ELECTRICAL WORKERS REGISTRATION BOARD

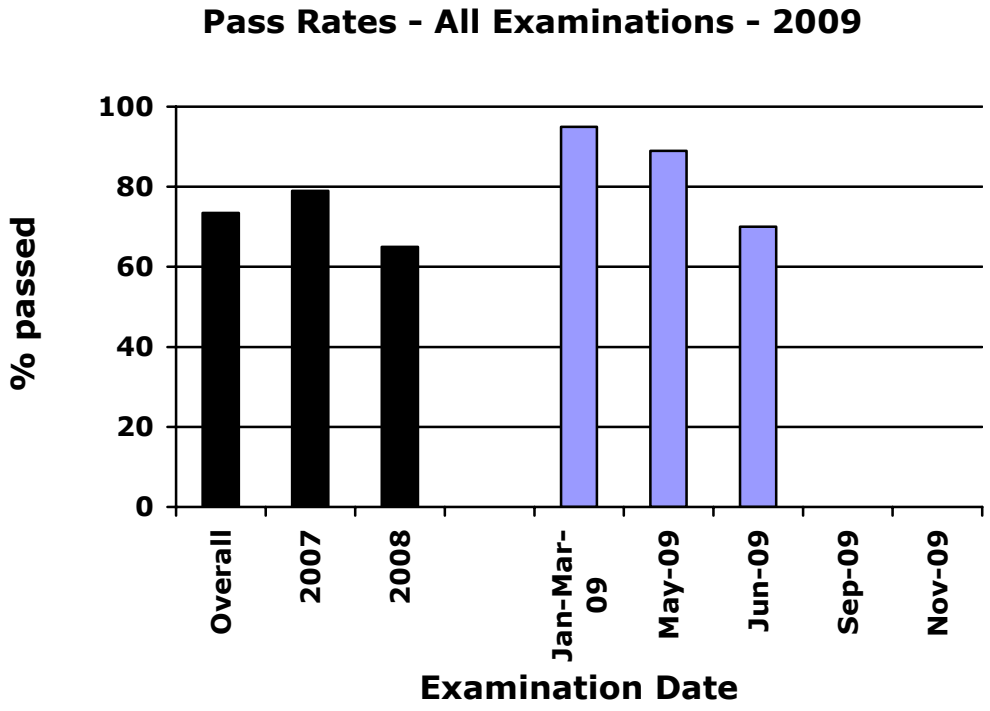
SUMMARY OF

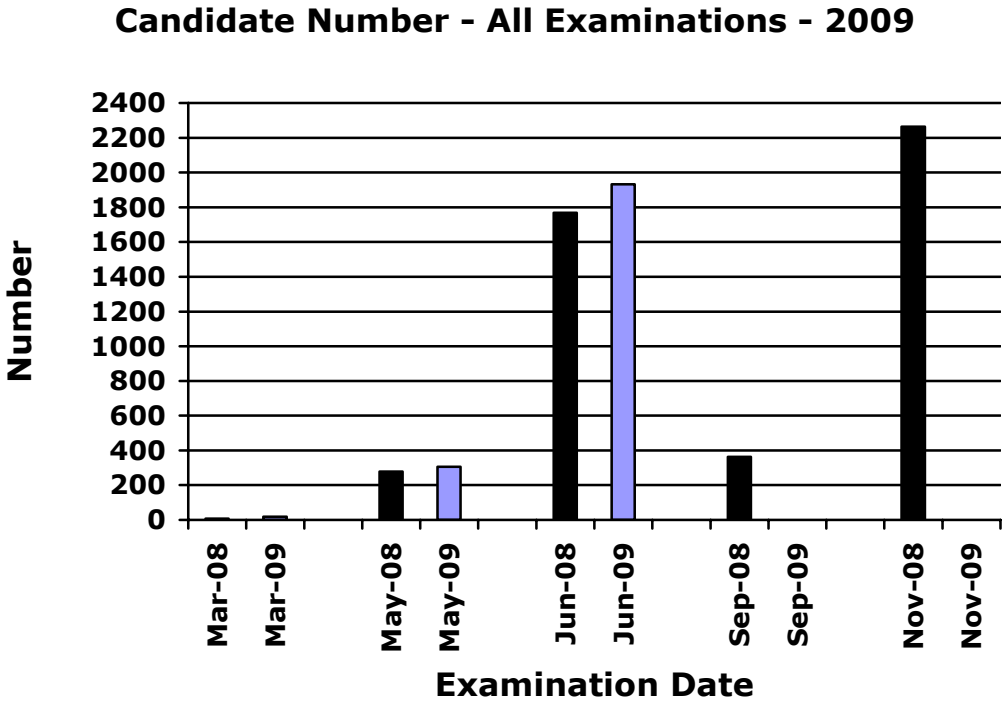
JUNE 2009 EXAMINATION ROUND

John Sickels
Registrar
4 December 2009

1. Summary of Examinations

	Number of candidates	Number of candidates who passed	Percentage passed
ESTA	292	241	82.5
ESTB	85	75	88
Elec. Regulations	803	588	73
Elec. Theory	695	422	61
Elec. Inspector	57	33	58
TEWC	0	0	0
E Security	0	0	0
June 2009	**1932**	**1359**	**70**





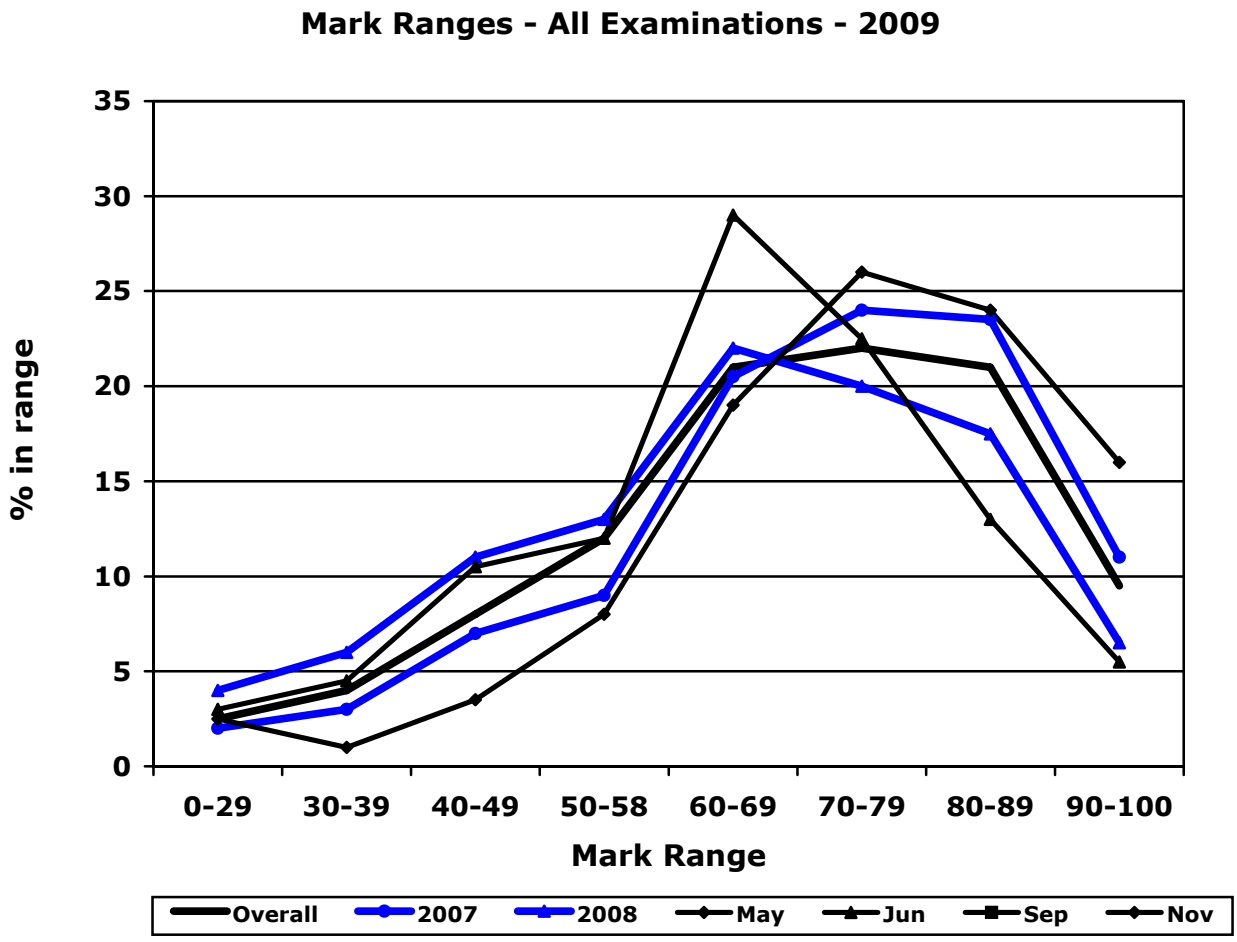
Mark Ranges

Number of candidates

Range	ESTA	ESTB	ER	ET	EI	TEWC	ES	June 2009	
90 – 100	77	1	13	15	0			**106**	**candidates**
80 – 89	86	20	96	50	2			**254**	**candidates**
70 – 79	43	32	217	137	5			**434**	**candidates**
60 – 69	35	22	262	220	26			**565**	**candidates**
50 – 58	10	8	98	108	11			**235**	**candidates**
40 – 49	18	0	67	101	12			**198**	**candidates**
30 – 39	11	1	28	41	0			**81**	**candidates**
0 – 29	12	1	22	23	1			**59**	**candidates**
	292	**85**	**803**	**695**	**57**			**1359**	

% of candidates

Range	ESTA	ESTB	ER	ET	EI	TEWC	ES	June 2009	
90 – 100	26	1	1.5	2	0			**5.5**	**% of candidates**
80 – 89	29.5	23	12	7	3.5			**13**	**% of candidates**
70 – 79	15	38	27	20	9			**22.5**	**% of candidates**
60 – 69	12	26	32.5	32	45.5			**29**	**% of candidates**
50 – 58	3.5	10	12	15.5	19			**12**	**% of candidates**
40 – 49	6	0	8.5	14.5	21.5			**10.5**	**% of candidates**
30 – 39	4	1	3.5	6	0			**4.5**	**% of candidates**
0 – 29	4	1	3	3	1.5			**3**	**% of candidates**


Mark Ranges - All Examinations - 2009
% in range
35
30
25
20
15
10
5
0
0-29
30-39
40-49
50-58
60-69
70-79
80-89
90-100
Mark Range
Overall
2007
2008
May
Jun
Sep
Nov

2. General Comments

The number of candidates for the June examinations were the highest since 2004, the first year overall statistics were recorded.

