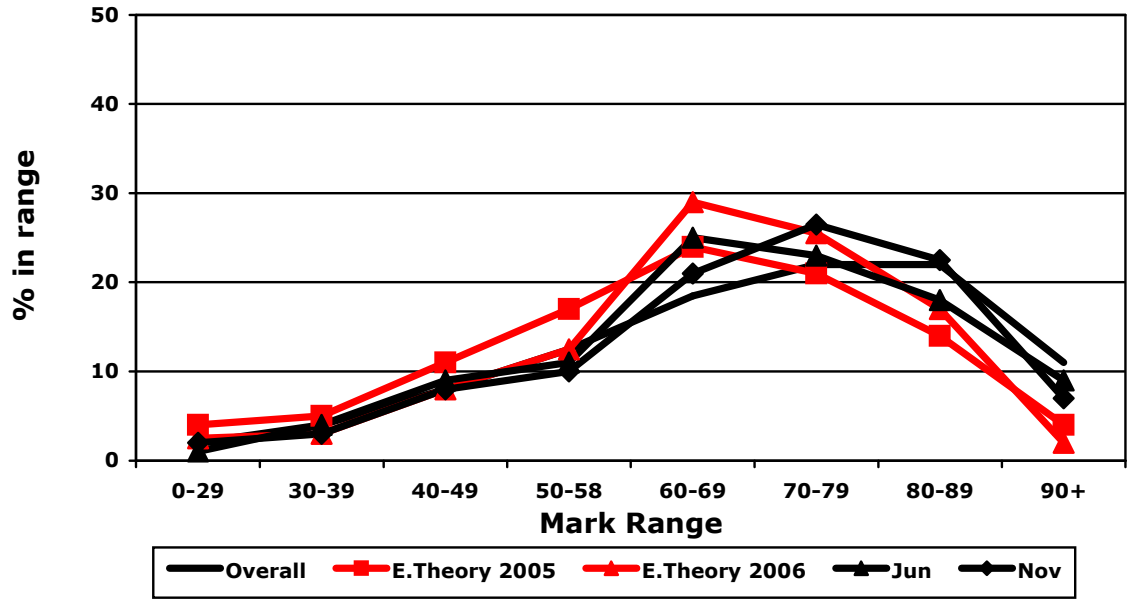
Number of candidates

Range	ET 24	ET 25		**November 2007**	
90 – 100	49	1		**50**	**candidates**
80 – 89	153	1		**154**	**candidates**
70 – 79	180	1		**181**	**candidates**
60 – 69	142	0		**142**	**candidates**
50 – 58	67	0		**67**	**candidates**
40 – 49	52	0		**52**	**candidates**
30 – 39	23	0		**23**	**candidates**
0 – 29	16	0		**16**	**candidates**
	682	**3**		**685**	

% of candidates

Range	ET 24	ET 25	ET 23	**November 2007**
90 – 100	7	34		**7% of candidates**
80 – 89	22.5	33		**22.5% of candidates**
70 – 79	26.5	33		**26.5% of candidates**
60 – 69	21	0		**21% of candidates**
50 – 58	10	0		**10% of candidates**
40 – 49	8	0		**8% of candidates**
30 – 39	3	0		**3% of candidates**
0 – 29	2	0		**2% of candidates**

2007 MARK RANGE - ELECTRICIAN THEORY



A4.2 - 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 similar questions from previous examination papers.

	Topic No.	**Topic**	Year	Q.No.	**Subject**	**75-100% (%)**	**50 – 70% (%)**	**0 – 45% (%)**
Q 1	**-**	**10, 2 mark questions**				**54**	**34**	**12**
Q 2	**H1a.27**	**Protection and Control Protection characteristics**			**Describe how discrimination occurs, define markings on fuse, back-up protection, inverse time characteristics**	**51**	**31**	**18**
			Nov 2005	3	Meaning of discrimination, fuse markings, back-up protection, inverse/time characteristics	32	31	37
			Nov 2006	6	Define inverse time characteristic, draw graph. Why is back-up protection installed, explain discrimination, under-rated and over-rated fuses	50	33	17

