

ELECTRICAL WORKERS REGISTRATION BOARD
SUMMARY OF
NOVEMBER 2006 EXAMINATION ROUND

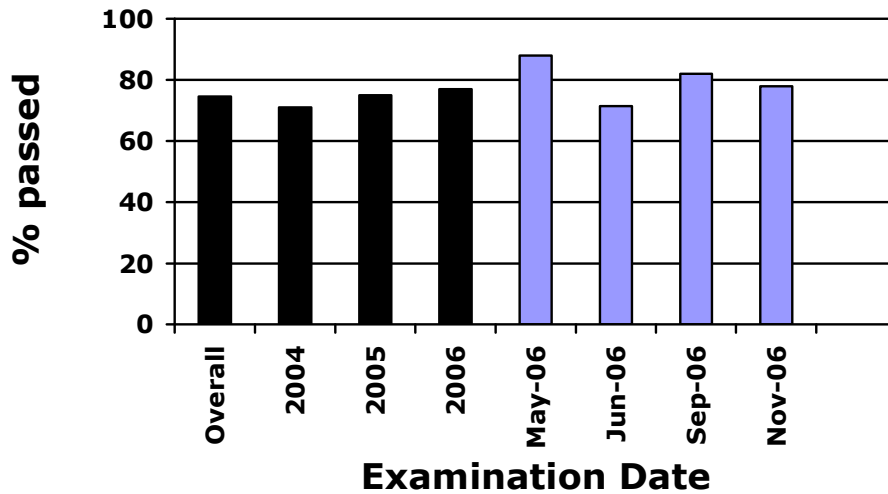
John Sickels
Registrar
February 2007

1. Summary of Examinations

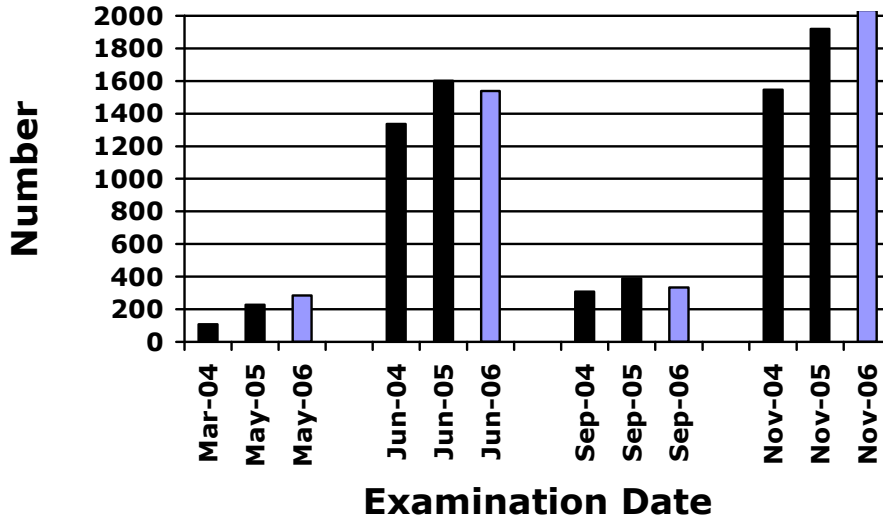
1.1 Overall

	Number candidates	of	Number candidates passed	of who	Percentage passed
ESTA	383		306		80
ESTB	203		158		78
Elec. Regulations	765		606		79
Elec. Theory	574		436		76
TEWC	5		2		40
Elec. Inspector	104		81		78
E Security	1		1		100
November 2006	2035		1590		78

2006 - PASS RATES - OVERALL



2006 - CANDIDATE NUMBERS - OVERALL



Mark Ranges

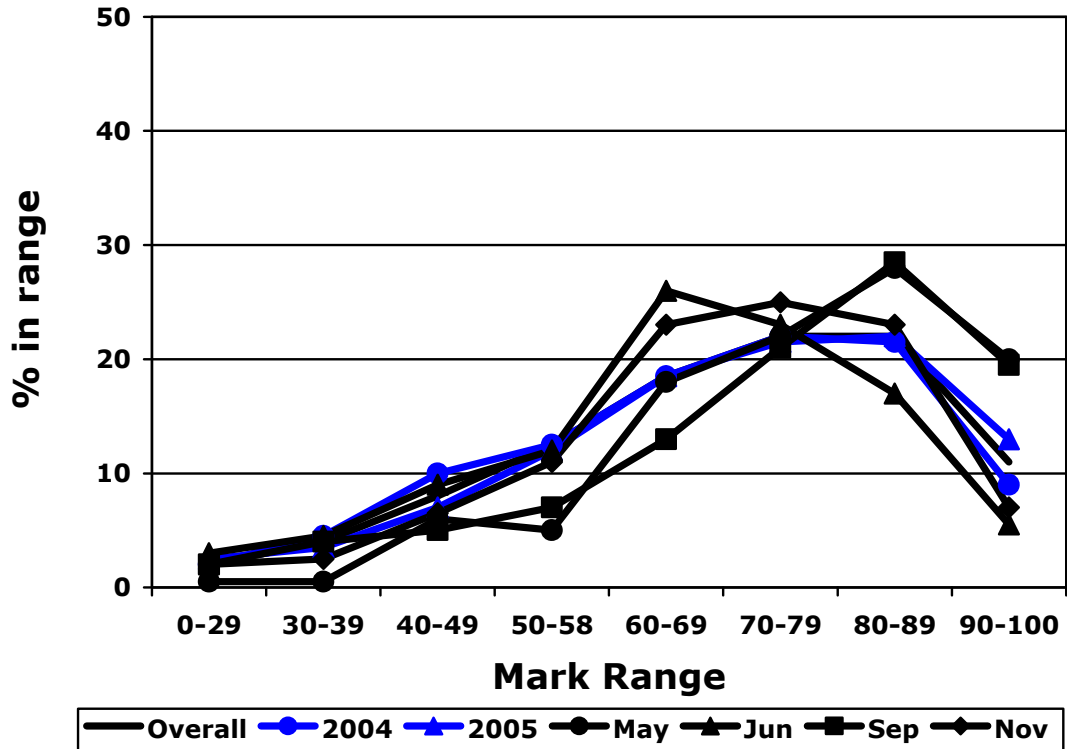
Number of candidates

Range	ESTA	ESTB	ER	ET	TEWC	EI	ES	November 2006	
90 - 100	65	16	50	11	1	2	0	145	candidates
80 - 89	130	49	159	118	0	10	0	466	candidates
70 - 79	77	50	202	150	1	33	1	514	candidates
60 - 69	34	43	195	157	0	36	0	465	candidates
50 - 58	30	23	91	69	2	11	0	226	candidates
40 - 49	27	10	40	44	0	12	0	133	candidates
30 - 39	8	8	17	17	1	0	0	51	candidates
0 - 29	12	4	11	8	0	0	0	35	candidates
	383	203	765	574	5	104	1	2035	

% of candidates

Range	ESTA	ESTB	ER	ET	TEWC	EI	ES	November 2006
90 - 100	17	8	6.5	2	20	2	0	7% of candidates
80 - 89	34	24	20.5	20.5	0	10	0	23% of candidates
70 - 79	20	25	26.5	26	20	32	100	25% of candidates
60 - 69	9	21	25.5	27.5	0	34	0	23% of candidates
50 - 58	8	11	12	12	40	10.5	0	11% of candidates
40 - 49	7	5	5.5	7.5	0	11.5	0	6.5% of candidates
30 - 39	2	4	2	3	20	0	0	2.5% of candidates
0 - 29	3	2	1.5	1.5	0	0	0	2% of candidates

2006 MARK RANGE - OVERALL



1.2 Comments

Moderation

The moderation process was conducted through a series of meetings. All moderators participated as expected, with most changes occurring in the Electrician Regulations and Electrical Inspector papers.

Marking

The marking went very well. The slow return of papers from examination centres still causes problems because this causes the distribution of papers to be erratic. Markers find it difficult to plan their marking.

As I stated in the September report, I was unsure whether the changes to the marking process produced any great advantage. Those changes were:

- Markers were emailed the examination papers and answer schedules the Monday after the examination.
- The 1st teleconference was held the following Monday prior to marking commencing.
- The 2nd teleconference was held a week later.

The changes were well received in the examination round. Markers provided a number of suggested changes to all the marking schedules. In most cases, this resulted in the number of changes during the marking being kept to a minimum.

Candidate performance

The overall pass rate of 78% was excellent. The number of candidates passed 2000 for the first time with the number of candidates for the Electrician regulation examination being 106 more than at the same time last year. There were also rises in the number of ESTA and Inspector candidate numbers.

Electrical Service Technician A

The pass rate of 80% for this examination was pleasing. The pass rates for this examination have slowly declined since September 2005. This pass rate arrested that decline.

Candidate performance was sound in all areas in this examination. For each question:

- At least half of the candidates were able to gain 7.5 marks or more (15 marks or more for question 1).
- At least three-quarters of candidates were able to gain 5 marks or more (10 marks or more for question 1).

The results for question 3 (fault finding and calculation of fault currents) and question 6 (testing) were very pleasing as the marks for similar questions in previous papers were very variable for these types of questions.

An abridged analysis is contained in Appendix 1.

Electrical Service Technician B

The result for this examination was slightly lower than in some previous examinations but, nonetheless, consistent with the overall pass rates. Markers commented that there was probably an over-emphasis on testing in the examination with similar answers required (albeit to different questions). Given the pass rate it would seem candidates took care in reading the questions presented and were not perturbed by the fact that some answers were similar.

Candidate performance was strong in question 1 (short-answer questions); question 2 (three-phase motor starters); question 3 (isolation procedures, diagnosing a fault); question 5 (testing requirements of AS/NZS 3760); question 8 (theory of the earthing of appliances); and question 9 (registration and practising licences). The performance in question 8 was much better than when a similar question was presented in May 2005.

Candidates had difficulty with questions 4 and 6. Question 4 related primarily to HRC fuses – markings, fuse selection, utilisation category (fusing factor). It is difficult to understand why candidate performance is so variable with this topic. At least one part of this type of question is asked in each examination and the topic is one of the most detailed in the teaching guidelines.

Question 6 related to carrying out Protective Earthing and Insulation Resistance tests on a faulty machine. While 30% of candidates were able to gain 7.5 marks or more and 40% of candidates between 5 and 7 marks, 30% of candidates displayed an inadequate knowledge of the topic. This is, by far the highest proportion for this topic for some time.