There were two main issues in the June examinations:

<u>The wide variance between the marking and remarking in the Electrician Theory examination.</u>

There was a wide variance between the marking and remarking in the Electrician Theory examination. Marks varied up to +/- 15 marks, where the expectation is that marks should not vary more than +/- 5 marks. This was the subject of a separate report to the Board. I check-marked 50 (79%) of the remarked examination papers. There was no issue with the fact that 19 passed, just that the variances were too wide.

All answers provided by candidates in the Electrician Theory examination are given from memory and in their own words – it is a closed book examination. These candidates do not have the aid of materials as do candidates in all other examinations. Therefore, comparatively, the answers provided by Electrician Theory candidates tend to be more subjective – open to wider interpretation. It would be expected that there would be a larger number of papers where the variance between the marking and remarking was more than 5 marks, perhaps as many as 8 marks in some cases. (Note that there was one remarked paper in the Electrician Regulations examination where a variance of this size occurred).

However, the wide variance in marks between the marking and remarking is not acceptable. Therefore, for the November examinations:

- I have instructed moderators for all examinations to consider issuing instructions either to candidates or markers or both to make it clear what the intention of a question is. Moderation is presently under way.

- During the marking, I will instruct markers to provide every solution they have accepted that are alternative to the original solution in the answer schedule. This will ensure markers have access to all acceptable solutions for a given answer while marking papers.

Awarding no marks for answers that were partly correct, but not hazardous

This issue came up in two areas:

1. Question 3 of the Electrician Regulations examination required candidates to state the Zones and installation requirements for a light switch; wall heater and switch; towel rail and permanent connection unit; and socket outlet in an en-suite bathroom. The question was divided as follows:

   - Light switch – parts (a)(i), (ii), (iii)
   - Towel rail and pc unit – parts (b)(i), (ii), (iii)
   - Wall heater and switch – parts (c)(i), (ii), (iii)
   - Socket outlet – parts (d)(i), (ii), (iii), (iv)

   Specific instructions were issued for the light switch (it had to be accessible when entering the room) and socket outlet (it had to be visible at all times.)

   An enclosed shower with a door was in the room. Given the size and configuration of the room it meant that the entire room was either in Zone 2 or Zone 3 of the shower. Zones 0 and 1 were inside the shower cubicle.

   For the zoning, a large number of candidates simply stated Zones 1, 2 and 3 of the shower. After much discussion with the markers we arrived at the following conclusion:

   - If a candidate stated Zone 1 in part (a)(i) for the light switch no marks were to be awarded for the other parts of (a) – regardless of the answers given. The reason being that this was contrary to the instructions given (that is, it had to be accessible when entering the room).

   - If a candidate stated Zone 1 in part (b)(i) for the towel rail and pc unit no marks were to be awarded for the other parts of (b) – regardless of the answers given. The reason being that it was incomprehensible that a towel rail be installed inside a shower cubicle.

   - If a candidate stated Zone 1 in part (c)(i) for the wall heater and switch no marks were to be awarded for the other parts of (c) – regardless of the answers given. The reason being that it was incomprehensible that a wall heater be installed inside a shower cubicle.

   - If a candidate stated Zone 1 in part (d)(i) for the socket outlet no marks were to be awarded for the other parts of (d) – regardless of the answers given. The reasons being that it was incomprehensible that a socket outlet be installed inside a shower cubicle and it was prohibited by the Standard.

2. One of the markers expressed unease about having to award marks for part of a question when other parts of the same question were clearly incorrect. The example given was a question regarding insulation resistance testing. The 4 parts of the question required candidates to state how they would do the test, what instrument they would use, the test voltage and the permitted results.

A candidate had correctly stated how they would do the test, the test voltage and the permitted results. But, they stated that they would use an ohmmeter to carry out the test. The marker's unease arose because the testing, test voltage and test result could not be obtained using an ohmmeter – yet they still had to award the marks.

At this stage, tying test results, test methods etc. to the instrument stated is applied only in questions relating to testing for phase/neutral transpositions on mains.

For (1) above, I am inclined to apply the rule on a case by case basis at this stage.

However, for (2) above, I need to consider it further and provide a separate paper for the Board's consideration as to how it could be applied generally.

General Comments

Three types of questions seem to over-whelm candidates:

- Maximum demand (Electrical Inspector and Electrician Regulations)
- Zoning and installation requirements for bathrooms (Electrician Regulations)
- Power and control circuits for motors - other than DOL starters (Electrician Theory

Most candidates seem to freeze when faced with these questions. Moderators and markers consider that these questions are relatively easy. Certainly, it is considered that the maximum demand and bathroom zoning questions are some of the easiest set in examinations at electrician and inspector level.

3. Moderation

The moderation went well with all moderators having valuable input.

The Electrical Inspector, Electrician Regulations and Electrician Theory Examinations were moderated in meetings. For the other examination papers, the moderation was carried out via secure email with one teleconference with the moderators of each paper.

4. Marking

The marking went very well with all markers returning marked papers by the required dates.

5. Electrical Service Technician A

The pass rate of 82.5% was a very good result. The candidate numbers were very similar to the numbers sitting in the previous two June examination for Electrical Service Technician A.

Candidates generally performed well in questions 1, 3, 4, 6, 7, 8 and 9.

In questions 3, 7, 8 9, between 70% and 74.5% of candidates were able to gain 7.5 or more marks. For those same questions, between 80% and 92% of candidates were able to gain 5 or more marks.

In questions 1, 4 and 6, between 60% and 68% of candidates were able to gain 7.5 or more marks. For those same questions, between 86% and 90% respectively were able to gain 5 or more marks

Question 2 related to calculating the minimum and maximum power used and current drawn in a heater controlled by a three-heat switch. Candidates often did not read the question accurately and did the wrong calculations. Candidates also had difficulty in working out the voltage drop component of this question.

Question 8 related to fault diagnosis. Once again a large number of candidates failed to read the question accurately and mixed up the solutions to the two parts.

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 of 88% was a very good result. The candidate numbers were very similar to the numbers sitting in the previous two June examination for Electrical Service Technician B. It is interesting to note that this is the only examination of the main 5 where June candidate numbers have actually dropped since 2004. Between 2004 and 2006 over 100 candidates sat this examination in June

Candidates generally performed well in questions 4, 5, 6, 7 and 9. Between 53.5% and 70% of candidates were able to gain 7.5 or more marks for these questions, while between 89% and 97% of candidates were able to gain 5 or more marks.

The 10 mark questions in which candidates struggled – questions 2, 3 and 8 – were similar in that they all related to fault diagnosis in some way.

Question 2 was about motor control circuits including determining control circuit faults for a given situation, while question 8 was about determining faults a three-phase motor and starters. About 20% of candidates could not even gain 5 marks for these questions.

Question 3 was about locating the faults on a circuit protected by an HRC fuse. Almost 90% of candidates were able to gain 5 or more marks for this question.

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 73% was an excellent result. The candidate numbers were the lowest of the 2007-09 June Electrician regulations examinations.

Candidates generally did well in question 1, 4, 5, 6, 7 and 8.

Question 4 related to insulation resistance testing of an electrical installation and included the requirement to describe how the testing was carried out. Almost 60% of candidates were able to gain 7.5 or more marks for this question. This compares to 36.5% of candidates when this type of question was last asked in November 2008.

Question 8 related to determining the size of an aluminium cable for an installation and 49% of candidates were able to gain 7.5 or more marks. This is similar to results for similar questions in previous years. Once again about one-third of candidates had little or no knowledge of how to do this question. About 100 candidates could not gain any marks for this question.

Candidates struggled with questions 2, 3 and 9.

Question 2 was a new question and only the first part of which would have been familiar to candidates. The question required candidates to state the methods for protection against indirect contact and describe how two of the methods achieve the safety outcome required. Candidates also had to state how they would verify that the safety outcomes had been achieved. Given it was effectively a new question, candidate performance was reasonable with one-third able to gain 7.5 or more marks, and 60% 5 or more marks.

Question 3 was about the zoning and installation requirements for equipment in an ensuite bathroom and candidate performance was dismal with 71% of candidates failing to get at least 5 marks for this question. This result is extremely disappointing as this is one of the less complex areas of AS/NZS 3000 that is supported by clear diagrams.