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	**E2.16**	**3ph-Motor/Alternators Selection, starting, protection**			**Three-phase motor terminal with no marks – tests to enable motor to be connected, define symbol on nameplate, draw connections on terminal block, motor faults**	**42**	**40.5**	**17.5**
Q 4	**H9.62**	**Commission and decommission equipment and appliances**			**Three-phase planer – tests to ensure it is safe to connect, testing for safety, actions after connecting planer**	**33**	**38**	**29**
			Jun 2006	9	Hot water cylinder, safe disconnection and isolation procedures	63	29	8
			Jun 2007	5	Connect new hot water cylinder – instrument testes before connection, safe procedures prior to connection	40.5	35	24.5
			Jun 2007	5	Faulty refrigeration plant – safe isolation procedures, leaving work safe, other electrician actions	63	24	13

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	**D3.21**	**<u>System theory</u> - Earthing of installations fittings and appliances**			**Faulty three-phase kiln – calculate current in faulty line, effect on circuit protection. Fault current if 8Ω fault develops, explain electrical hazards.**	**54**	**23.5**	**22.5**
			Nov 2005	2	Fault on 3 phase pottery kiln, calculate current in faulty line, effect on protection, hazard to user	39.5	36.5	24
			Jun 2006	5	Fault on 3 phase pottery kiln, calculate current in faulty line, effect on protection, hazard to user	66	12	22
			Jun 2007	8	Faulty three phase lathe – calculate current in faulty line, effect on protection, hazard if PEC was 10Ω	31	23	46
			Jun 2007	8	Faulty heater. Draw circuit diagram, calculate power dissipated in PEC. How effective earthing provides protection against shock, how high resistance earth increases risk of shock,	27	39	34

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	**E2.16**	**<u>3ph-Motor/Alternators</u> Selection, starting, protection**			**Draw control circuit for three phase starter, redraw start/stop and insert remote start/stop with 3-core cable, replacement for thermal overload**	**55.5**	**29.5**	**15**
			Jun 2006	6	400V DOL starter circuit with remote stop/start, use of reduced voltage starters	37.5	5	57.5
			Nov 2006	4	Draw 230V DOL starter circuit, why thermal overload and HRC fuse protection required, how thermistor protects motor	43	36	21
			Jun 2007	4	Draw stop/start for motor control circuit. Three phase motor, calculate input power, kVA and line current. Why reduced voltage staring required	38	18	44
			Jun 2007	9	Draw control circuit for three phase starter, difference between variable speed controller and soft starter. Why thermal overload and HRC fuses used for motor circuit protection	55	28	17

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 7	**H10.66**	**Fault diagnosis**			**Hazards of mains transposition, testing for transposition, cause of shock off washing machine**	**61**	**21**	**18**
			Jun 2006	4	Hazards of mains transposition, testing for transposition	14	10	76
			Jun 2007	6	Hazards of mains transposition, testing for transposition	61	13.5	25.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	**G2.24**	**<u>Transformers</u> Operating principles**			**Three- phase transformer – draw circuit diagram, calculate secondary phase and line voltages, primary and secondary line currents, method to reduce iron losses**	**57**	**20**	**23**
			Jun 2005	8	3 phase transformer – sketch circuit, calculate primary and secondary line currents, kVA rating. Two methods to cool transformers.	34	12	54
			Nov 2005	7	3 phase transformer – calculate secondary phase and line voltages, primary and secondary line currents	39	25	36
			Nov 2006	5	3 phase transformer – calculate secondary phase and line voltages, primary and secondary line currents, why CT is dangerous on open circuit, method to reduce iron losses	43.5	35	21.5
			Jun 2007	7	Three phase transformer - calculate primary and secondary line currents, total kVA. Why no fuses on CT secondary	37.5	8	54.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	**L1.40/54**	**<u>Isolation</u> Equipment and Personal safety**			**Danger and Out-of-Service tags, precautions when attaching tag to switch, how prove-test-prove is carried out**	**51**	**34**	**15**

A4.3 - Moderation

Three moderators were used for ET 24.

This paper was moderated via a moderation meeting

A4.4 - Marking

Five markers were used for ET 24.

Teleconferences were held with the markers on 26 November and 3 December.

Version 2 of the answer schedule was sent to markers on 26 November.

Version 3 of the answer schedule was sent to markers on 3 December.

Comment

This paper was well balanced with no particularly difficult questions as evidenced by almost all candidates attempting every question.