An abridged analysis is contained in Appendix 2.

Electrician Regulations

The number of candidates for this examination was the highest recorded since 1992. The pass rate was very satisfactory. The moderation panel originally considered that the examination was too easy so made some significant changes. While markers considered the paper reasonable, they did comment that they thought it was one of the more difficult in recent years. So all credit to the candidates - they were well prepared and performed accordingly.

Candidates performed well in question 1 (short answer question); question 2 (earthing and bonding requirements); question 5 (requirements for motors in AS/NZS 3000); question 6 (connections within wiring systems); question 7 (protection and segregation of wiring systems); and question 9 certification and inspection. The majority of candidates were able to gain 5 or more marks for these topics. More than half of all candidates were able to display a sound knowledge (7.5 marks or more - 15 marks or more for question 1) in these topics.

Candidates had difficulty with questions 4, 5 and 8. Question 3 related to calculating a cable size based on load and voltage drop. The performance was similar to previous years with about 30% of candidates able to demonstrate a sound knowledge of the topic while about 50% unable to display an adequate knowledge. Over 300 candidates got less than 3 marks. Consideration needs to be given as to whether this type of question is appropriate given that programmes are available, particularly via the Internet, to do this type of calculation. Maybe the question is more suited to the factors that need to be taken into account when the size of a cable needs to be obtained.

Question 4 relating to polarity testing on the mains of a single-phase installation. Only 19% of candidates could display a sound knowledge of the topic and a further 21% an adequate knowledge. 460 candidates had little or no knowledge of the topic. Part (a) of this question, worth 3 marks, required candidates to refer to AS/NZS 3000 and state three reasons why testing for polarity is necessary. 93% of candidates were able to gain 3 marks or more. This indicates, once again, that candidates understand the outcomes required by a Standard, but most have little idea how to achieve that outcome.

Question 8 related to RCDs. The number of candidates displaying a sound knowledge of this topic was lower than in the past. Markers considered that candidates' difficulty arose because there is not a clear distinction between domestic and residential installations.

An abridged analysis is contained in Appendix 3.

Electrician Theory

The pass rate for this examination was similar to the June examination and the first time in three years where the results for both the June and November examinations were similar.

Both moderators and markers considered that this examination was not as difficult as those in the past. The comment of one marker that the examination was a more "ESTB" style examination is a valid one. Both this and the June examination were more safety oriented than pure electrical theory.

Candidates performed well in question 1 (short answer questions); question 2 (earthing systems); question 4 (testing); question 5 (transformer calculations), question 6 (electrical protection); question 7 (safe isolation and testing for faults); and question 9 (testing). With these questions about three-quarters of candidates could display at least an adequate knowledge with about half of all candidates displaying a sound knowledge.

Candidates performance in question 4 – three-phase motor starters – was much improved from the result of a similar question in the June examination. About 80% of candidates were able to display, at least, an adequate knowledge of the topic. This compares with 38% of candidates for a similar question in the June examination.

Question 8 posed the most difficulty for candidates. This question related to the effect of various transpositions when an isolator was replaced. Only 12% of candidates could display a sound knowledge of the topic and 43% an adequate knowledge. The poor results for this question mirror similarly poor results for question 4 in the Electrician Regulations examination – transposition of mains conductors. It is a concern that most candidates do not know of the effects of transposing conductors because such issues can affect both themselves and the public.

An abridged analysis is contained in Appendix 4.

Tradespersons Electrical Work Certificate

Five candidates sat this examination and two passed.

An abridged analysis is contained in Appendix 5.

Electrical Inspector

The pass rate for this examination was excellent. Moderators considered that the draft examination was too difficult and made the necessary adjustments. However, markers considered that the examination was still quite difficult. Candidates and training providers should be commended. Once again standards were high.

Candidates performed well in question 1 (short answer questions); question 2 (fault loop impedance); question 4 (supply to caravan parks and marinas); question 5 (installation of RCDs); question 6 (transpositions in mains) and question 7 (reconnection of an installation). In these questions about half of all candidates displayed a sound knowledge with about another 30% displaying an adequate knowledge.

Question 3 related to calculate of a cable size based on load and voltage drop. This type of question continues to test candidates' knowledge. About 30% of candidates have little concept of how to carry this out. Conversely, about half of the candidates display a sound knowledge of the topic.

Question 8 comprised material that has not been in examination papers for some time and candidates performed very well. Most had a keen appreciation of the dangers of a high impedance neutral.

Maximum demand calculations still continue to present major difficulties for candidates. Only 2% of candidates could display a sound knowledge, with a further 12.5% able to display an adequate knowledge. The question was set out in a manner consistent with examples shown in Appendix C of AS/NZS 3000. Despite this, many candidates did not follow the lead given in the question and performed poorly.

An abridged analysis is contained in Appendix 6.

Electronic Security Alarm Installer

One candidate sat this examination and passed with 78 marks.

A partial analysis is contained in Appendix 7.

Appendix 1

Electrical Service Technician A

17, 18 and 25 November 2006

ESTA paper 1022, a moderated paper, was used for the main examination on 18 November. ESTA 1023, a composite paper, was used for special examinations on 17 and 25 November.

A1.1 Moderation

ESTA 1022 was moderated by Peter Le Quesne, Ken Bate and Don Merrill.

The paper content was considered reasonable in terms of content and time. The amendments were as follows:

No.	Question	Answer
2(b)	Additional information added to question	Additional option for expressing the value of milliseconds included
2(c)	Part for stating reference included	-
3(a)	Preamble amended to refer to the resistance being in a termination rather than the PEC	
3(a)(ii)	-	Correct answer inserted
3(a)(iii)	-	Correct formula inserted
3(c)	Amended to emphasise the unsafe effect of a transposition as required by the answer	-
6(a)(iii)	-	1 st bullet point split up into two separate options
7(a)(ii)	-	Option from table 3.5 of AS/NZS 3000 added.
8(a)	Instruction to label diagram inserted	Diagram fully labelled
9	Reference changed from electric blanket to portable water heater	-

The final paper was checked by Peter Le Quesne. Amendments were made to questions 5, 6 and 8.

A1.2 Marking

Notes

1. "Remarks" include changes resulting from correspondence and/or teleconferences with markers and others and significant issues
2. "Comments" include a synopsis of the comments received in markers' reports or a comment from one marker's report that is representative of the others.

Markers

ESTA 1022 was marked by:

- Walter Mehana
- Andy Buckley
- John Turner
- Paul Metcalfe
- Marius Schmidt

ESTA 1023 was marked by Godfrey Nesus.

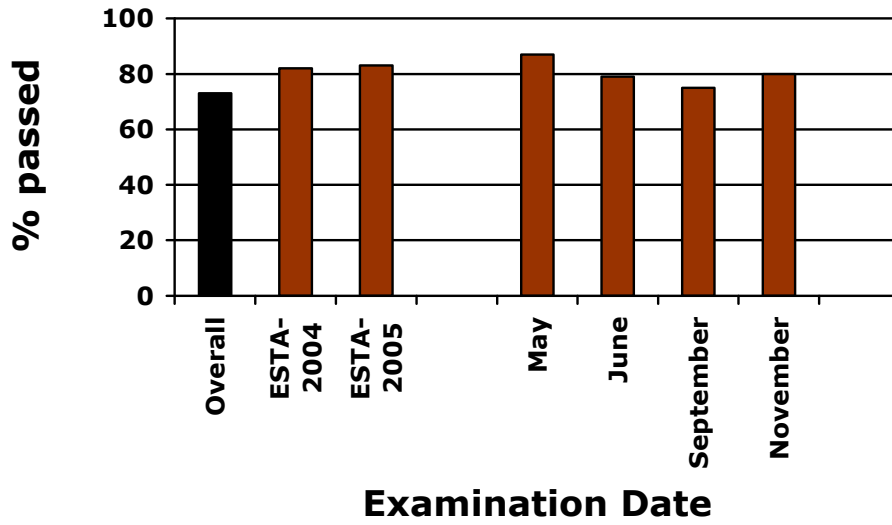
Overall Analysis

<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
383	306	Average pass mark	74%
		Median mark	80
	80%	<u>Those who passed</u>	
		Average pass mark	81.5%
		Median mark	83

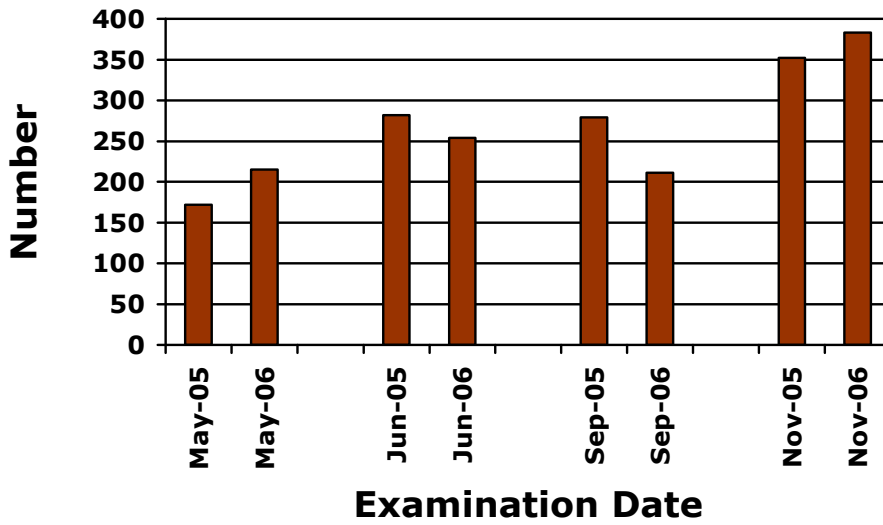
21 candidates gained 95 marks or better. 2 candidates gained 100 marks