It seems that most candidates preferred to state the requirements of the Standard "parrot fashion" without giving any thought to what the question was asking. Why candidates consider it acceptable to install equipment such as towel rails and heaters inside a shower cubicle is beyond belief.

Question 9 related to earthing of systems and candidates simply seemed to have difficulty locating the required parts of the Standard.

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

8. Electrician Theory

The pass rate of 61% (after remarking) was very good. Candidate numbers were the highest record for a June Electrician Theory examination since 2004.

Candidates generally did well in questions 3, 4 8 and 9.

Question 3 related to characteristics of fuses and their application. Candidates had a good knowledge of this topic with 62% able to gain 7.5 marks or more. Candidates also had a good knowledge of danger and out-of-service tags and use of the prove-test-prove method (question 8) and the characteristics of MCBs and earthing systems (question 9).

Question 4 was a calculation question requiring candidates to determine the neutral current in a three-phase system with different loads on each phase. Candidates either knew how to do this question or did not. 47% of candidates gained 7.5 or more marks, but 43.5% of candidates gained less than 5 marks.

Of the questions that caused problems for candidates:

Question 2 related insulation resistance testing of an electrical installation and half of the candidates gained less than 5 marks. It is concerning that such a large number of candidates have little idea of testing in this area.

Question 6 related to transformer calculations and two-thirds of candidates gained less than 5 marks. This type of question appears regularly in examinations and most candidates should have passed this question.

Question 8 related to motors. Many candidates were able to wire a remote stop/start station and emergency stop into an existing control circuit. Few candidates knew how to draw power circuit to forward and reverse a single phase motor.

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

9. Electrical Inspector

The pass rate of 58% was disappointing result for the Electrical Inspectors examination. This is the second year in which an Electrical Inspector Examination has been held in June and the result in the corresponding examination in 2008 was equally disappointing.

There were three questions – questions 1, 7 and 8 – in which candidates did well. Question 8 related to a phase/neutral transposition on a three-phase mains and 80.5% of candidates were able to gain 7.5 marks or more. Candidates had an in-depth knowledge of testing in this area.

Candidates did very well in question 7 which required them to determine the size of a cable based on load and voltage drop calculations. Almost two-thirds of candidates were able to gain 7.5 marks or more.

Candidates performance in question 2 (general knowledge of fuses and MCBs) and question 6 (requirements of AS/NZS 3001 for caravans) was average. This is disconcerting because candidates at this level should have an in-depth knowledge of protection and have little difficulty in working with Standards.

Of the questions with which the candidates struggled:

Question 3 required candidates to determine the heaviest loaded phase of a residential development using the maximum demand tables of AS/NZS 3000. No candidate successfully completed this question and none could gain more than 6 marks. These questions are deliberately made straight-forward with all candidates having to do is apply the various load groups. Candidates in this examination (and in the Electrician Regulations examination) seem to be over-whelmed when faced with this type of question.

Question 4 related to drawing the circuit diagram of a three-phase RCD and stating the requirements of NZS 3019 for testing this type of RCD. Only 23% of candidates could gain 7.5 marks or more. Only 52% of candidates could gain 5 or more marks. This was partly a general knowledge question which is well within the capabilities of these candidates. Most candidates did not refer to NZS 3019 when answering the part relating to testing.

I should be noted that a similar question was in the November 2008 Electrician Theory examination and in that examination 47% of candidates gained 7.5 marks or more, while 79% gained 5 or more marks.

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

10. Tradespersons Electrical Work Certificate

There were no candidates for the Tradesperson Electrical Work Certificate examination in June 2009

11. Electronic Security Alarm Installer

There were no candidates for the Electronic Security Alarm Installer examination in June 2009.

Appendix 1

Electrical Service Technician A Examinations

20 June 2009

ESTA 1047, a moderated paper, was used for the examination of 20 June 2009.

A1.1 - Overall Candidate Performance

	Number of candidates	Number of candidates who passed	Percentage passed
ESTA 1047	292	241	82.5
June 2009	**292**	**241**	**82.5**

ESTA 1047

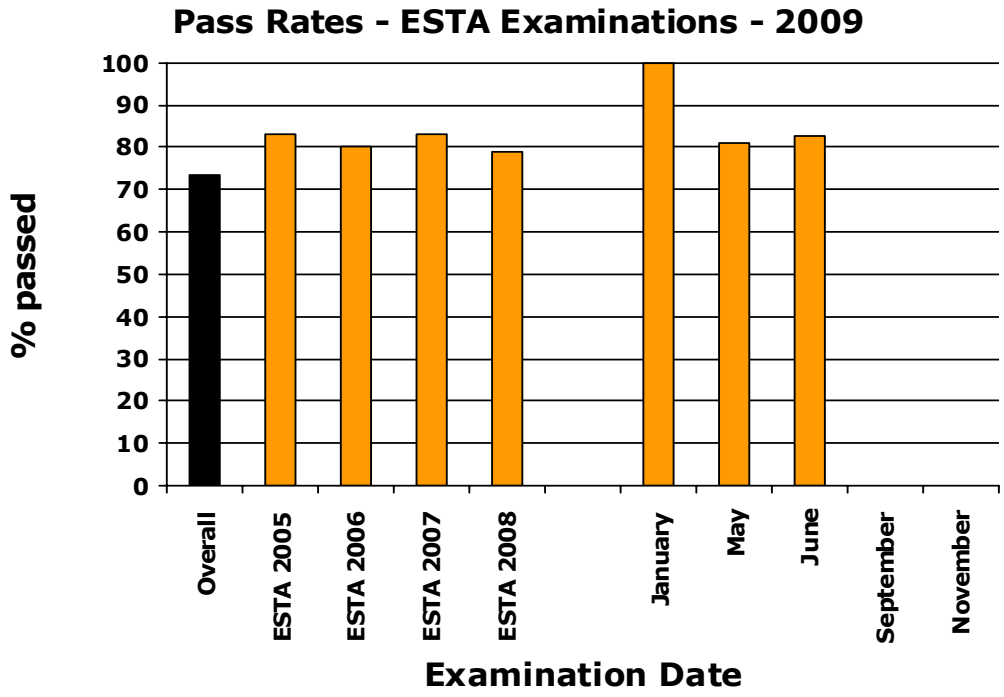
All candidates

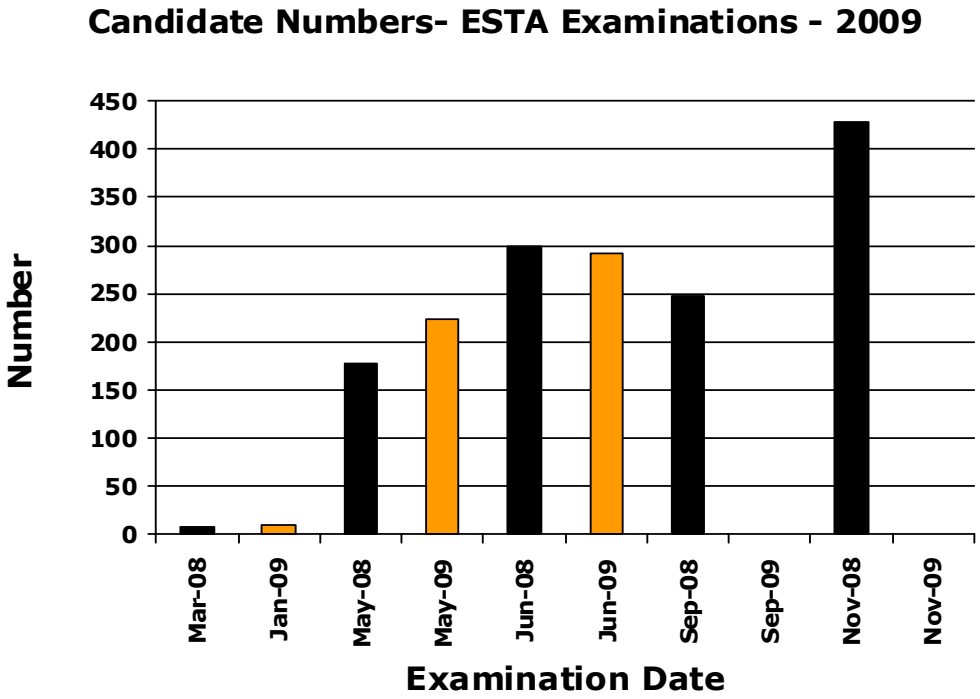
Average pass mark 75 %
Median mark 81

Those who passed

Average pass mark 82.5
Median mark 84

3 candidates gained 100 marks. 24 gained 95 marks or more.