The worrying trend of potential electricians who have difficulty understanding or communicating with written language continues.

Although most could explain what "prove-test-prove" meant in question 9(b), it was often used in other answers like "confetti"– often dropped in regardless of whether it made sense or not. This raises concern as to whether many candidates actually understand how the method is applied.

Similarly, candidates gave a great number of "implied" answers, for example, question 1(a):

> *"By earthing the frame, when a fault occurs it should isolate the circuit unless there is a high resistance to earth."*

This implies that because of the earthed frame the protection will operate and thereby isolate the circuit – but is vague.

Other examples are:

The max short circuit current the fuse "can handle".
……must operate "correctly"

Both are an attempt to persuade the examiner that they know what "can handle" and "correctly" mean. However, often subsequent answers a candidates provides reveal that their concept of these terms is different from reality

Many candidates are unable to complete an electrical drawing that use internationally (or any other) recognised symbols, or indeed understand what they are.

A4.5 - Amendments to ET 24

The significant amendments to ET 24 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(a)	-	-	Split into two distinct marks
1(d)	Rewritten to make intention clearer	Amended accordingly	Additional option added
1(e)	-	Amended to be more accurate	Additional option added
1(f)	Amended to require the main reason instead of one reason	Amended to be more accurate	Abridged to be more accurate
1(g)	-	Amended to be align accurately with the question	-
1(h)	Rewritten to make intention clearer	-	-
1(j)	-	Inserted reference to an MEN switchboard	Split into two distinct marks
2(a)	Rewritten to make intention clearer	Amended to accurately reflect the requirements of the question	-
2(b)	Rewritten to make intention clearer. Marks reallocated to ensure fairer recognition of answer for AC40	Amended accordingly	Marks allocated for each distinct part of each answer
2(c)	-	-	Answer amended to refer to circuits in general (not just motor circuits)
3(a)	Preamble - reference to PEC and IR test included to ensure requirement is clear	Amended accordingly	-
3(a)(i)	Rewritten to make intention clearer	Amended accordingly	-
3(a)(ii)	New question relating to motor nameplate inserted	Amended accordingly	Additional requirement added
3(a)(iii)	Was (a)(ii). Rewritten to make intention clearer	Amended accordingly	-
3(b)	Was (b)(i)	Amended accordingly	-
3(c)	Was (b)(ii). Only one answer required, marks reduced accordingly	Amended accordingly	Additional option added
4	Preamble – additional information included.	-	-
4(a)	Split into two parts and rewritten to make intention clearer. Marks reduced to 5.5	Amended accordingly	-

The significant amendments to ET 24 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
4(b)	Rewritten to make intention clearer Marks reduced to 1.5	Amended accordingly	-
4(c)	Amended to require three actions. Marks amended accordingly	Amended accordingly. Two additional options added	Three additional options added
5	Was question 9	Amended accordingly	-
5(a)(ii)	-	-	Amended to provide two distinct options
6(a)	-	-	Abridged to be more accurate
6(b)	-	-	Amended to better align with question
7(b)(i)	-	Reference to turning off the main switch inserted	Reference to turning off the main switch removed – considered not necessary
7(c)	Reference to no transposition having taken place inserted. Reformatted to show two answers required	Two additional options added	Last bullet point amended to be more accurate. Additional option added
8(a)	Preamble - reference to "standard low voltage" replaced with "voltage not commonly used".	-	-
8(a)(i)	-	-	Marks allocated
8(a)(v)	Reference to maximum current under full load conditions inserted	-	-
8(b)	-	Additional option added	-
9	Was question 5	-	-
9(a)(iii)	-	-	Additional option added

Appendix 5

Electrical inspector

17 November 2007

IT 13, a moderated paper, was used for the examination of 17 November 2007.