5 Candidates sat the special examination paper (ESTA 1023)

2006 PASS RATES - ESTA



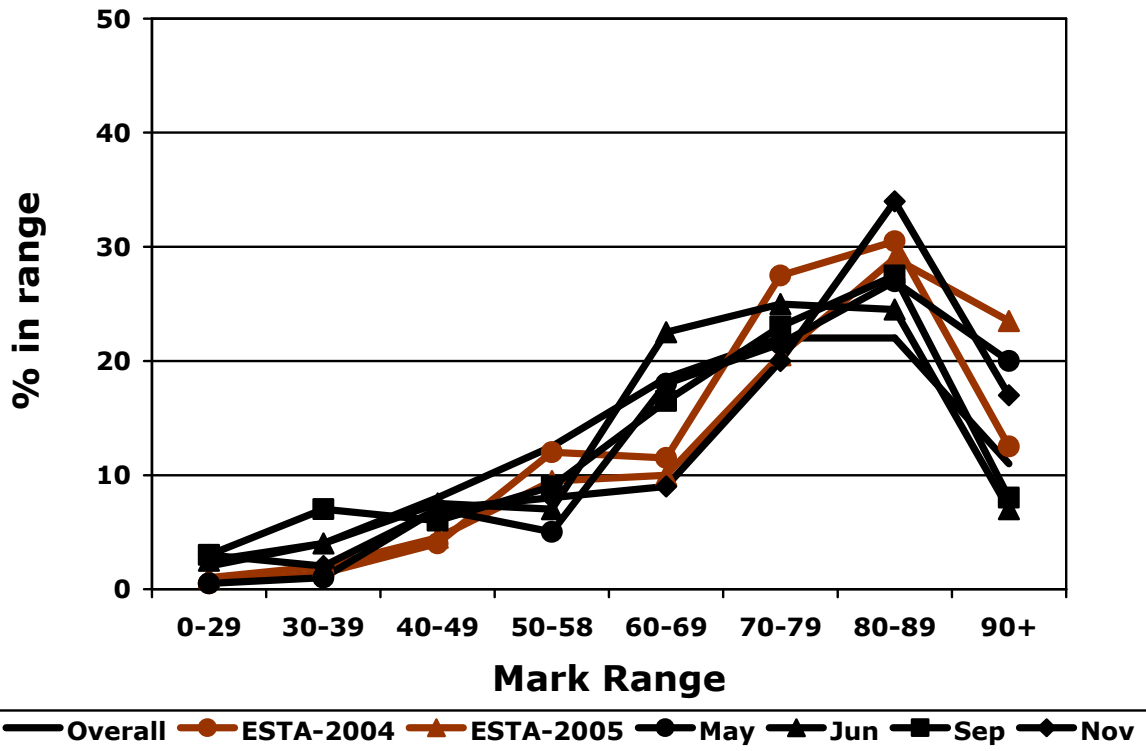
2006 - CANDIDATE NUMBERS - ESTA



Mark ranges

Mark ranges:	90 – 100	65 candidates	17%
	80 – 89	130 candidates	34%
	70 – 79	77 candidates	20%
	60 – 69	34 candidates	9%
	50 – 58	30 candidates	8%
	40 – 49	27 candidates	7%
	30 – 39	8 candidates	2%
	0 – 29	12 candidate	3%

2006 MARK RANGE - ESTA



Performance by topic

Candidates who gained between 75% and 100% of the marks (15-20 marks in question 1 and 7.5 to 10 marks in 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 similar questions from previous examination papers.

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q.1	-	10, 2 mark multi-choice questions				51	26	23
Q.2	D1.12	<u>System theory</u> - 3 – phase systems			Define Hertz, sketch & label one cycle. Define standard low voltage, low voltage direct contact, isolated and indirect contact	56	30	14
			Dec 2003	12	Define Hertz, sketch & label one cycle	67	18	15
			Nov 2004	15	Define Hertz, sketch & label one cycle	54	22	24

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q.3	H10.66	<u>Fault diagnosis</u>			Faulty washing machine - calculate current, power dissipated in PEC and whether fuse will operate. Cause of neutral to be switched in an appliance	57	24	19
			Mar 2004	14	Faulty heater, calculate current in PEC, explain sequence of events	47	18	35
			Jun 2004	13	Faulty heater, calculate current in PEC, explain sequence of events	52	20	28
			Nov 2004	12	Faulty heater, calculate current in PEC, explain sequence of events	63	14.5	22.5
			Sep 2005	14	Faulty heater, calculate current and power dissipated, fuse operation,	84.5	4	11.5
			Jun 2006	9	Faulty heater, calculate current in PEC, explain sequence of events. Transpositions – effect on appliance, other transposition situations	37	28	35
			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

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q.4	H1a.27	<u>Protection and Control</u> Protection characteristics <u>Protection and Control</u> Selection of control and protection equipment			Characteristics of HRC fuses. Advantages of HRC fuses over rewirable fuses. Why not permitted to bridge HRC fuse carrier with fuse wire	54.5	31.5	14
	H1c.31		Sep 2004	12	HRC fuse characteristics	57	19	24
			Sep 2005	18	5 reasons why not to bridge HRC fuse with fuse wire	29	33	38
			Nov 2005	19	3 advantages HRC over rewirable, why not permitted to bridge HRC fuse with fuse wire.	52	17	31
Q.5	K2.38	<u>Statutory testing and inspection requirements</u> <u>Testing and inspection methods</u>			Five visual checks required by Standard. PEC test in class I appliance	82	14	4
	K4.46		Jun 2005	12	Five visual checks required by Standard	85	7	8
			Mar 2004	18	PEC testing of an appliance	65	17	18
			Jun 2004	16	PEC testing of an appliance	80	13	7
			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

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q.6	K4.46	<u>Testing and inspection methods</u>			Reason for PEC, polarity and insulation resistance tests. Why PEC test before IR test, Polarity testing	57	23	20
			May 2006	9	Reason for PEC, polarity and insulation resistance tests. Polarity testing	39	33	28
Q.7	H3d.41	<u>Cables and Cords Specifications</u>			Colour coding of replacement cords, care of extension leads	66	23	11
			Sep 2004	13	Cord would on drum – what could happen, how to prevent. Connect cored to centre of ES.	29	32	39
			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

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q.8	A5.5	<u>Theory</u> - Simple circuits			Draw circuit with 3 resistances in parallel, calculate current and power	62.5	11	26.5
			Nov 2005	16	Circuit of three resistances in series – calculate power	64	10	26
			Nov 2005	17	Draw circuit with 3 resistances in series, what is voltage if ammeter reads 0.72A	79	11	10
			May 2006	2	Sketch single phase circuit with 2 resistances. Calculate current and power	91	7	2
			Jun 2006	5	Sketch single phase circuit with 3 resistances, 2 in series. Calculate current and power	54	10	36

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q.9	C2.11	<u>a.c.</u> – Measurements V, A, P, pf			Portable water heater – calculate current and power in low positions and resistance, current and power in high position	63	13	24
			May 2005	11	Elements connected in parallel, calculate resistances and currents	76	9	15
			Sep 2005	19	Ohmmeter measures resistance of heater, calculate current and power	88	7	5
			Sep 2005	20	Electric blanket – power in low position, current in high position	46	16	38
			Nov 2005	11	Meters testing circuit record certain values. Find missing values	88	6	6
			Nov 2005	12	Meters testing circuit record certain values. Find missing values	84.5	9	6.5
			Jun 2006	3	Calculate current and power for heater at 230V. Calculate permitted voltage variation, power at minimum and maximum voltage variations	54	29	17
			Sep 2006	2	Calculate current and power for heater at 230V. Calculate current at max. Volt drop, difference in power dissipated at max. volt drop	66.5	14	19.5

Remarks

- Teleconferences were held with markers on 27 November and 4 December.
- Version 2 of the answer schedule was sent to markers on 28 November.

Comments

The paper seemed fairly easy for the majority of candidates.

Appendix 2

Electrical Service Technician B

25 November 2006

ESTB 2017, a moderated paper, was used for this examination

A2.1 Moderation

ESTB 2017 was moderated by Peter Le Quesne, Ken Bat and Don Merrill on 30 October.

The paper was considered to be to be reasonable in terms of time and content. The amendments were as follows:

No.	Question	Answer
1(d)	Space for reference removed	
1(g)	-	Additional reference added
1(h)	-	Correct symbol for power inserted
2(c)	"Schematic diagram" changed to "circuit diagram"	Diagram fully labelled
3(b)	-	Option for using a 1000v d.c. insulation resistance tester included
5(b)	Space for reference added	-
5(c)(i)	-	Additional option added relating to a 0.01 M Ω test result
5(c)(ii)	Space for reference added	-
6(b)(ii)	-	Common reference for Megohm inserted
7	Question made clearer. Information in preamble of the question inserted in parts (a), (b) and (c) where appropriate.	-
7(b)	-	Additional option added
8(c)	-	Explanation added to 2 nd bullet point
8(d)	Amended to make intention clearer	-
9(a)	Mark allocation corrected	-
9(b)(ii)	-	Correct reference inserted

The final draft was checked by Peter Le Quesne. Amendments were made to questions 1 (f), (h) and (j), 2, 3, 5, 6 and 7.

A2.2 Marking

Notes

1. "Remarks" include changes resulting from correspondence and/or teleconferences with markers and others and significant issues.
2. "Comments" include a synopsis of the comments received in markers' reports or a comment from one marker's report that is representative of the others.