Pass Rates - ESTA Examinations - 2009
% passed
100
90
80
70
60
50
40
30
20
10
0
Overall
ESTA 2005
ESTA 2006
ESTA 2007
ESTA 2008
January
May
June
September
November
Examination Date


Candidate Numbers- ESTA Examinations - 2009
Number
450
400
350
300
250
200
150
100
50
0
Mar-08
Jan-09
May-08
May-09
Jun-08
Jun-09
Sep-08
Sep-09
Nov-08
Nov-09
Examination Date

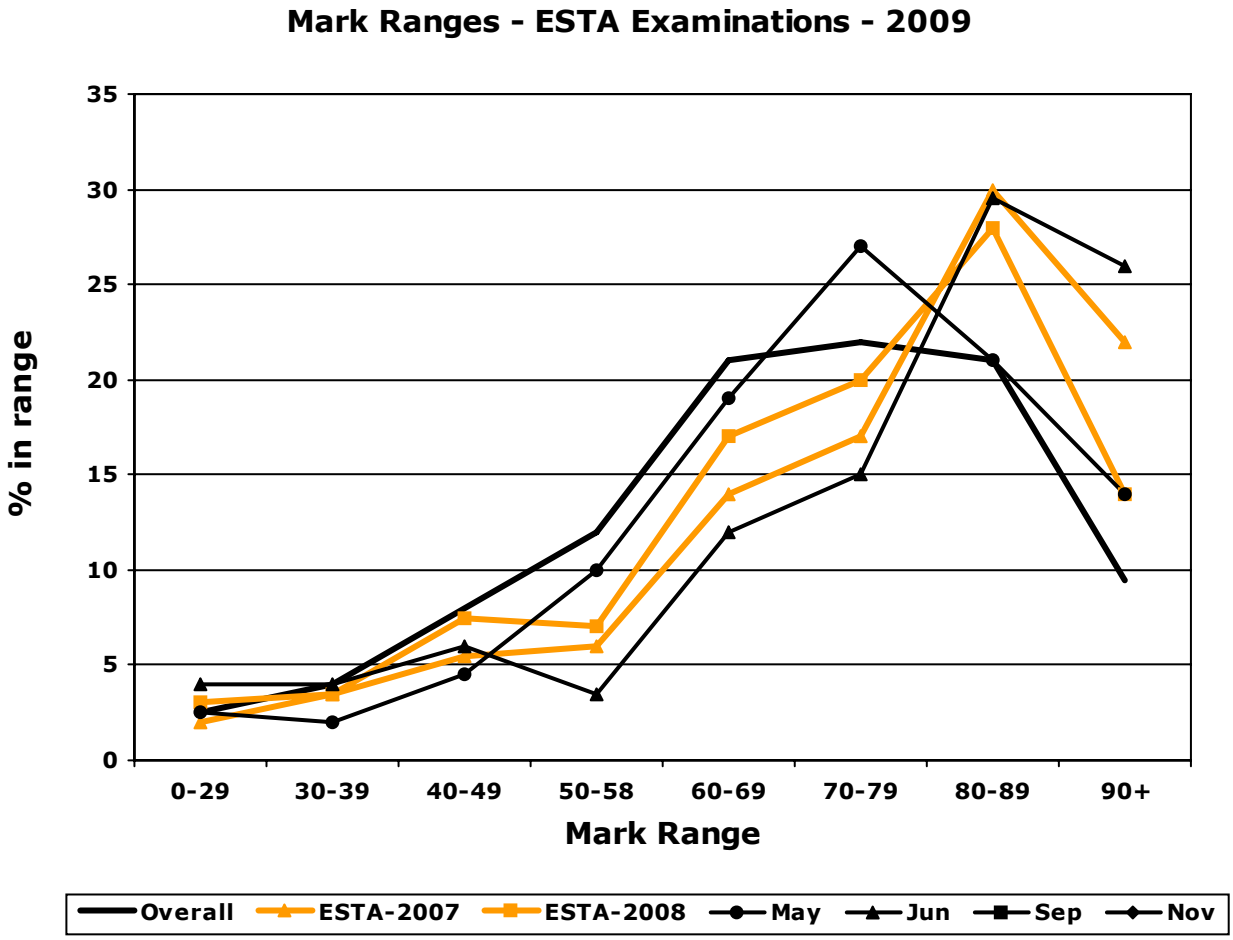
Mark Ranges

Number of candidates

Range	ESTA 1047					June 2009	
90 – 100	77					**77**	**candidates**
80 – 89	86					**86**	**candidates**
70 – 79	43					**43**	**candidates**
60 – 69	35					**35**	**candidates**
50 – 58	10					**10**	**candidates**
40 – 49	18					**18**	**candidates**
30 – 39	11					**11**	**candidates**
0 – 29	12					**12**	**candidates**
	292					**292**	

% of candidates

Range	ESTA 1047					June 2009	
90 – 100	26					**26**	**% of candidates**
80 – 89	29.5					**29.5**	**% of candidates**
70 – 79	15					**15**	**% of candidates**
60 – 69	12					**12**	**% of candidates**
50 – 58	3.5					**3.5**	**% of candidates**
40 – 49	6					**6**	**% of candidates**
30 – 39	4					**4**	**% of candidates**
0 – 29	4					**4**	**% of candidates**


Mark Ranges - ESTA Examinations - 2009
% in range
35
30
25
20
15
10
5
0
0-29
30-39
40-49
50-58
60-69
70-79
80-89
90+
Mark Range
Overall
ESTA-2007
ESTA-2008
May
Jun
Sep
Nov

A1.2 - Overall Marking Analysis

Performance by topic

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

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 1	**-**	**10, 2 mark questions**				**62**	**34**	**4**
Q 2	**A5.5**	**Theory - Simple circuits.00**			**Heater with three-heat switch. Calculate maximum power at 230V, power in medium position, minimum current, power at minimum permitted voltage**	**45.5**	**12.5**	**42**
			Sep 2008	3	Draw circuit diagram – 2 resistances in series, one in parallel. Calculate total resistance, circuit voltage, total power consumed	65	8	27
			Sep 2008	3	Draw circuit diagram – 2 resistances in series, one in parallel. Calculate power consumed by one resistor, current drawn by series resistors, power if one resistor short-circuited	56	25	19
			May 2009	7	Draw 230V circuit supplying 2 elements controlled by two-position selector switch, Calculate maximum power and minimum current.	48	29	23

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	**H1c.31**	**<u>Protection and Control</u> Selection of control and protection equipment**			**Under-rated and over-rated fuses. Advantages of HRC fuse over rewireable fuses. Why not permitted to bridge HRC fuse with fuse wire. Types of faults on MCBs and HRC fuses**	**70**	**17**	**13**
			Jun 2008	8	Three advantages of HRC fuses when compared to rewireable fuses. Why HRC fuse is not to be replaced with fuse wire. How RCD operates when there is a fault, PRCDs	59	21	20
			Sep 2008	5	Under-rated and over-rated fuses. Advantages of HRC fuse over rewireable fuses. Why not permitted to bridge HRC fuse with fuse wire. Types of faults on MCBs and HRC fuses	50	25	25
			Nov 2008	8	Under-rated and over-rated fuses. Advantages of HRC fuse over rewireable fuses. Why not permitted to bridge HRC fuse with fuse wire. Types of faults on MCBs and HRC fuses	54.5	27	18.5
			May 2009	9	Under-rated and over-rated fuses. Advantages of HRC fuse over rewireable fuses. Why not permitted to bridge HRC fuse with fuse wire. Types of faults on MCBs and HRC fuses	62.5	27	10.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 4	**K4.46**	**<u>Testing and inspection methods</u>**			**PEC test on Class I appliance – instrument used, how to do test, results. Why ohmmeter not used for IR test. Ammeter connected in parallel with appliance.**	**68**	**22**	**10**
			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 2008	6	Reason for PEC test, how it is carried out, acceptable values. Why ohmmeter not used for IR test, connecting ammeter in parallel	47	32	21
			Nov 2008	4	PEC testing of electrical appliance. Retesting repaired appliance. Flexible cord insulation characteristics	48.5	34	17.5
			May 2009	5	PEC test on Class I appliance – instrument used, how to do test, results. Why ohmmeter not used for IR test. Ammeter connected ion parallel with appliance.	59.5	30.5	10

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	**H10.66**	**<u>Fault diagnosis</u>**			**Appliances plugged in socket out – fuse blows. Describe how to determine if socket outlet overloaded, describe tests to determine if faulty appliance**	**49**	**23.5**	**27.5**
			Mar 2008	9	Situation that cause transpositions. Faulty washing machine, calculate fault current, whether fuse will blow.	75	12.5	12.5
			May 2008	5	Appliances plugged in socket out – fuse blows. Describe how to determine if socket outlet overloaded, describe tests to determine if faulty appliance	14	22	64
			Sep 2008	7	Appliances plugged in socket out – fuse blows. Describe how to determine if socket outlet overloaded, describe tests to determine if faulty appliance	50	19	31
			May 2009	8	Appliances plugged in socket out – fuse blows. Describe how to determine if socket outlet overloaded, describe tests to determine if faulty appliance	35	30	35

	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**			**Precautions when changing fuse. Difference between switching off and isolating, continued isolation. Precautions when connecting instruments**	**60**	**28**	**12**
			May 2007	5	Safety, replacing a blown fuse, continued isolation, switching off and isolating, PPE and its use	54	31	15
			Nov 2007	2	Check before turning off main switch, define PPE, switching off and isolating, precautions when connecting test instruments	42	38	20
			Nov 2007	6	Why recommend main switch turned off, cause of fault, isolating transformers, protective devices	35	44	21
			Mar 2008	6	Why recommend main switch turned off, cause of fault, isolating transformers, protective devices	62.5	25	12.5
			Jun 2008	9	Why recommended to turn off main switch. Isolation of appliances. Personal protective safety equipment.	54	33	13
			Sep 2008	2	Insert fuse link, cannot turn off main switch – two precautions. Fault in wiring. Difference between switching off and isolation. Continued isolation	49.5	42	8.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 7	**K4.46**	**<u>Testing and inspection methods</u>**			**IR test of appliance with semi-conductor devices. Alternative to IR testing..**	**73.5**	**18.5**	**8**
			Nov 2007	9	IR testing and semi-conductors. IR testing appliance. Testing appliance with MOV fitted.	55	26	19
			Mar 2008	2	IR testing and earth leakage testing, IR testing and avoid damage to semi-conductor devices, IR test of concrete mixer	75	25	0
			May 2008	6	IR testing and earth leakage testing, IR testing and avoid damage to semi-conductor devices, IR test of concrete mixer	55	29	16
			Sep 2008	6	IR test of appliance with MOV. Alternative to IR test. IR test of appliance with semi-conductors. IR test of concrete mixer.	69	19	12
			Nov 2008	2	IR testing of appliance with semi-conductors. IR testing of dishwasher. Why ohmmeter not used for IR test. Other IR test instruments.	50	34	16
			May 2009	6	IR test of appliance that incorporates semi-conductor devices. Why PEC, IR and polarity tests carried out. Why PEC test before IR test	47	30	23