A5.1 - Overall Candidate Performance

	Number of candidates	Number of candidates who passed	Percentage passed
IT 13	129	111	86
November 2007	**129**	**111**	**86**

Candidate performance – IT 13

Candidates	Candidates Passed
129	**111**
	86%

All candidates

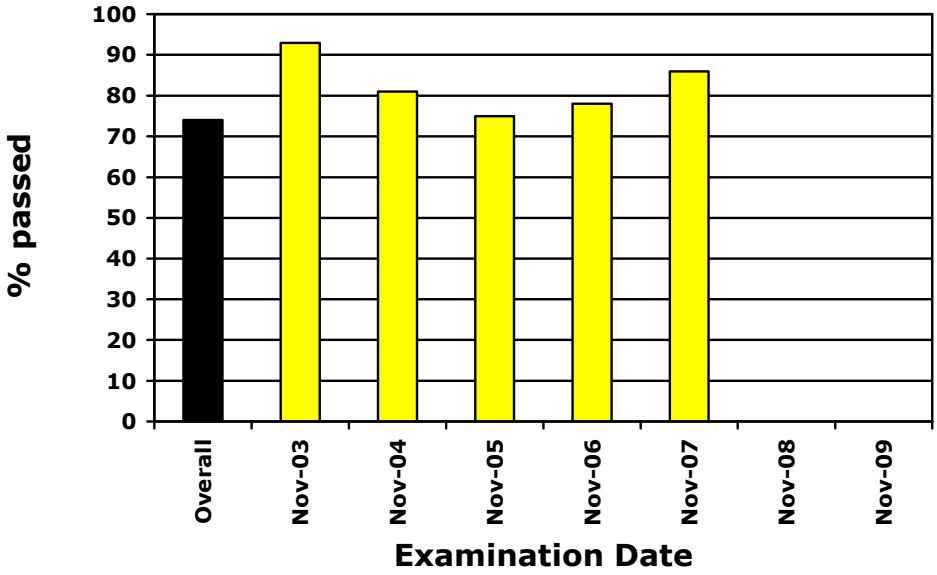
Average pass mark 69%
Median mark 69.5

Those who passed

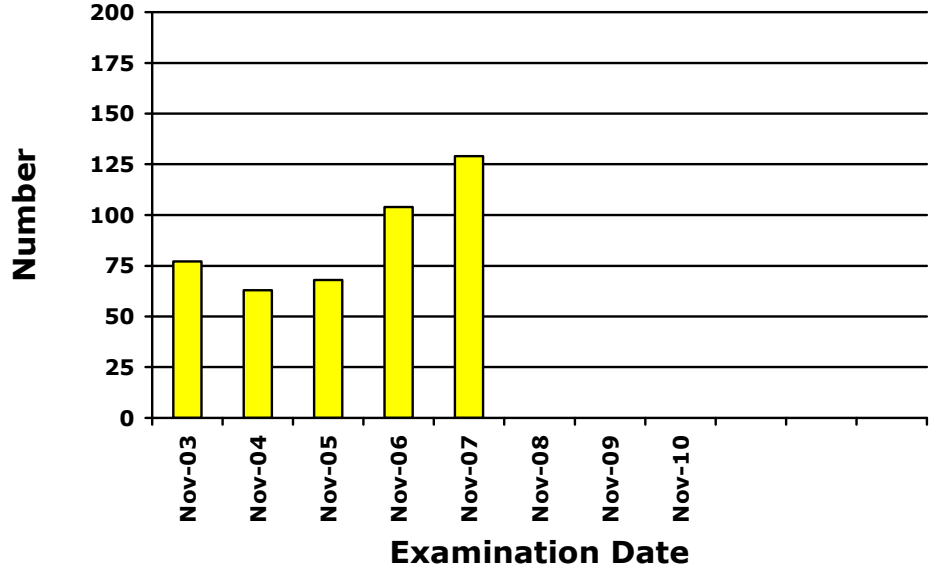
Average pass mark 72%
Median mark 72.5

1 Candidate more than 90 marks.

PASS RATES - ELECTRICAL INSPECTOR



CANDIDATE NUMBERS - ELECTRICAL INSPECTOR



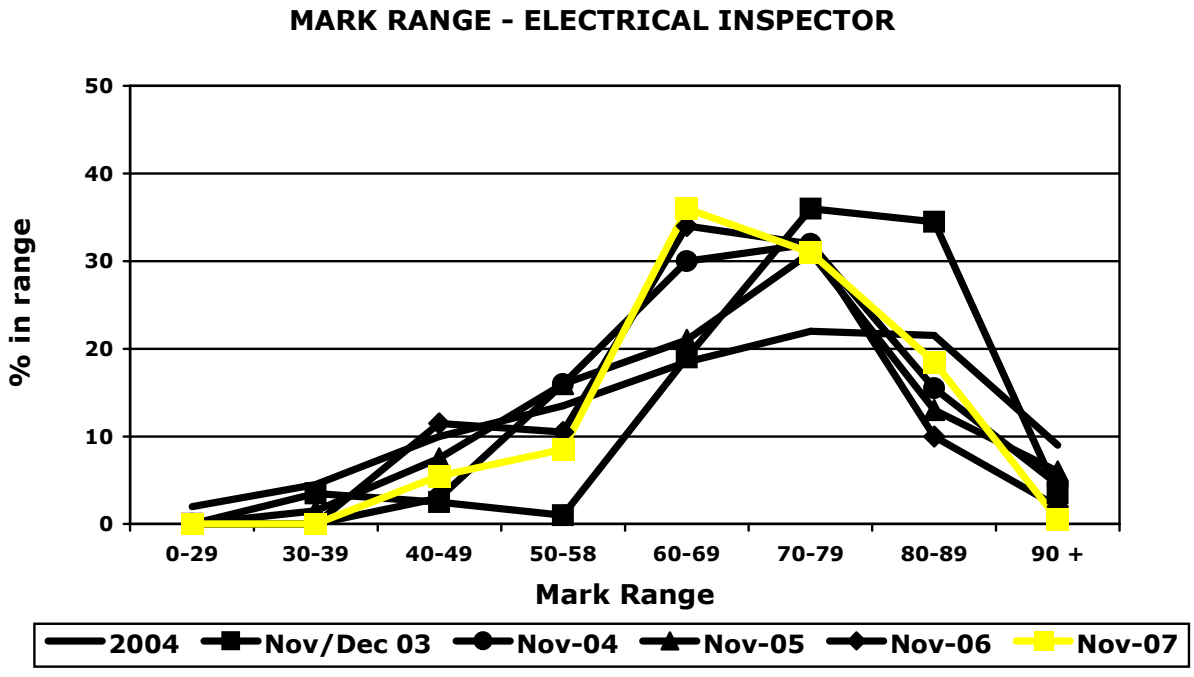
Mark Ranges

Number of candidates

Range	IT 13			November 2007	
90 – 100	1			**1**	**candidates**
80 – 89	24			**24**	**candidates**
70 – 79	40			**40**	**candidates**
60 – 69	46			**46**	**candidates**
50 – 58	11			**11**	**candidates**
40 – 49	7			**7**	**candidates**
30 – 39	0			**0**	**candidates**
0 – 29	0			**0**	**candidates**
	129			**129**	

% of candidates

Range	IT 13			November 2007
90 – 100	0.5			**0.5% of candidates**
80 – 89	18.5			**18.5% of candidates**
70 – 79	31			**31% of candidates**
60 – 69	36			**36% of candidates**
50 – 58	8.5			**8.5% of candidates**
40 – 49	5.5			**5.5% of candidates**
30 – 39	0			**0% of candidates**
0 – 29	0			**0% of candidates**



A5.2 - 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 similar questions from previous examination papers.

	Topic No.	**Topic**	Year	Q.No.	**Subject**	**75-100% (%)**	**50 – 70% (%)**	**0 – 45% (%)**
Q 1	**-**	**10, 2 mark questions**				**84**	**15.5**	**0.5**