Markers

ESTB 2017 was marked by:

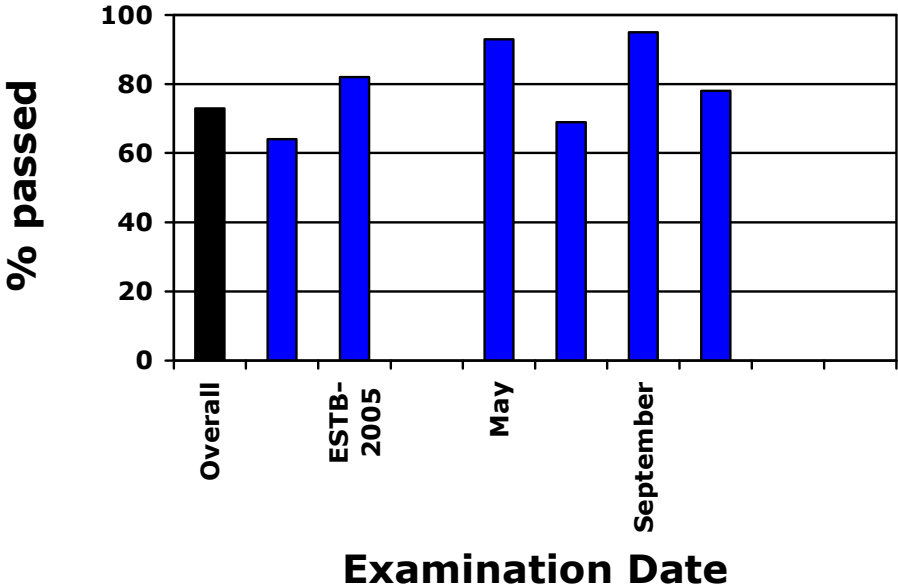
- Barry Jenkins
- Kevin Sweeney
- Marius Schmidt

Overall Analysis

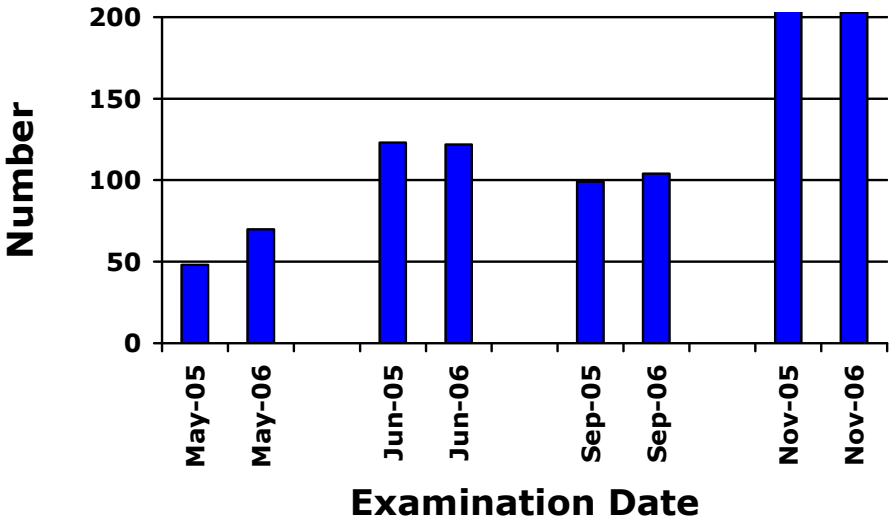
<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
203	158	Average pass mark	69.5%
		Median mark	72
	78%	<u>Those who passed</u>	
		Average pass mark	76%
		Median mark	75

17 Candidates gained 90 or more marks. 1 candidate gained 98 marks.

2006 PASS RATES - ESTB



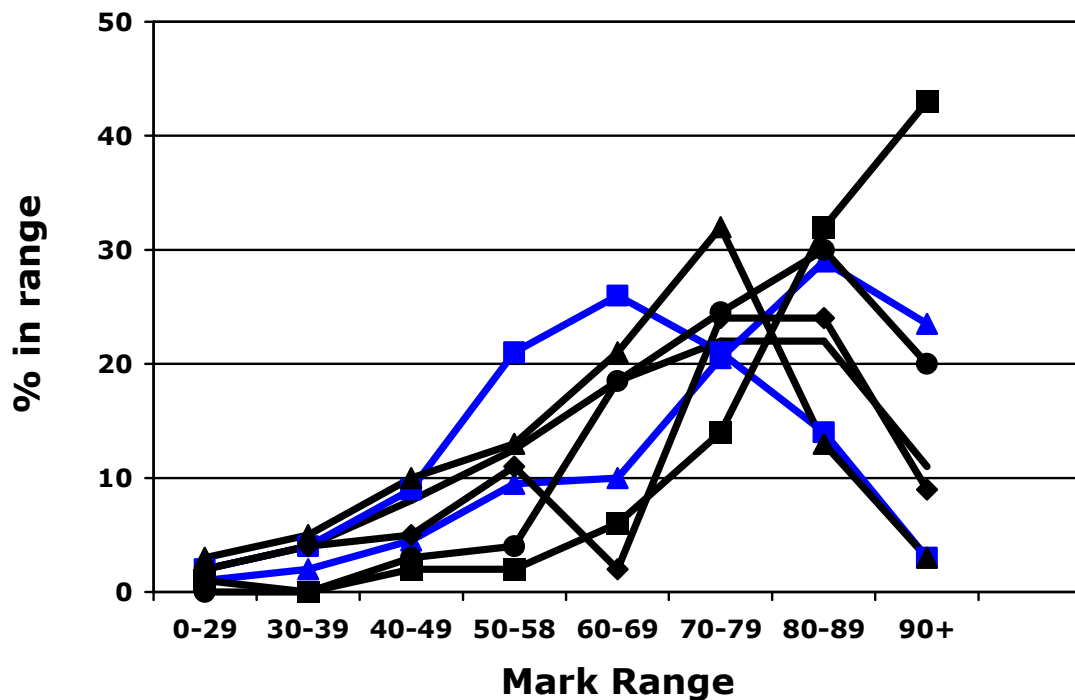
2006 CANDIDATE NUMBERS - ESTB



Mark Ranges

Mark ranges:	90 - 100	16 candidates	8%
	80 - 89	49 candidates	24%
	70 - 79	50 candidates	25%
	60 - 69	43 candidates	21%
	50 - 58	23 candidates	11%
	40 - 49	10 candidates	5%
	30 - 39	8 candidates	4%
	0 - 29	4 candidates	2%

2006 MARK RANGE - ESTB



— Overall — ESTB-2004 — ESTB-2005 — May — Jun — Sep — Nov

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				63.5	30.5	6
Q 2	E2.16	<u>3ph-Motor/Alternators</u> Selection, starting, protection			Reversal of supply line to 3 phase motor. Reduced voltage starters. Draw 230V control circuit. How thermal overload protects motor	55	28	17
			Nov 2004	4	Reversal of supply line to 3 phase motor, reduced voltage starters, sketch 400V control circuit	46.5	23	30.5
			May 2006	8	400V control circuit for DOL starter, explain how circuit protects, explain how phase reversal protects	64	20	16

	Topic No.	Topic	Year	Q.No.	Subject	75- 100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	H10.66	<u>Fault diagnosis</u>			3 phase motor with broken isolator. Safe disconnection and isolation procedures. Test and diagnose fault.	54	34.5	11.5
			Sep 2004	4	3 phase motor with broken isolator. , safe disconnection and isolation procedures for removing motor for repair.	57.5	29	13.5
			Sep 2005	6	3 phase motor with broken isolator. , safe disconnection and isolation procedures for removing motor for repair.	67	21	12

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 4	H1c.31	<u>Protection and Control</u> Selection of control and protection equipment			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
			Mar 2004	7	Why fuses located on switchboards, over-rated and under-rated fuses, technical advantages of HRC fuses	91	9	0
			Sep 2004	8	Effect on circuit of using over-rated and under-rated fuses and relays, HRC back-up protection, fuse wire in tortuous path	51.5	32	16.5
			Nov 2004	9	Fuse wire in tortuous path, characteristics of HRC fuses	8	34	58
Q 5	K2.38	<u>Statutory testing and inspection requirements</u>			Testing to AS/NZS 3760, polarity	84	13	3
			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

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	K4.46	<u>Testing and inspection methods</u>			Fixed-wired planer – MCB functions than trips, small shocks off frame, describe PEC and IR tests	30	40	30
			Jun 2004	6	PEC test and insulation resistance testing of faulty single phase machine	51	37	12
			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
			Sep 2006	4	3 phase motor – IR test, PEC test, recommissioning	62.5	31.5	6
Q 7	H10.66	<u>Fault diagnosis</u>			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
			Mar 2004	10	Replaced isolating switch – effect of wrong connections.	51.5	37	11.5
			May 2006	7	Replaced isolating switch – effect of wrong connections, 2 tests for transpositions	47	41.5	11.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	D4.22	<u>System theory</u> - MEN systems			Purpose of the PEC and why it is necessary to carefully terminate. Appliances not connected to earth, why MEN neutral earthed	46.5	28.5	25
			May 2005	8	Purpose of the PEC and why it is necessary to carefully terminate. Why neutral conductor required in unbalanced 3 phase load	33	23	44
Q 9	P2.13 P3.13	<u>Legislation</u> <u>Registration</u> <u>Legislation</u> <u>Practising licences</u>			Registration requirements. Practising licences. Classes of person who can carry out PEW	67	17	16
			May 2005	5	PEW, refresher courses	73	16	11
			May 2006	6	3 requirements for registration, practising licence requirements, classes who may do PEW	56	20	24
			Jun 2006	2	3 requirements for registration, practising licences and refresher courses	47.5	25.5	27
			Sep 2006	9	Refresher courses, practising licences, classes of person who can carry out PEW	81	13	6

Remarks

- Teleconferences were held on 5 and 12 December.
- Version 2 of the answer schedule was sent to markers on 6 December.

Comments

The paper was within the scope of the teaching guidelines and should not have presented any difficulties to a candidate who was properly prepared.

In this paper, there were probably too many questions on testing procedures, which tended to have similar answers particularly questions 3(b), 5(b), (c) and (d), 6(b) and 7(d). Although testing is extremely important, it should not totally dominate the exam paper, particularly where the answers in some cases are near identical.

Appendix 3

Electrician Regulations

25 November 2006

ER 21, a moderated paper, was used for this examination.