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	**H10.66**	**<u>Fault diagnosis</u>**			**Calculate fault current on faulty appliance. Transposition of phase and neutral**	**73**	**10**	**17**
			Nov 2007	4	Faulty heater. Calculate fault current, whether fuse will blow, power dissipated. Phase, neutral transpositions.	62.5	16	21.5
			Jun 2008	5	Faulty dishwasher, calculate current and power in PEC and whether fuse would operate, effect of transpositions	68	22	10
			Sep 2008	7	Fan heater used when faulty – calculate current in PEC, effect on operation of fuse. Phase/neutral transpositions. Why low PEC value contributes to safety	60	22.5	17.5
			Nov 2008	7	Fan heater used when faulty – calculate current in PEC, effect on operation of fuse. Phase/neutral transpositions. Why low PEC value contributes to safety	53	26.5	20.5
			May 2009	4	Vacuum cleaner used when faulty – calculate fault current flowing, effect on operation of fuse. Phase/neutral transpositions.	65	25	10

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	**C2.11**	**a.c. – Measurements V, A, P, pf**			**230V/240V heater. Calculate current, power at 230V, power if element open-circuited.**	**74.5**	**7**	**18.5**
			June 2008	2	Calculate current for heater at 230V. Calculate permitted voltage variation, power at minimum and maximum voltage variations. Faults on identical heaters	43	21	36
			Sep 2008	8	Portable water heater – calculate current and power in low positions and resistance, current and power in high position	72.5	7.5	20
			Sep 2008	8	Calculate voltage drop permitted at socket outlet. Calculate power consumed by heater and at minimum permitted voltage.	44	37	19
			Nov 2008	6	Calculate voltage drop permitted at socket outlet. Calculate power consumed by heater and at minimum permitted voltage.	40	31	29
			May 2009	2	Electric blanket – two 55W elements. Calculate current in low, medium and high.	35	10	55

A1.3 - ESTA 1047

A1.3.1 - Moderation

There were two moderators for ESTA 1047.

ESTA 1047 was moderated by secure email. A teleconference was held with moderators on 19 May.

A1.3.2 - Marking

There were five markers for ESTA 1047.

Teleconferences were held with the markers on 29 June and 6 July.

Version 2 of the answer schedule was sent to markers on 29 June, version 3 on 7 July.

Comments

Overall, this was a well-constructed examination paper. The emphasis on testing and Ohms law is consistent with the examination prescription.

Considerable changes occurred during the marking – but this is common as often things appear in candidates answers that are not foreseen until marking commences and candidates' interpretations appear. In addition, the use of 5 markers may well have resulted in a wider range of opinions.

Most candidates attempted all questions with a reasonable degree of competence.

Some answers given were virtually verbatim from past papers. This seems to indicate that some of the lower scoring candidates are relying on remembering answers from past papers. Some candidates identified the wrong instrument to carry out a prescribed test, but still stated the correct test method, that is, their answer did not relate to the instrument they had identified. Again this could indicate trying to recall answers to previous questions, but getting mixed-up.

A1.3.3 - Amendments to ESTA 1047

The significant amendments to ESTA 1047 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(a)	Replaced with another question. Original duplicate of 1(e)	Amended accordingly	-
1(f)	Replaced with another question. Original duplicate of 6(b)(i)	Amended accordingly	-
1(i)	Replaced with another question. Original duplicate of 6(d)(i)	Amended accordingly	-
2(a)	Reference to heater operating at 230V added.	-	Answer amended to 2 decimal places
2(b)	Reference to heater operating at 230V added.	Editorial amendment	Answer amended to 2 decimal places
2(c)	Reference to heater operating at 230V added.	-	-
3(a)(ii)	-		Amended to make more accurate
3(b)	-	-	1st and 7th bullet points amended to be more accurate
3(d)(i)	-	-	Amended to be more accurate
4(c)	-	-	Amended to be more accurate
5(a)(ii)	-	-	Rewritten to be more accurate
5(b)(i)	-	-	Editorial amendment
5(b)(ii)	-	-	2 additional options added
6(a)	-	Additional option added	-
6(b)(ii)	Rewritten to make intention clearers	Additional option added	Last bullet point deleted. Covered by 1st bullet point
6(c)	-	-	Additional option added
8(a)	Preamble rewritten to make intention clearer	-	-
7(a)(i)	-	-	Additional option added
7(a)(ii)	-	-	Additional option added
7(d)(iii)	-	-	Last bullet point deleted. Not relevant to question

The significant amendments to <u>ESTA 1047</u> arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
8(a)(i)	-	-	Answer amended to 2 decimal places
8(a)(ii)	Preamble rewritten to make intention clearer	-	Additional option added
8(a)(iii)	-	-	Answer amended to 2 decimal places
8(b)(i)	Rewritten to make intention clearer	Amended to make more accurate	-
9(a)(i)	-	-	Answer amended to 2 decimal places
9(a)(ii)	Editorial amendment	-	Answer amended to 2 decimal places
9(a)(ii)	-	-	Answer amended to 2 decimal places

Appendix 2

Electrical Service Technician B Examinations

26 and 27 June 2009

ESTB 2037, a moderated paper, was used for the examination of 27 June 2009.
ESTB 2038, a composite paper, was used for the examination of 26 June 2009.

A2.1 - Overall Candidate Performance

	Number of candidates	**Number of candidates who passed**	**Percentage passed**
ESTB 2037	82	72	88
ESTB 2038	3	3	100
May 2009	**85**	**75**	**88**