Q 2	**D4.22**	**System theory - MEN systems**			**Calculate MVA rating of busbars and PSSC for industrial installation, power factor correction on motor circuit, why earth loop impedance test carried out**	**52**	**26**	**22**
			Nov 2004	3	Inspection of new switchboard – calculate fault level and PSSC, setting overloads with PF correction.	9.5	35	55.5
			Nov 2006	2	Diagram and circuit of loop impedance tester, use of information from loop impedance tester, min. size main earth, calculate fault level and PSSC	48.5	33	18.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	**H1b.28**	**<u>Protection and Control</u>** **RCD characteristics**			**Describe operation of RCD on earth fault, markings and operating characteristics of Type A RCD, advice on RCD protection in kitchen**	**66.5**	**25**	**8.5**
			Nov 2006	5	RCDs installed in a motel, Type A RCDs.	57	32	11
Q 4	**H3b.30**	**<u>Cables and Cords</u>** **Selection of final subcircuits**			**4-core N/S cable from three-phase distribution panel to pottery kiln – buried direct or surface mounted options. Calculate cable size for both based on load and volt drop**	**46**	**22**	**32**
			Nov 2003	2	3 phase furnace – calculate cable size, loading and volt drops.	40	22	38
			Nov 2004	6	3 phase furnace – calculate cable size, loading and volt drops.	54	6	40
			Nov 2005	7	3 phase factory – calculate cable size, loading and volt drops.	57	15	28
			Nov 2006	3	3 phase furnace – calculate cable size, loading and volt drops.	48.5	19.5	32