A3.1 Moderation

ER 21 was moderated by David Barnes and Bill Lowe and Alan Cuthbert on 31 October. The paper was considered to be too easy in terms of content and time. The amendments were as follows:

No.	Question	Answer
1(b)	Amended to refer only to the voltage drop at the point of supply and not the installation	Amended accordingly
1(c)	Reference to a portable appliance changed to handled appliance	Reference corrected
1(f)	Deleted as being too obscure. Replaced with new question 1(j)	-
1(g to j)	Renamed 1(f) to 1(i) respectively	Amended accordingly
1(j)	New question relating to identification of Type A RCDs	-
2	Preamble rewritten to include reference to AS/NZS 3000	-
2(a)	Reference to the cable being copper was inserted	Instruction inserted in 1(a) to the effect that candidates must state that the main earthing conductor is copper.
2(d)	-	Answers from AS/NZS 3000 B4.2, 1.7.4.3 and 6.3.3.2.2 included
3(a)	Amended to require the minimum cable size Formatted to make answering easier	Reference corrected Calculation for 35 mm ² cable included
3(b)	Formatted to make answering easier	Calculation for 25 mm ² cable included
3(c)	Amended to instruct candidates to ignore the installation cost	-
4(b)	-	Editorial amendment
4(c)(i)	-	Editorial amendment Requirement to turn off main switch inserted Reference to independent or temporary earth included as alternative to "remote earth"
4(c)(ii)	-	Alternative methods deleted from note as installation is live.
5(a)	-	Amended to make it clearer that there are two options available
5(c)(i)	Amended to make clearer	

No.	Question	Answer
5(e)	-	Answer from AS/NZS 3000 2.8.4.2 added to answer
6(b)	-	Answers from AS/NZS 3000 4.11 added to answer
6(c)	Editorial amendment	-
7(a)	Too obscure. Replaced with question relating to underground cables	-
8	Preamble incorporated in part (a)	-
8(a)	Amended to be more specific and only to incorporate parts (i) and (ii)	Amended accordingly
8(b)	Was (a)(iii). Amended to require a more general answer.	Amended accordingly
8(c)	Was 8(b). Reference changed from a hotel to an existing domestic residence	Amended accordingly
9	Preamble amended to make a clearer distinction between those items requiring certification and those that do not.	-
9(a)	-	Amended in light of changes to preamble
9(c)	-	Amended in light of changes to preamble References included

The 2nd draft was checked by Alan Cuthbert. Amendments were made to questions 1(f), 2, 3, 4, 8, and 9

A3.2 Marking

Notes

1. "Remarks" include changes resulting from correspondence and/or teleconferences with markers and others and significant issues.
2. "Comments" are a synopsis of the comments received in markers' reports or a comment from one marker's report that is representative of the others.

Markers

ER 21 was marked by:

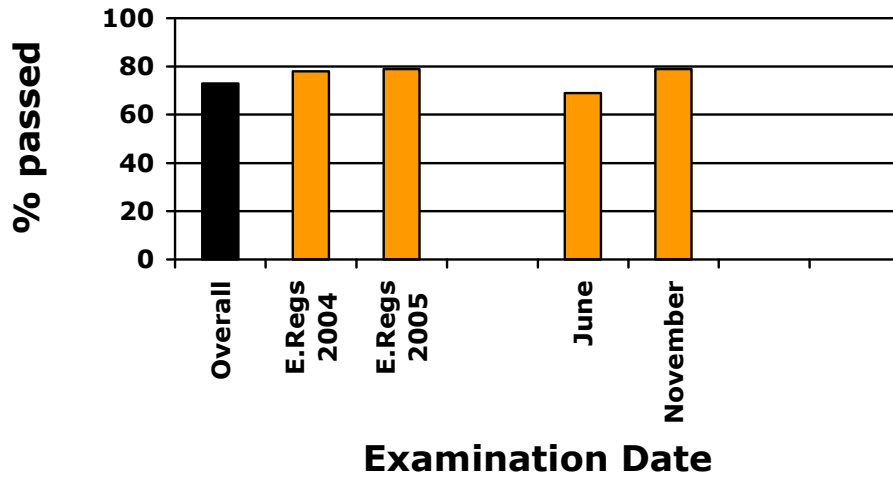
- Allister McGregor
- Ross Hulbert
- Marius Schmidt
- Athol Gibson
- George Pearce
- Kevin Sweeney
- Peter De Breuk
- Mike Johnson

Overall Analysis

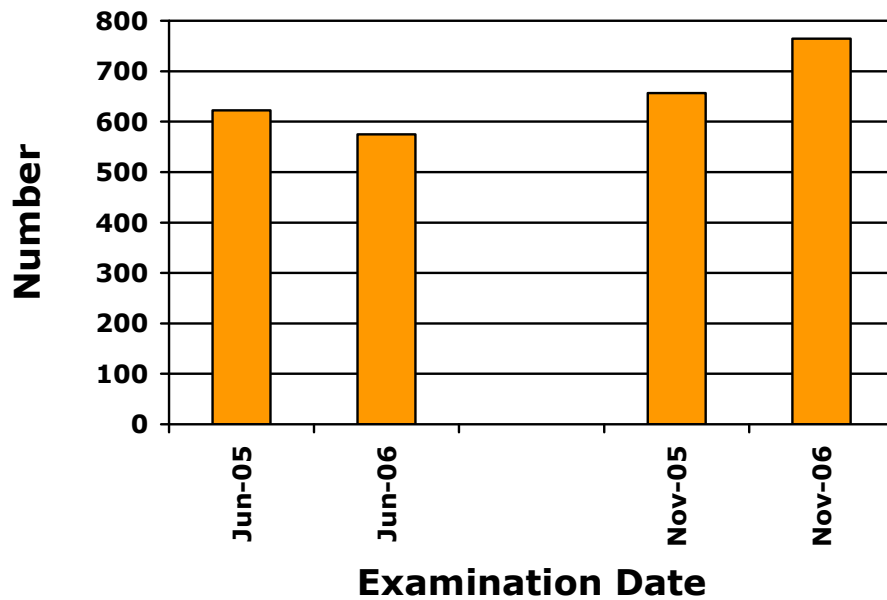
<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
765	606	Average pass mark	69%
		Median mark	70.5
	79	<u>Those who passed</u>	
		Average pass mark	75%
		Median mark	75

14 candidates gained 95 marks or better.

2006 PASS RATES - ELECTRICIAN REGS



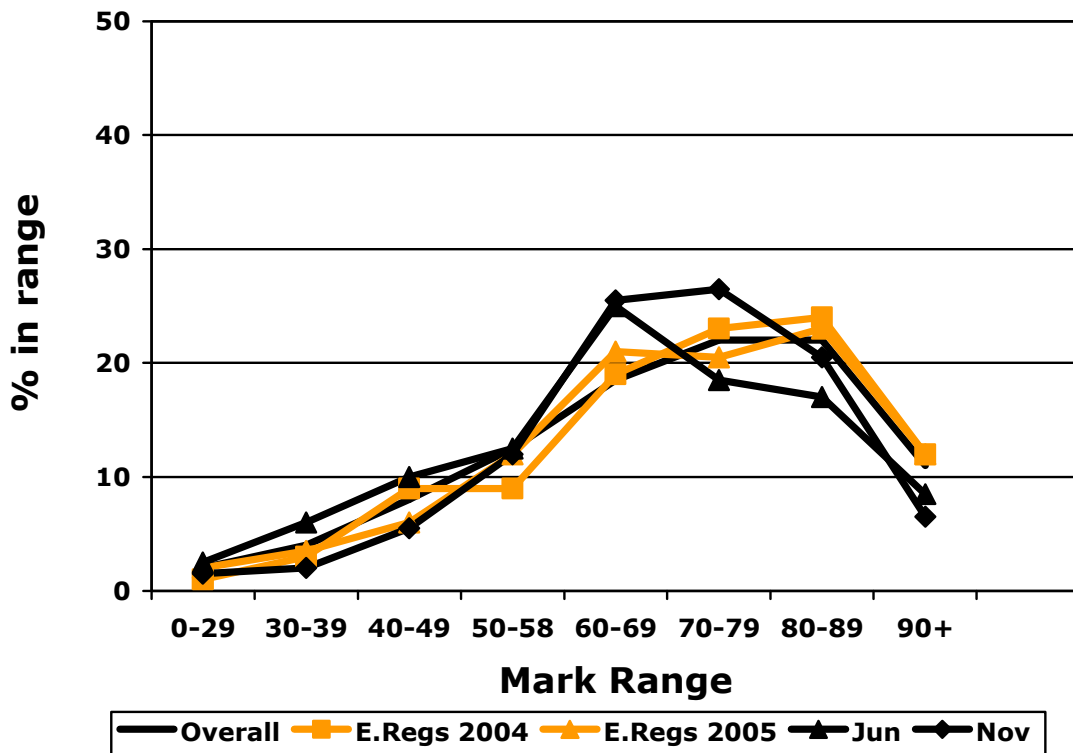
2006 CANDIDATE Nos. - ELECTRICIAN REGS



Mark Ranges

Mark ranges:	90 - 100	50 candidates	6.5%
	80 - 89	159 candidates	20.5%
	70 - 79	202 candidates	26.5%
	60 - 69	195 candidates	25.5%
	50 - 58	91 candidates	12%
	40 - 49	40 candidates	5.5%
	30 - 39	17 candidates	2%
	0 - 29	11 candidates	1.5%

2006 MARK RANGE - ELECTRICIAN REGS.



Performance by topic

Candidates who gained between 75% and 100% of the marks for each question (15 - 20 marks for question 1 and 7.5 to 10 marks for any other questions) are considered to have a sound knowledge of a topic. The table below shows the percentage of candidates in each range for each 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				57	32	11
Q 2	D3.21	<u>System theory</u> - Earthing of installations fittings and appliances			Earthing conductors for 16mm² cable. Pipes not to be used for earthing. When pipes must be earthed. Why equipotential bonding carried out. Why fault loop impedance must be low, restriction placed on PEC on distribution board	57	32	11
			Jun 2006	6	Operational results of earthing, minimum size of earth, protection against mechanical damage, restrictions on PEC	66.5	20.5	13

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	H3b.30	<u>Cables and Cords</u> Selection of final subcircuits			3 phase cable at crushing plant, calculate cable size, Vd and load for two installation options	30	16	54
			Nov 2003	24	1 phase oven in bakery, determine suitability of proposed cable – Vd and load	28	21	51
			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
Q 4	K2.38 K4.46	<u>Statutory testing and inspection requirements</u> <u>Testing and inspection methods</u>			3 reasons why polarity testing necessary. Equipment for polarity test on mains. How to carry out polarity test and expected result	19	21	60
Q 5	E2.16	<u>3ph- Motor/Alternators</u> Selection, starting, protection			Isolating switch for motor circuit. Overload protection. Over-temp. protection. Pf correction. Features of isolation switches	47	39	14
			Nov 2005	28	Saw blade motor – control requirements, overload and over-temperature requirements	41	21	38

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	H3d.41	<u>Cables and Cords Specifications</u>			Connections between conductors and electrical equipment. Locations where wiring systems could be disturbed. Changing of wiring enclosures	76	16	8
Q 7	H3d.41 H3c.35	<u>Cables and Cords Specifications</u> <u>Cables and Cords Overhead and underground</u>			U/G mechanical protection for Cat B system. Segregation of ELV wiring. Cable trunking systems	66	26	8
			Nov 2005	24	Cables installed in trunking – requirements for trunking, changing wiring enclosures, types of flexible cords used for fixed wiring	69	19	12
			Nov 2005	25	Requirements for u/g cables, spacing between u/g systems and other services	56	23	21
Q 8	H1b.28	<u>Protection and Control</u> RCD characteristics			Installation of RCDs – hotel, with other protection, domestic installations	31	53	16
			Nov 2004	28	Installation of RCDs	44.5	33	22.5
			Jun 2005	20	Installation of RCDs	41	26	33

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	K3.39	<u>Certification, verification, WOE</u>			Work on LV installation – what needs COC and testing, inspections, issuing CoCs	68	20	12
			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

Remarks

- Teleconferences were held with markers on 5 and 12 December.
- The amendments for Version 2 of the answer schedule was sent to markers on 6 December.
- Advice on changes to the answer schedule was provided to markers on 7, 11, 12 and 18 December.