ESTB 2037

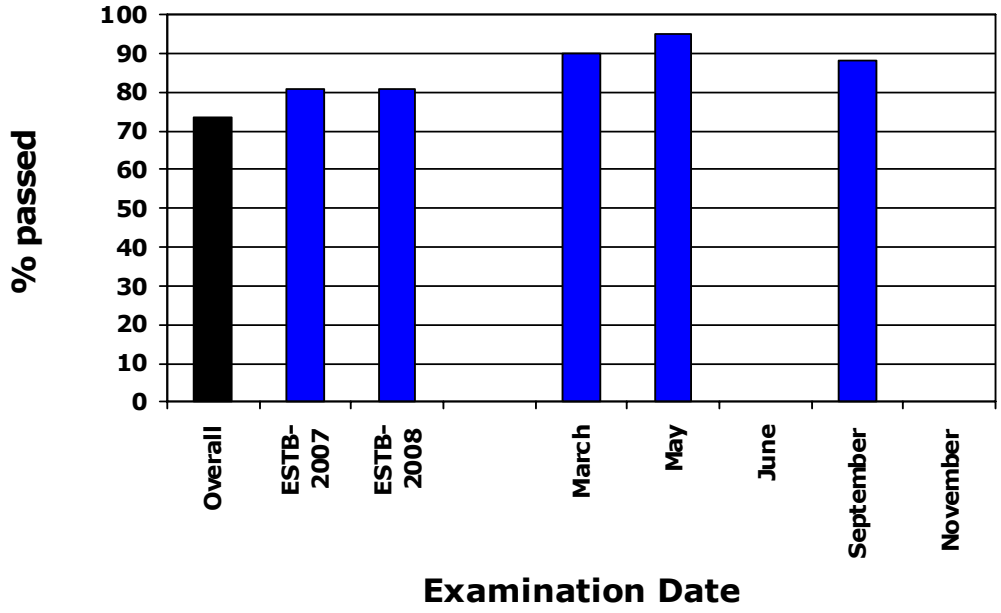
All candidates

Average pass mark 71 %
Median mark 73

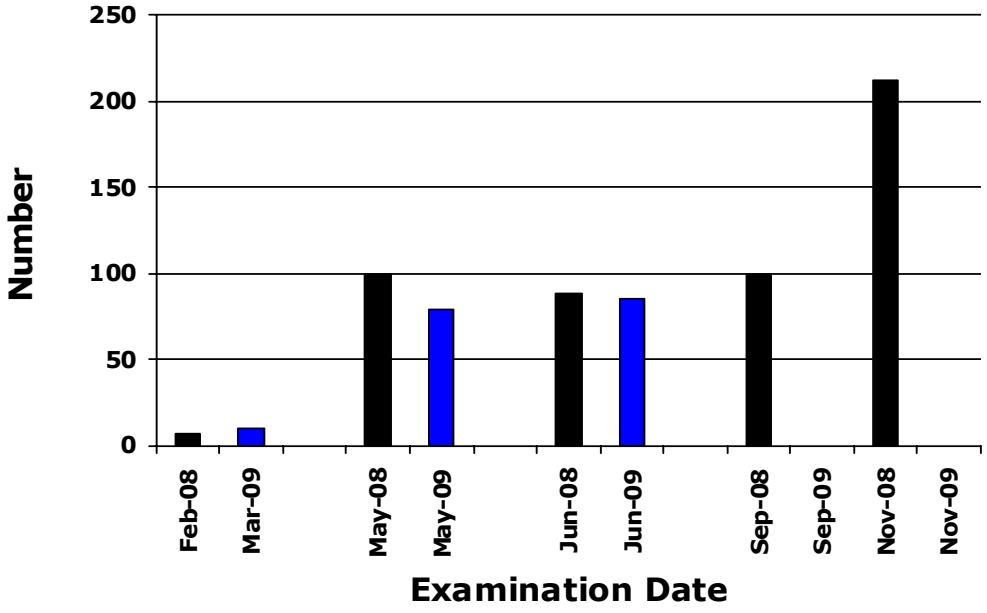
Those who passed

Average pass mark 74 %
Median mark 75

Pass Rates - ESTB Examinations - 2009



Candidate Numbers - ESTB Examinations - 2009



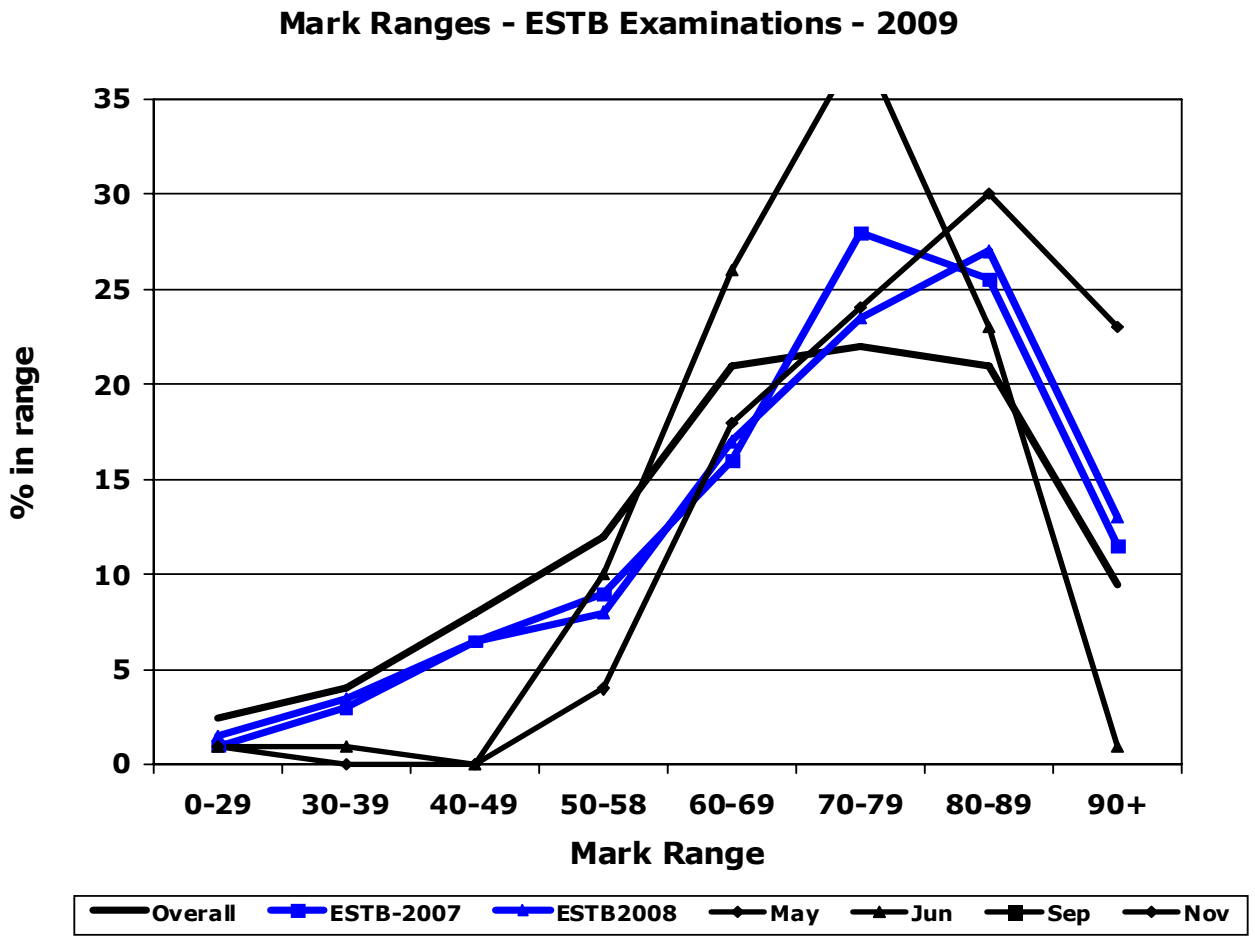
Mark Ranges

Number of candidates

Range	ESTB 2037	2038		**June 2009**	
90 – 100	1	0		**1**	**candidates**
80 – 89	19	1		**20**	**candidates**
70 – 79	31	1		**32**	**candidates**
60 – 69	21	1		**22**	**candidates**
50 – 58	8	0		**8**	**candidates**
40 – 49	0	0		**0**	**candidates**
30 – 39	1	0		**1**	**candidates**
0 – 29	1	0		**1**	**candidates**
	82	**3**		**85**	

% of candidates

Range	ESTB 2037	2038		**June 2009**	
90 – 100	1	0		**1**	**% of candidates**
80 – 89	23	34		**23**	**% of candidates**
70 – 79	38	33		**38**	**% of candidates**
60 – 69	26	33		**26**	**% of candidates**
50 – 58	10	0		**10**	**% of candidates**
40 – 49	0	0		**0**	**% of candidates**
30 – 39	1	0		**1**	**% of candidates**
0 – 29	1	0		**1**	**% of candidates**


Mark Ranges - ESTB Examinations - 2009
% in range
35
30
25
20
15
10
5
0
0-29
30-39
40-49
50-58
60-69
70-79
80-89
90+
Mark Range
Overall
ESTB-2007
ESTB2008
May
Jun
Sep
Nov

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**				**38**	**49**	**13**
Q 2	**E2.16**	**3ph-Motor/Alternators Selection, starting, protection**			**Diagram of 400V control circuit – name components. Voltage of circuit. Faults on control circuit. Alternative to thermal overload.**	**35.5**	**45**	**19.5**
			Jun 2006	3	Draw 400V control circuit, reduced voltage starters	28	1	71
			May 2007	3	Parts of DOL starter, protection by thermal overload or thermistor, reversal of supply lines	70.5	22	7.5
			May 2008	9	Draw 400V control circuit, motor faults.	59	20	21
			Jun 2008	9	Draw 400V control circuit, motor faults.	58.5	19.5	22

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	**H10.66**	**<u>Fault diagnosis</u>**			**Fuse blows on circuit protected by HRC fuse. Testing to locate fault. Action taken to repair fault.**	**49**	**39**	**12**
			Nov 2007	5	Locate fault on MCB circuit supplying appliances, describe remedial action for each fault	42	36	22
			Feb 2008	9	Fuse blows on circuit supply appliances. How to locate fault and remedial action	14	43	43
			May 2008	5	Appliances plugged in socket out – fuse blows. Describe how to determine if socket outlet overloaded, describe tests to determine if faulty appliance	66	15	19
			Jun 2008	5	Appliances plugged in socket out – fuse blows. Describe how to determine if socket outlet overloaded, describe tests to determine if faulty appliance	50.5	31	18.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 4	**K2.38**	**Statutory testing and inspection requirements**			**AS/NZS 3760 – state requirements for instrument tests on appliance. Describe IR test of appliance. Colour coding of conductors**	**63.5**	**31.5**	**5**
			Nov 2005	7	Testing to AS/NZS 3760	76.5	5.5	18
			Sep 2007	7	Standard to which appliance must be tested, three checks and tests to be carried out, testing requirements of Standard, polarity testing	34.5	38	27.5
			Feb 2008	6	Testing to AS/NZS 3760, inspections and tests. Polarity testing	72	28	0
			May 2008	3	Testing to AS/NZS 3000. PEC tests, testing to check integrity of insulation	80	16	4
			Sep 2008	9	AS/NZS 3760 – test on an appliance. IR values for isolating transformer. Polarity testing	69	17	14
			Sep 2008	9	Testing of portable water heater. Visual checks.	43	33	24
			Nov 2008	5	Testing of portable water heater. Visual checks.	68	21.5	10.5
			May 2009	6	Testing to AS/NZS 3760 – two instrument tests on appliance, IR testing of isolating transformer. Polarity testing of single phase appliance	61	31.5	7.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	**K4.46**	**Testing and inspection methods**			**Main safety issue with connecting ammeter in parallel and voltmeter is series. Safety precautions when connecting test instruments. Tests to ensure appliance is electrically safe.**	**70**	**24**	**6**
			Jun 2008	4	Connecting ammeter in parallel and voltmeter in series, carrying out IR test.	68	19.5	12.5
			Sep 2008	5	Main safety issues – connecting ammeter in parallel, connecting voltmeter in series. Safety precautions when testing. Testing to ensure appliance is electrically safe.	46	27	27
			Sep 2008	5	Main safety issues – connecting ammeter in parallel, connecting voltmeter in series. Safety precautions when testing. Testing to ensure appliance is electrically safe.	38	29	33
			Nov 2008	2	Main safety issues – connecting ammeter in parallel, connecting voltmeter in series. Safety precautions when testing. Testing to ensure appliance is electrically safe.	42	32	26