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	**H10.66**	**Fault diagnosis**			**Hazards of phase and neutral transposition, describe test method, expected reading, shocks off washing machine – likely causes**	**81.5**	**16.5**	**2**
			Nov 2004	2	Mains transpositions	59	17	24
			Nov 2006	6	Hazards of mains transposition, testing for polarity, expected results	59	23.5	17.5
Q 6	**H5e.37** **H5f.37**	**Caravan parks** **Caravans** **Marinas** **Pleasure vessels**			**Supply of electricity to connectable installations, methods of connecting, socket outlets and protection devices for pleasure crafts**	**42**	**49.5**	**8.5**
			Nov 2005	9	Connectable installation requirements, requirements of AS/NZS 3014	26.5	41	32.5
			Nov 2006	4	Requirements for supply, responsibility for EWOF, methods of supply to marina, plug connections, max resistance	55	35	10

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 7	**K1.34**	**<u>Testing for supply</u>**			**Existing house – checks to be made of particular aspects. House disconnected for 2 months, test and checks to be carried out before connection**	**42.5**	**45**	**12.5**
			Nov 2005	4	House disconnected for 2 months, inspection of certain aspects of the installation for homeowner, checks required when reconnecting for retailer	25	44	31
			Nov 2006	7	Reconnection of installation – documentation, tests before reconnection, requirements for testing	66	25	9

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	**D4.22**	**System theory - MEN systems**			**Hazards of open-circuited screen in a N/S cable feeding duplex unit, metal that must be earthed, draw fault paths**	**40**	**49**	**11**
			Nov 2006	2	Diagram and circuit of loop impedance tester, use of information from loop impedance tester, min. size main earth, calculate fault level and PSSC	48.5	33	18.5
Q 9	H3a.29	Cables and Cords Selection of mains and submains			**Maximum demand of low rise residential development comprising living units and communal areas**	**3**	**17**	**80**
			Nov 2003	4	Max. demand of 3 phase bakery	1	6	93
			Nov 2004	9	Max. demand of 3 phase factory	13	19	68
			Nov 2005	4	Max. demand of 3 phase small engineering shop	43	26	31
			Nov 2006	9	Max. demand of 3 phase small engineering shop	2	12.5	85.5

A5.3 - Moderation

Three moderators were used for IT 13.

This paper was moderated via a moderation meeting

A5.4 - Marking

Two markers were used for IT 13.

Teleconferences were held with the markers on 26 December and 5 December.

Version 2 of the answer schedule was sent to markers on 26 December.

Comment

The examination paper had a good balance of complexity to test candidates understanding of testing, maximum demand, phase/neutral transposition, volt drop, compliance responsibility, and installation re testing.

The examination did not require many changes during the marking period. Credit should go to the moderation team for a good exam.

Candidates generally did well in this examination. The standard of writing was generally high, while the calculations were generally poor. Those candidates who struggled with the examination generally did poorly in questions 4, 7 and 9.

A5.5 - Amendments to IT 13

The significant amendments to IT 13 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(a)-(j)	-	-	Correct marks inserted
2(a)	Preamble, (a) and (b), incorporated into (a). Amended to make question specific	Amended accordingly	-
2(b)	Was (c). Amended to make stand-alone question	Amended accordingly	-
2(c)	Was (d). Amended to make stand-alone question	Amended accordingly	-
2(d)	Was (e)	-	-
3(b)	Amended by removing reference to NZS 3019 –now can be answered either from that Standard or from general knowledge.	-	-
3(b)(i)	-	1st and 2nd bullet points corrected	-
3(c)	Rewritten to make intention clearer	Additional option added Reference included	-
4	Reference to maximum demand removed.	-	-
4(a)	Reformatted to allow for two distinct calculations	Amended accordingly	-
4(b)	Reformatted to allow for two distinct calculations	Amended accordingly	-
4(c)	Rewritten to require size of cable and preferable installation method	Amended accordingly	-
5(a)	Editorial amendment	-	-
5(b)(i)	-	Two diagrams condensed into one	-
5(b)(ii)	-	-	Reference to turning off main switch deleted. Considered not relevant to question
5(c)	Reference to the fact that no phase/neutral transposition included	Three additional options added	Additional option added