Comments

The paper seemed a very reasonable paper with a good balance of questions. A few candidates ran out of time to answer all questions and some changed their answer and then got it wrong. However, most candidates attempted all the 10 mark questions which resulted in an overall improvement in marks across the board.

Some candidates still fail to read the questions properly and consequently provide incorrect answers.

Appendix 4

Electrician Theory 17 and 18 November 2006

ET 19, a moderated paper, was used for the main examination on 18 November.
ET 20, a composite paper, was used for a special examination 17 November.

A4.1 Moderation

ET 19 was moderated by Herb Edie, Andy Buckley and Bob McCreanor on 2 November. The paper was considered relatively easy in terms of content and time. The amendments were as follows:

No.	Question	Answer
1(i)	-	The term "connections: replaced with "phase connections"
2(a)	Diagram expanded to provide more room for the answer	-
2(c)	Amended to require the two answers	Amended to require only two answers. 1 st two bullet point in the original answer not relevant to question
3(a)(i)	-	3 rd and 4 th bullet points deleted as not being relevant to question
3(b)(i)	The term "portable RCD" highlighted	-
4	Scenario in part (a) moved to preamble for the whole question	-
4(b)	Amended to align with preamble	-
5(b)	-	Amended to put focus on what the question requires
5(c)	-	Two additional options added
6(c)	Amended to make clearer and to refer to discrimination in an electrical installation	4 th bullet point amended to be more specific as to what is required
7(a)	-	Replaced with an answer that details the points need to be covered. Note added to the effect that repeated operation of the MCB is hazardous
8	Question made clearer. Information in preamble of the question inserted in parts (a), (b) and (c) where appropriate.	-
8(a)	Marks reduced to 3	Amended to align better with the question
8(c)	Marks increased to 4	Additional answer added

A4.2 Marking

Notes

1. "Remarks" include changes resulting from correspondence and/or teleconferences with markers and others and significant issues.
2. "Comments" are a synopsis of the comments received in markers' reports or a comment from one marker's report that is representative of the others.

Markers

ET 19 was marked by:

- Judith Varga
- Marius Schmidt
- Kevin Gardner
- Lou Hiller
- Ken Knox
- Steve Brook

ET 20 was marked by Godfrey Nesus.

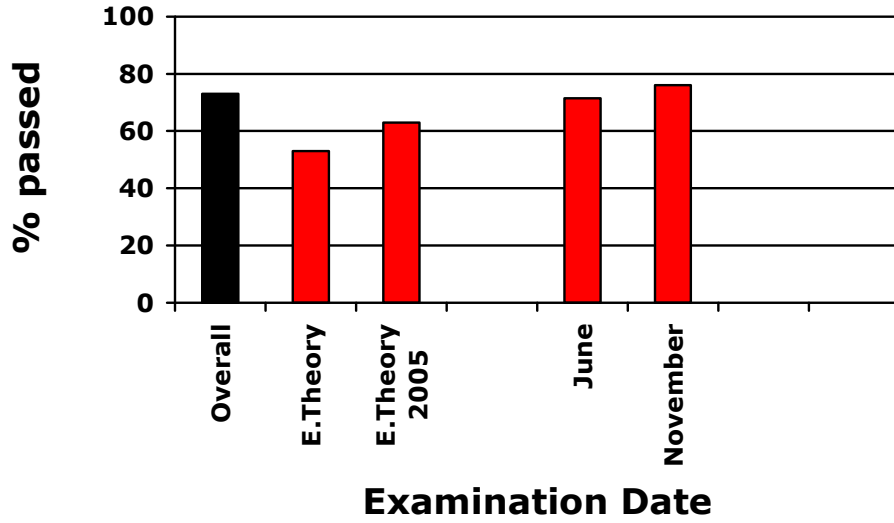
Overall Analysis

<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
574	436	Average pass mark	67%
		Median mark	69
	76%	<u>Those who passed</u>	
		Average pass mark	73%
		Median mark	73

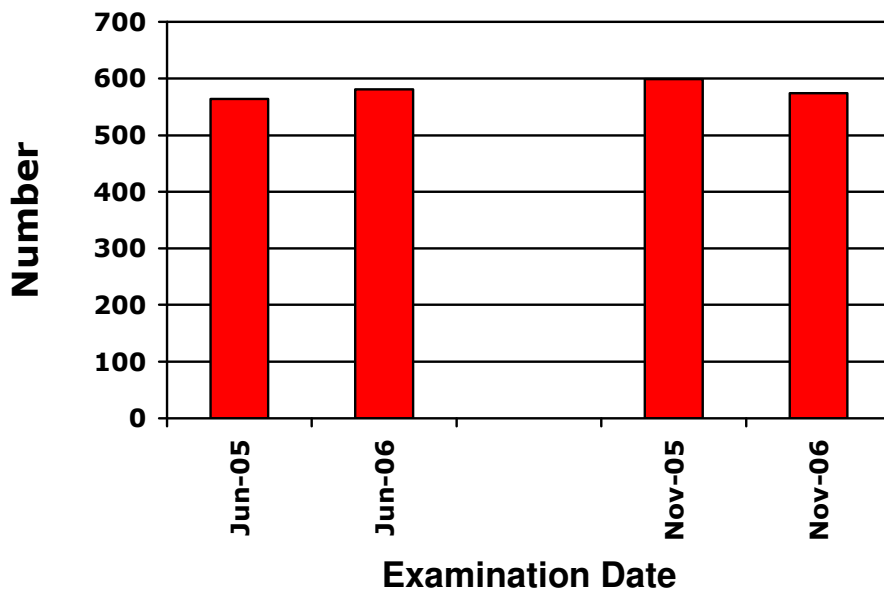
2 candidates gained 95 marks or better.

4 Candidates sat the special examination paper (ET 20)

2006 PASS RATES - ELECTRICIAN THEORY



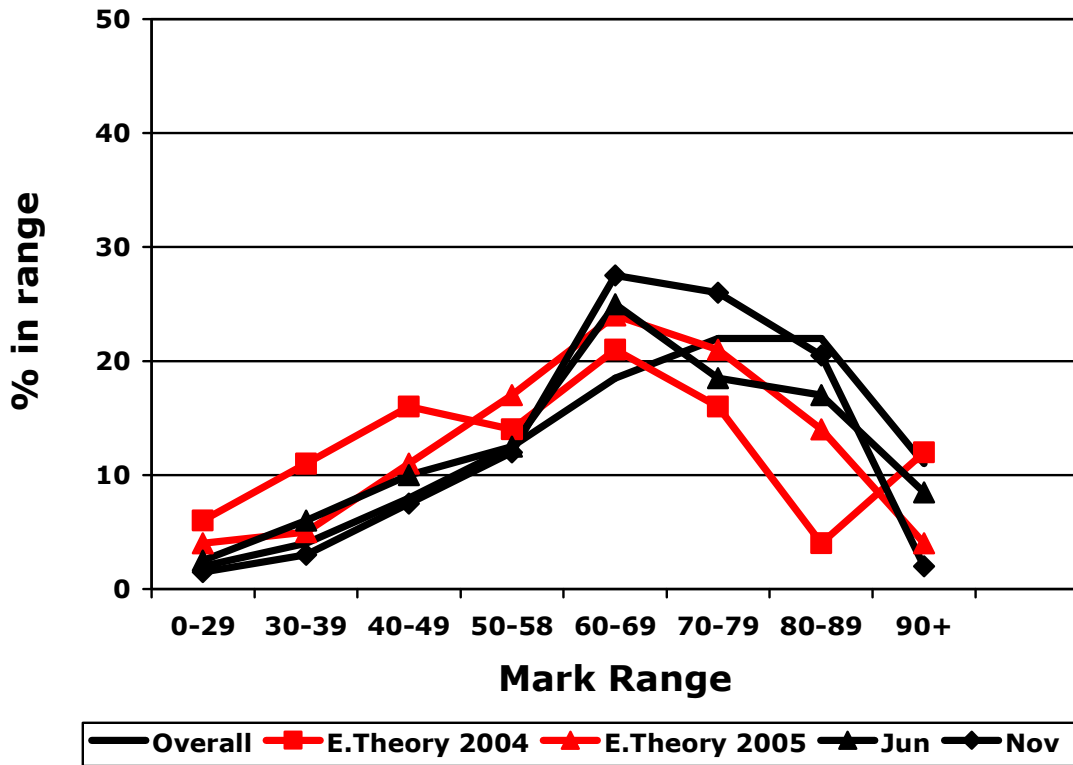
2006 CANDIDATE Nos. - ELECT. THEORY



Mark Ranges

Mark ranges:	90 – 100	11 candidates	2%
	80 – 89	118 candidates	20.5%
	70 – 79	150 candidates	26%
	60 – 69	157 candidates	27.5%
	50 – 58	69 candidates	12%
	40 – 49	44 candidates	7.5%
	30 – 39	17 candidates	3%
	0 – 29	8 candidates	1.5%

2006 MARK RANGE - ELECTRICIAN THEORY



Performance by topic

Candidates who gained between 75% and 100% of the marks for a question (15-20 marks in question 1 and 7.5 to 10 marks in any of the others) are considered to have a sound knowledge of a topic. The table below shows the percentage of candidates in each range for each 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	41.5	13.5
Q 2	D3.21	<u>System theory - Earthing of installations fittings and appliances</u>			MEN system - draw fault loop and single-phase fault. Calculate current in faulty phase and whether MCB will operate. Reasons why high resistance earth fault increase risk of shock	48	24	28
			Nov 2003	3	Fault on 3 phase lathe, calculate current in faulty line, effect on protection, hazard to user	41.5	22	36.5
			Jun 2004	2	Fault on 3 phase pottery kiln, calculate current in faulty line, effect on protection, hazard to user	55.5	23	21.5
			Nov 2004	2	Fault on single phase appliance, sketch diagram calculate phase current, explain benefit of effective earthing and hazard of high resistance earth	55	31	14