	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**			**Isolation when switch not adjacent to motor. Prove-test-prove method, Danger tag system. Securing isolation**	**53.5**	**35.5**	**11**
			Sep 2006	7	Additional precautions to secure isolation, switching off and isolating, explain prove-test-prove method, PPE	71	21	8
			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
			Feb 2008	3	Three precautions after disconnecting an appliance, why prove-test-prove is used, testing to confirm isolation, three ways of ensuring continued isolation	0	100	0
			Sep 2008	4	Precautions when isolator not close to motor. Why prove-test-prove is used. Situations where two danger tags are used. Continued isolation.	61.5	22	16.5
			Sep 2008	4	What prove-test-prove establishes. Continued isolation. Safety of persons and property	38	52.5	9.5

	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 - four factors when selecting. Factors affecting voltage drop in cord. Colours of three-phase cable.**	**65**	**28**	**7**
			Sep 2007	6	Six factors when selecting cord, colour coding of single phase cord. Two ways of identifying double insulated appliance	83	14	3
			Nov 2007	7	Flexible cords - volt drop, reduce effect of volt drop, colour coding	69	26	5
			Feb 2008	4	Flexible cords - four factors when selecting, volt drop and reducing the effect of voltage drop, colour coding	57	43	0
			May 2008	9	Flexible cords - four factors when selecting. Colours of three-phase cable, volt drop and reducing the effect of voltage drop, current rating of cords	64	33	3
			Jun 2008	3	Flexible cords - four factors when selecting. Colours of three-phase cable, fitting plug to flexible cord, current rating of cords	57.5	33.5	9
			Nov 2008	4	Flexible cords - four factors when selecting. Colours of three-phase cable, fitting plug to flexible cord, current rating of cords	57.5	33.5	9

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	**E4.18**	**<u>3ph-Motor/Alternators</u> Fault diagnosis**			**Fault diagnosis- overload on wood planer; overheating motor; faulty starter, motor fails to start. Why reduced voltage starters used.**	**19.5**	**60**	**20.5**
			Jun 2007	8	Purpose of phase failure relay, fault diagnosis, drawing terminal connections	58	32	10
			Sep 2007	2	Two conditions that would cause overload, two causes for faults, reason for using reduced voltage starters	31.5	42.5	26
			Feb 2008	2	Two causes for faults – sustained overcurrent, overheating motor faulty starter, motor not starting. Reason for using reduced voltage starters	14	72	14

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	**D4.22**	**<u>System theory</u> - MEN systems**			**State nominal voltages in MEN system. Define MEN system. Why neutral conductor required. Situations where neutral conductor not required. Frequency and peak voltage**	**71**	**25.5**	**3.5**
			May 2008	4	Circumstances in which neutral is required and not required in three phase final subcircuit. Diagram of MEN system arrangement	56	21	23
			Sep 2008	8	List nominal voltage in MEN system. Define term MEN system. Situations where no neutral required. Frequency and peak voltage	55	28	17
			Sep 2008	8	Diagram of MEN system with single and three phase installations. Why PEC is required. Why neutral required with different heating loads.	62	9.5	28.5
			Nov 2008	3	List nominal voltage in MEN system. Define term MEN system. Situations where no neutral required. Frequency and peak voltage	52.5	27	20.5

2.3 - ESTB 2037

A2.3.1 - Moderation

There were two moderators for ESTB 2037.

ESTB 2037 was moderated by secure email. A teleconference was held with moderators on 21 May.

A2.3.2 - Marking

There were two markers for ESTB 2037.

A teleconference was held with the markers on 7 July.

Version 2 of the answer schedule was sent to markers on 7 July.

Comments

This examination paper was one of the better moderated papers with very few alterations to the marking schedule..

The paper had a good range of practical type questions that mirror the situations a candidate would meet on a daily basis.

There should have been some calculations to give wider spread of questions.

A2.3.3 - Amendments to ESTB 2037

The significant amendments to ESTB 2037 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(b)	-	Editorial amendment	-
1(f)	Rewritten to make intention clearer	Editorial amendment	-
2(a)		Editorial amendment	-
2(b)	Editorial amendment	-	-
2(f)	Editorial amendment	-	-
3(b)(ii)	-	Reference to "electrician" changed to "registered electrician".	-
4(b)(i)	-	Rewritten to be more accurate	Reference to "windings" changed to "load"
4(b)(ii)	Rewritten to specify only one set of colours	-	-
5(a)	-	Editorial amendment	-
6(e)	-	-	Additional option added
7(b)(ii)	Cross-reference corrected	-	-
7(c)	Rewritten to specify only one set of colours	-	-
8(b)	Editorial amendment	-	-
9(a)	-	Full answer inserted	-

Appendix 3

Electrician Regulations Examinations

27 June 2009

ER 36, a moderated paper, was used for the examination of 27 June 2009

A3.1 - Overall Candidate Performance

	Number of candidates	Number of candidates who passed	Percentage passed
ER 36	803	588	73
June 2008	**803**	**588**	**73**

ER 36

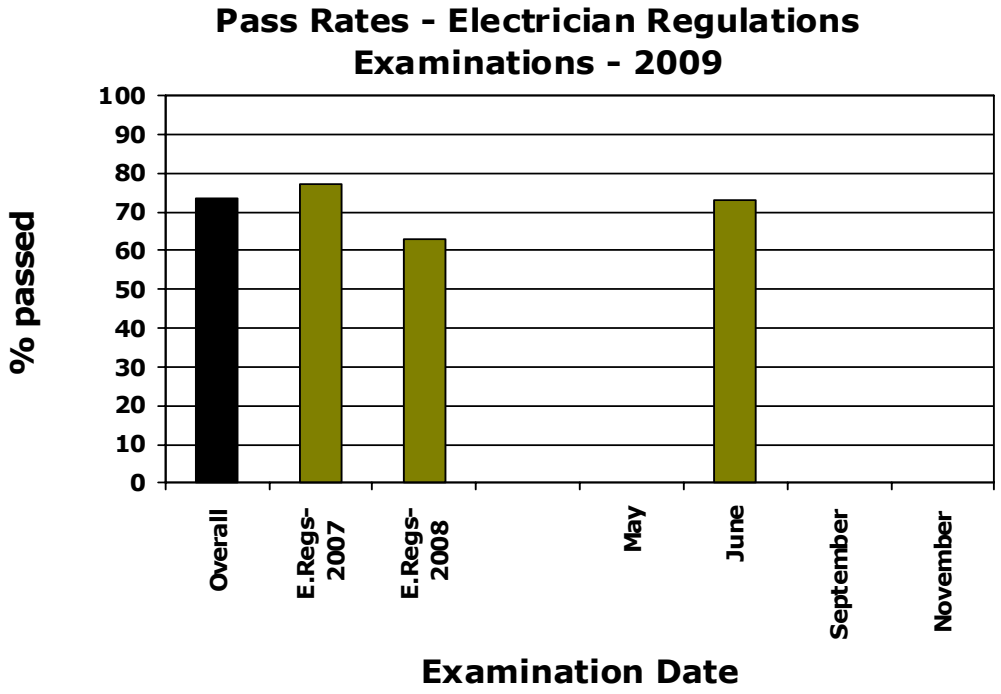
All candidates

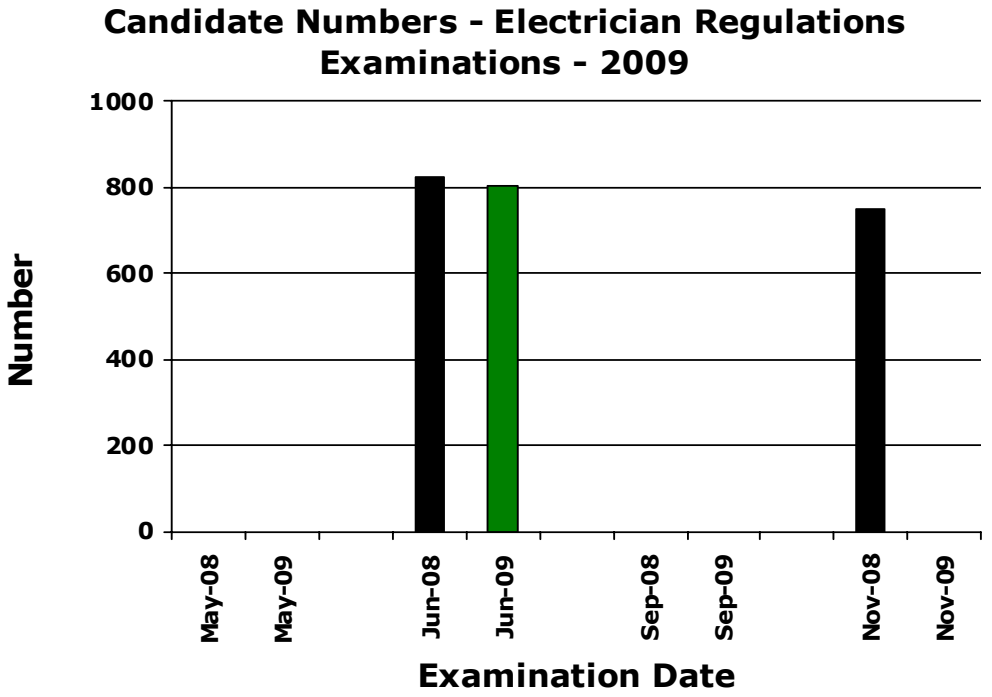
Average pass mark 64.5 %
Median mark 66

Those who passed

Average pass mark 71.5 %
Median mark 71

13 Candidates gained 90 or more marks.


Pass Rates - Electrician Regulations
Examinations - 2009
% passed
100
90
80
70
60
50
40
30
20
10
0
Overall
E.Regs-2007
E.Regs-2008
May
June
September
November
Examination Date