The significant amendments to IT 13 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
6(d)	Amended to make clearer	Amended accordingly	-
7	Preamble, (a) and (b) rewritten to make two distinct questions relating to a house that has just been sold	-	-
7(a)(ii)	-	Editorial amendment	-
8(a)	Rewritten to make more topical	Amended accordingly	-
9	Rewritten to make intention clearer	Correct calculation for communal area inserted	-

Appendix 6

Tradesperson Electrical Work Certificate

24 November 2007

TEWC 145, 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 145A which comprised questions 1 to 4, 5, 7, 8, 11 and 14 of TEWC 145.

A6.1 - Moderation

Three moderators were used for TEWC 145.

This paper was moderated via a meeting

A6.2. - Marking

One marker was used for TEWC 145 and 145A.

Comments

Two candidates sat and passed this examination. One candidate gained 85 marks, the other 76 marks.

A6.3 - Amendments to TEWC 145

The significant amendments to TEWC 145 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(d)	-	Amended to show where the 2 marks are allocated	-
1(h)	Editorial comment	Condensed to be more specific	-
2(d)	Editorial comment	-	-
3(b)	-	Amended to make more accurate	-
4	Editorial comment	-	-
5(a)	-	Last bullet point deleted. Considered not relevant to question	-
7(b)	-	Condensed to be more specific	-
8(b)	Rewritten to make intention clearer	Additional option added	-
8(d)	Editorial amendment	-	-
9(a)	Deleted reference to the supervisor in the 2nd paragraph	Editorial amendment	-
10(b)	-	Deleted reference to damaged wiring Three additional options added	-
11(b)	Deleted reference to earth continuity conductor	-	-
12(a)	-	Last bullet point deleted. Considered not relevant to question	-
13(b)	-	Condensed to be more specific	-
14(a)	Deleted reference to the supervisor in the 2nd paragraph	Editorial amendment	-

Appendix 7

Electronic Security

17 November 2007

ES 13, a moderated paper, was used for this examination.

A7.1 - Moderation

Three moderators were used for ES 13.

This paper was moderated via a meeting

A7.2. - Marking

Two markers were used for ES 13.

Comments

Six Candidates sat this examination and all passed.

A7.3 - Amendments to ES 13

The significant amendments to ES 13 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(b)	Editorial amendment	-	-
1(c)	Rewritten to make intention clearer	-	-
1(d)	-	-	Additional option added
1(e)	Rewritten to make intention clearer	Amended accordingly	-
2(a)	-	-	Question considered vague. Note added to accept any reasonable answer
2(b)	Replaced with part that is consistent with other parts of the question	Amended accordingly	-
2(c)(ii)	-	Two additional options added	-
2(d)	Editorial amendment	Additional option added	2nd and 3rd bullet points deleted as being contradictory to the question
3(a)	Editorial amendment	-	Reference to "faulty machine" deleted
4(a)	Deleted reference to earth continuity conductor 3rd paragraph rewritten to make intention clearer	Calculation amended to be more accurate	-
4(b)(i)	-	Condensed to be more accurate	-
5(a)	Rewritten to make intention clearer.	Amended accordingly	-
6(d)	Replaced with question relating to the regulations	-	-
6(e)	Rewritten to make intention clearer.	Amended accordingly	-
7(a)	Editorial amendment	Amended accordingly	-
7(a)(ii)		Condensed to be more accurate	-
7(d)	Replaced with question relating to handheld appliances. Original a duplicate of question in question 9	Amended accordingly	-

The significant amendments to ES 13 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
8(a)	-	-	Reference inserted
9(a)	Editorial amendment	-	-
9(f)	Editorial amendment	-	-