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
			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
Q 3	K4.46	<u>Testing and inspection methods</u>			Reason for fault loop and RCD tests and how carried out. Describe prove-test-prove method of testing.	65	27	8
			Jun 2004	4	Reason for fault loop and RCD tests and how carried out, describe prove-test-prove method of testing.	60.5	29.5	10
Q 4	E2.16	<u>3ph-Motor/Alternators Selection, starting, protection</u>			Draw 230V DOL starter circuit. Why thermal overload and HRC fuse protection required. How thermistor protects motor	43	36	21
			Jun 2006	6	400V DOL starter circuit with remote stop/start, use of reduced voltage starters	37.5	5	57.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	G2.24	<u>Transformers</u> Operating principles			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 2004	5	3 phase transformer – sketch circuit, calculate secondary phase and line voltages, primary and secondary line currents	40	44	16
			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

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	H1a.27	<u>Protection and Control</u> Protection characteristics			Define inverse time characteristic, draw graph. Why is back-up protection installed. Explain discrimination. Under-rated and over-rated fuses	50	33	17
			Nov 2004	6	Light circuit – voltmeter reading; protection of MCB, protection of HRC, discrimination	44	36	20
			Jun 2005	4	Underrated & overrated fuses, advantages of HRC fuses, inverse time characteristic, operation of thermal or electromagnetic MCB	51	38	11
			Nov 2005	3	Meaning of discrimination, fuse markings, back-up protection, inverse/time characteristics	32	31	37
			Jun 2006	2	Light circuit – protection of MCB and RCD, protection of HRC, discrimination	61	30	9
Q 7	H10.66	<u>Fault diagnosis</u>			Faulty single phase circuit with outlets – describe safe isolation, types of faults, action to repair fault.	38	41	21
Q 8	H10.66	<u>Fault diagnosis</u>			Replacement of kiln isolator –effect of various transpositions. Testing for transposition	12	43	45

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	K4.46	<u>Testing and inspection methods</u>			Three phase motor disconnected – describe IR test, circuit continuity test, other checks before returning to service	56.5	34.5	9
			Jun 2005	2	Insulation test and circuit continuity check of 3 phase and 3 other checks.	39	49	12

Remarks

- Teleconferences were held with markers on 27 November and 4 December.
- Version 2 of the answer schedule was sent to markers on 28 November.
- Advice was provided to markers on 27, 28, 29 and 30 November and 4 December.

Comments

The paper did not present a major difficulty to the majority of candidates. Most were able to attempt all of the questions. Perhaps this paper was not as searching as those previous. It was more in keeping with an EST B style paper.

Unlike previous years, question 1 did not provide an indicator as to how well a candidate would do in the remainder of the paper.

Concepts of current and voltage seem to be well understood. However the term "impedance" was rarely used.

Often, care was not taken to read the question asked – with sometimes the opposite being answered or missing vital words (for example, "other" and "before" in question 9(c)).

Some used a strategy of stating all possible answers. Candidates need to be made aware, that where only two or three answers are specifically required only the first two (or three) are read – the rest are ignored even when a later answer is correct and an earlier one wrong.

Conversely, answers were sometimes incomplete and totally ambiguous. Candidates need to demonstrate their knowledge to markers so clear communication is important. Often it was not the spelling that was a problem (the meaning could be determined by the context used), but the use of "will" or "may", or "could" or "would" can make a difference. For example, compare:

 "the current could cause damage" with

 "the current would cause damage"

Two different situations are explained.

Appendix 5

Tradesperson Electrical Work Certificate

25 November 2006

TEWC 141, 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 141A which comprised questions 1 to 4, 5, 6, 7, 8, 13 and 14 of TEWC 141.

A5.1 Moderation

TEWC 141 was moderated by Peter Le Quesne, Ken Bate and Don Merrill.

The paper was considered reasonable in terms of content and time. The amendments in TEWC 141 were as follows:

No.	Question	Answer
1(a)	Amended to make intention clearer	-
1(b)	-	Amended to provide to possible options
1(g)	Amended to cover requirements of a standard	-
1(h)	-	Colour coding from AS/NZS 3000 included as an option
1(j)	-	Marks inserted
2(a)	Instruction to label diagram included	Diagram labelled
2(b)	-	Answer corrected
2(c)	-	Answer corrected
3(c)	-	Last bullet point deleted as being outside the knowledge of candidates
4(a)	Reference changed from AS/NZS 3000 to AS/NZS 3760	Amended accordingly
5(a)	Warning inserted relating to including dangerous parts in an answer	-
6(b)	-	Reference to 0.01 Megohms included as an option
7(b)	-	3 rd bullet point amended to refer to testing between the earth pin and frame of the appliance
8(b))(ii)	-	Editorial amendment
9(a)	-	Correct symbol for power inserted
9(b)	Spaces for references inserted	

No.	Question	Answer
10(b)	-	Reference to 0.01 Megohms included as an option
11(b)	-	3 rd bullet point amended to refer to testing between the earth pin and frame of the appliance
12(b))(ii)	-	Editorial amendment
14(a)(ii)	-	Additional option added

The 2nd draft was checked by Peter Le Quesne. Amendments were made to questions 1(f), (j), 2, 6, 7 and 10

A5.2 Marking

Notes

1. "Remarks" include changes resulting from correspondence and/or teleconferences with markers and others and significant issues.
2. "Comments" are a synopsis of the comments received in markers' reports or a comment from one marker's report that is representative of the others.

Markers

TEWC 141 was marked by Kevin Sweeney

Overall Analysis

<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
5	2	Average pass mark	63%
		Median mark	57.5
	40%	<u>Those who passed</u>	
		Average pass mark	83%
		Median mark	83

All candidates were plumbers.

Mark Ranges

Mark ranges:	90 – 100	1 candidates	20%
	80 – 89	0 candidates	0%
	70 – 79	1 candidates	20%
	60 – 69	0 candidates	0%
	50 – 58	2 candidates	40%
	40 – 49	0 candidates	0%
	30 – 39	1 candidates	20%
	0 – 29	0 candidates	0%

Remarks

- Teleconferences were held on 5 and 12 December.
- The amendments comprising Version 2 of the answer schedule were sent to markers on 6 December.

Comments

The analysis contains only questions 1 to 9 of TEWC 141 as all candidates were plumbers

Questions requiring documents were showed candidates' familiarity with the required legislation.

Apart from the one exception candidates performed reasonably well with one candidate performing very well.

Appendix 6

Electrical Inspector

18 and 25 November 2006

Electrical Inspector paper IT10, a moderated paper, was used for the main examination on 18 November. IT11, a composite paper, was used for the special examination on 25 November

A6.1 Moderation

IT 10 was moderated by David Barnes, Bill Lowe and Alan Cuthbert Bate on 1 November 2005. The paper was considered too difficult in terms of content and time. The amendments were as follows:

No.	Question	Answer
1(d)	Reference to the Electricity Regulations inserted	-
1(g)	1 st part of the question deleted	Amended accordingly Two additional options added
1(i)	Editorial amendment	Additional option added
1(j)	-	Additional options from AS/NZS 3000 1.7.4.3.3, 1.11.2.2 and 6.3.3.2.2
1(k)	Amended to refer to 230V and 400V electrical installations	Amended accordingly
1(l)	Amended to require only one solution	Amended accordingly
1(m)	Amended to require only one solution	Amended accordingly
1(n)	Reference to emergency systems included	-
1(q)	"Characteristics" changed to "types"	-
2(a)	Amended to require the drawing and labelling of a circuit rather than describing it	Amended accordingly
2(b)	Inserted the word "fault" after "earth"	-
2(c)	-	Reference corrected Note added to the effect that the cable being copper must be specified
2(d)	"3phase transformer" changed to "three-phase distribution transformer"	-
3	Additional information added to preamble to make intention clearer	-
3(a)	-	Editorial amendment
3(b)	-	Solution for 35 mm ² cable included
3(d)	Amended to make intention clearer.	Note added to the effect that the cable being copper must be specified
4	Considered inappropriate for this level of examination. Replaced with question relating to caravan parks and marinas	Amended accordingly
5(a)(ii)	Amended to indicate that there is	Additional option added

	more than two solutions	
5(b)	Replaced with a question relating to RCDs	Amended accordingly
6	Preamble changed to refer to an electrical installation rather than a domestic installation	-
6(b)(iv)	-	Reference to alternative solutions deleted
7	Preamble amended to make question clearer Question moved to end of paper	Corrections made to solution. Marks allocated differently
8(a)	Was 8(b)	-
8(b)	Was 8(a)	Reference corrected
9(b)(ii)	-	Amended to ensure answers are specific
9(c)	Amended to place emphasis on gM fuses	-

The 2nd draft was checked by David Barnes. Some minor amendments were made.

A6.2 Marking

Notes

1. "Remarks" include changes resulting from correspondence and/or teleconferences with markers and others and significant issues.
2. "Comments" are a synopsis of the comments received in markers' reports or a comment from one marker's report that is representative of the others.

Markers

IT 10 was marked by:

- Peter De Breuk
- Mike Johnson
- Allister McGregor

IT 11 was marked by Godfrey Nesus.

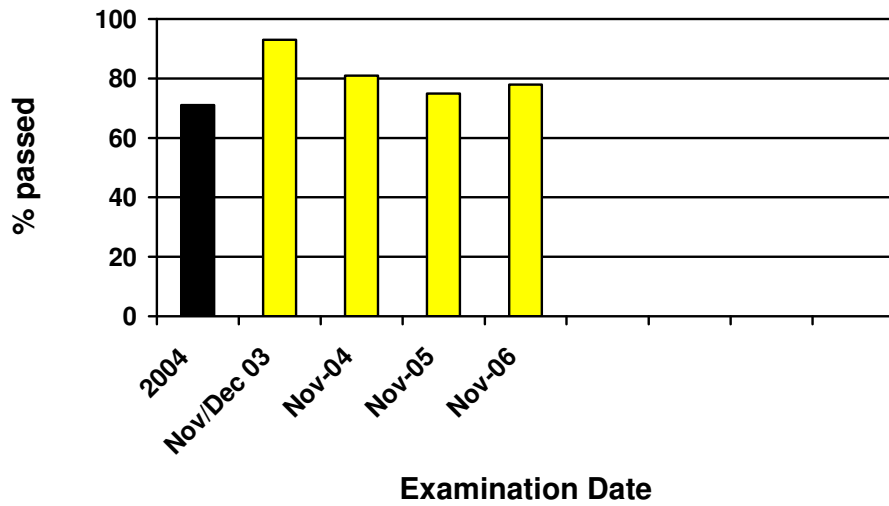
Overall Analysis

<u>Candidates</u>	<u>Candidates Passed</u>	<u>All candidates</u>	
104	81	Average pass mark	66%
		Median mark	67
	78%	<u>Those who passed</u>	
		Average pass mark	71%
		Median mark	71

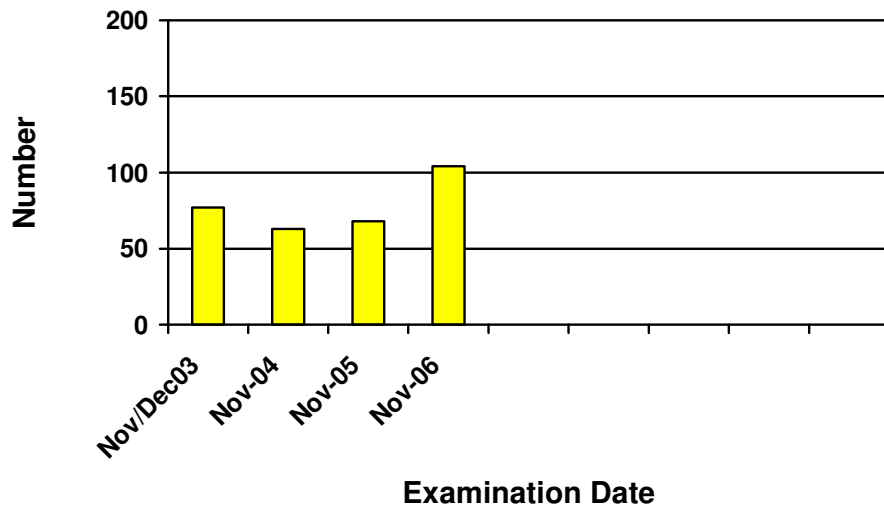
2 candidates gained 90 marks or better.

1 candidate sat the special examination (IT 11)

PASS RATES - ELECTRICAL INSPECTOR

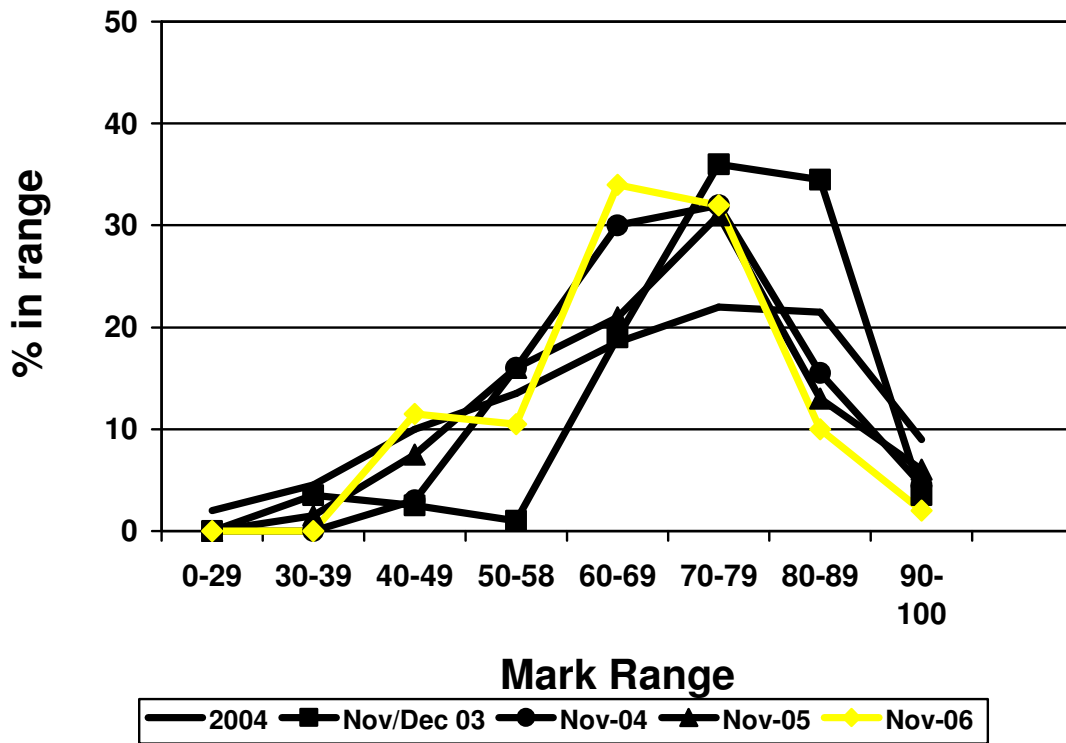


CANDIDATE NUMBERS - ELECTRICAL INSPECTOR



Mark ranges:	90 - 100	2 candidates	2%
	80 - 89	10 candidates	10%
	70 - 79	33 candidates	32%
	60 - 69	36 candidates	34%
	50 - 58	11 candidates	10.5%
	40 - 49	12 candidates	11.5%
	30 - 39	0 candidates	0%
	0 - 29	0 candidates	0%

MARK RANGE - ELECTRICAL INSPECTOR



Performance by topic

Candidates who gained between 75% and 100% of the marks for a question (15 to 20 marks for question 1 and 7.5 to 10 marks for the other questions) are considered to have a sound knowledge of a topic. The table below shows the percentage of candidates in each range for each 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	-	20, 1 mark questions				57	33	10
Q 2	D4.22	<u>System theory</u> - MEN systems			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
			Nov 2003	6	Hazards if main neutral impedance higher than earth, circuit fault path for single phase appliance fault	58	26	16
			Nov 2004	3	Inspection of new switchboard – calculate fault level and PSSC, setting overloads with PF correction.	9.5	35	55.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	H3b.30	<u>Cables and Cords</u> Selection of final subcircuits			Three phase furnace – calculate cable size, loading and volt drop.	48.5	19.5	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
Q 4	H5e.37	<u>Caravan parks caravans</u>			Requirements for supply. Responsibility for EWOFF. Methods of supply to marina. Plug connections. Max resistance of earthing.	55	35	10
			Nov 2005	9	Connectable installation requirements, requirements of AS/NZS 3014	26.5	41	32.5
Q 5	H1b.28	<u>Protection and Control</u> RCD characteristics			RCDs installed in a motel, Type A RCDs.	57	32	11
			Nov 2005	8	Characteristics of HRC characteristic curves, operation of RCD, PSSC of transformer	46	26	28

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	H10.66	<u>Fault diagnosis</u>			Hazards of mains transposition. Testing for polarity and expected results	59	23.5	17.5
			Nov 2004	2	Mains transpositions	59	17	24
Q 7	K1.34	<u>Testing for supply</u>			Reconnection of installation – documentation, tests before reconnection, requirements for testing	66	25	9
			Nov 2003	9	Installation disconnected for 8 months, documentation and testing. Testing of prescribed electrical work	53	35	12
			Nov 2004	5	Installation disconnected for 8 months, documentation and testing. Checks required by NS 3019.	76	21	3
			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
Q 8	H1a.27	<u>Protection and Control</u> Protection characteristics			Hazards if neutral impedance high. Current ratings of switchgear. Motor rated fuses	46	29	25

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	H3a.29	<u>Cables and Cords</u> Selection of mains and submains			Max. demand of 3 phase small engineering shop	2	12.5	85.5
			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

Remarks

- A teleconference was held with markers on 27 November and 5 December.
- Version 2 of the answer schedule was provided to markers on 28 November.
- Amendments comprising Version 3 of the answer schedule were sent to markers on 6 December

Comments

The examination covered a wide area. Candidates seemed to manage their time well and worked hard to complete the paper. The examination was more difficult than in recent years with few candidates achieving 80 or more marks. However, the calibre of the candidates can be measured by the fact that more than 70% passed.

The questions were well set out in the answer booklet and candidates appeared to have no problem in understanding them.

As found in previous examinations, few candidates could demonstrate that they can correctly calculate the size of a supply cable which will meet both load and voltage drop requirements. Some candidates had insufficient knowledge to tackle parts of questions 1, 6, 8 and 9. Cryptic answers were given to questions on electrical hazards. This is an area which could be strengthened in electrical safety refresher training for electrical workers.

Appendix 7

Electronic Security 18 November 2006

ES9, a moderated paper, was used for this examination.

A7.1 Moderation

ES9 was moderated by Herb Edie, Andy Buckley and Bob McCreanor.

The paper was considered reasonable in terms of content and time. The amendments were as follows:

No.	Question	Answer
1(c)	Reference to a multimeter was deleted. Considered that having an ohmmeter and multimeter in the question would be confusing.	-
2(a)(i)	-	3 rd and 4 th bullet points deleted as being a use for the test result, not a reason for carrying it out
4(c)	-	Reference to socket outlet changed to permanent connection unit as per the question.
5(c)	Question amended to make the intention clearer	-
5(e)	Question amended to make the intention clearer	Amended to be clearer as to what happened when the supply is lost to a PRCD
6(b)	-	Reference corrected
6(e)(i)	-	Amended to focus on the part from the regulation that is the required answer
8(a)	The word "plug-in" high-lighted	Editorial amendment
9(c)	-	Three possible methods deleted and replaced with the three required steps to be covered in the testing method.
9(d)(ii)	-	Additional option added
10(a)	Reference to "RCD" changed to "RCCB"	-
10(b)	Reference to "RCD" changed to "RCCB"	-
10(c)	Amended to make it clearer that there are only four possible answers	-

A7.2 Marking

Notes

- 1. "Remarks" include changes resulting from correspondence and/or teleconferences with markers and others and significant issues.**
- 2. "Comments" are a synopsis of the comments received in markers' reports or a comment from one marker's report that is representative of the others.**

Markers

ES 9 was marked by Andy Buckley

One candidate sat and passed with a mark of 78