Candidate Numbers - Electrician Regulations
Examinations - 2009
Number
1000
800
600
400
200
0
May-08
May-09
Jun-08
Jun-09
Sep-08
Sep-09
Nov-08
Nov-09
Examination Date

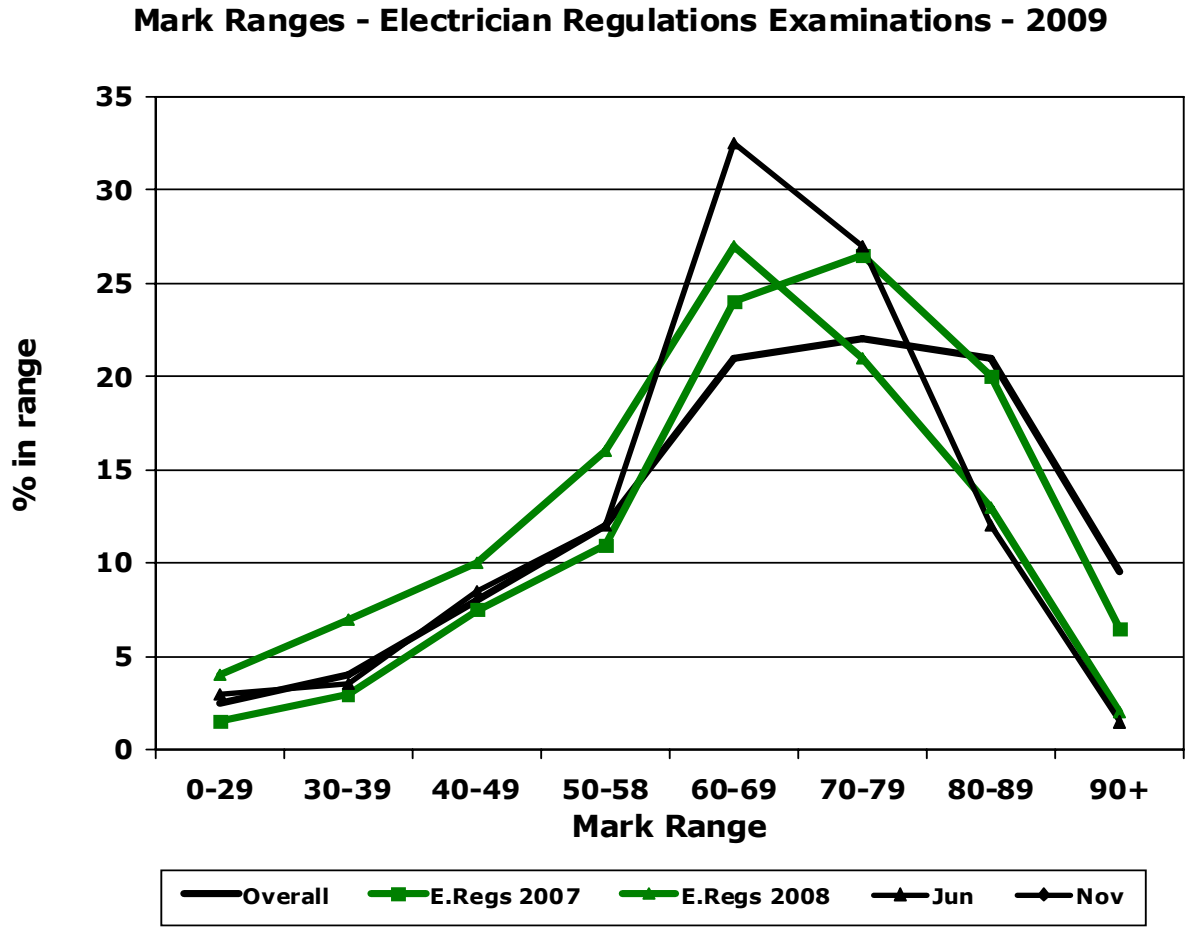
Mark Ranges

Number of candidates

Range	ER 36				**June 2009**	
90 – 100	13				**13**	**candidates**
80 – 89	96				**96**	**candidates**
70 – 79	217				**217**	**candidates**
60 – 69	262				**262**	**candidates**
50 – 58	98				**98**	**candidates**
40 – 49	67				**67**	**candidates**
30 – 39	28				**28**	**candidates**
0 – 29	22				**22**	**candidates**
	803				**803**	

% of candidates

Range	ER 36				**June 2009**	
90 – 100	1.5				**1.5**	**% of candidates**
80 – 89	12				**12**	**% of candidates**
70 – 79	27				**27**	**% of candidates**
60 – 69	32.5				**32.5**	**% of candidates**
50 – 58	12				**12**	**% of candidates**
40 – 49	8.5				**8.5**	**% of candidates**
30 – 39	3.5				**3.5**	**% of candidates**
0 – 29	3				**3**	**% of candidates**


Mark Ranges - Electrician Regulations Examinations - 2009
% in range
35
30
25
20
15
10
5
0
0-29
30-39
40-49
50-58
60-69
70-79
80-89
90+
Mark Range
Overall
E.Regs 2007
E.Regs 2008
Jun
Nov

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**				**48**	**38**	**14**
Q 2	**H1a.27**	**Protection and Control Protection characteristics**			**Protection against indirect contact – state three methods permitted in AS/NZS 3000; describe how two of the methods provide the safety outcome; how to verify the methods achieve this. Maximum disconnection time for protection.**	**34.5**	**26.5**	**39**
			Nov 2004	22	Explain- current rating, fusing factor, breaking capacity; current rating of HRC fuse, disconnection times	12	32	56
			Jun 2008	2	Characteristics of short circuit protection devices, where overload devices may be omitted, fittings suitable for overload and short circuit, fittings for automatic disconnection of supply. Fuse characteristics	61	26	13

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	**J.33**	**<u>Damp and wet areas</u>**			**En-suite bathroom – install light switch; towel rail and switch; heater and switch; and socket outlet. Determine zones, IP ratings and installation requirements.**	**7**	**22**	**71**
			Jun 2004	19	Installing, towel rail, socket outlet and switch in bathroom	42.5	43.5	14
			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

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 4	**K2.38**	**Statutory testing and inspection requirements**			**New domestic residence – why IR test required to be carried out; which parts are tested separately, test instrument used and test voltage, permitted test results. Difference between a polarity test and correct circuit connection test.**	**59.5**	**30.5**	**10**
			Jun 2004	22	3 mandatory checks and tests and 1 reason for each	85	8	7
			Jun 2005	26	PEC and IR test – AS/NZS 3000. How to carry out PEC test	54	22	24
			Jun 2006	9	Reasons for testing in low voltage installations	79	9.5	11.5
			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
			Nov 2008	6	IR testing requirements. Carrying out IR test	36.5	43.5	20

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	**H1b.28**	**<u>Protection and Control</u>** **RCD characteristics**			**How connections are made to switchboard comprising main switch, earth bar, three neutral bars, oven MCB and two banks of MCBs, each protected by an RCD.**	**61**	**15.5**	**23.5**
			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
			Nov 2007	4	Requirements for outlet in laundry, RCDs in commercial, industrial installations, installing RCDS in kitchen	56	25	19
			Nov 2008	2	Draw connections on switchboard for mains, main earth, RCDs and final subcircuits	52	12	36

	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**			**Maximum demand of 230 V domestic installation**	**42**	**32.5**	**25.5**
			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
			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
			Nov 2008	8	Maximum demand of 230 V domestic installation	27	47	26

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 7	**I.32**	**<u>Switchboards</u>**			**MEN switchboard in shopping centre – requirements for installing in storage room, restricting access to live parts; identification of switchboard. Access to switchboard.**	**73.5**	**21**	**5.5**
			Jun 2004	18	Switchboards – high rise apartment block	78	18	4
			Nov 2005	21	Switchboard in storage cupboard in commercial complex – Installation requirements, requirements for live parts, location identification, doorway dimensions	80	17	3
			Jun 2007	7	Switchboard when MEN system used, installing switchboard in cupboard, near shower and swimming pool, restricted locations	88	9	3
			Jun 2008	6	Where MEN board placed in an installation. Multi-story apartments main switchboard – location signs, where can't be located, exposed live parts. Switchboards – four areas where they are totally prohibited.	49.5	32.5	18

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	**H3a.29**	**<u>Cables and Cords</u> Selection of mains and submains**			**Determine size of three phase aluminium cable to building – load and volt drop.**	**49**	**17**	**34**
			Nov 2005	18	Cable size of 3 phase development, volt drop and load	52.5	14	33.5
			Jun 2006	3	Cable size of 3 phase farm complex, volt drop and load	26	12	62
			Nov 2008	4	Cable size of 3 phase supply to building, volt drop and load	42	19	39
Q 9	**D3.21**	**<u>System theory</u> - Earthing of installations fittings and appliances**			**Selection and installation requirements for installation earthing. Minimum size of earthing conductor. Maximum length of circuit.**	**23**	**54**	**23**
			Nov 2004	18	3 Operational results for earthing	77	1	22
			Jun 2006	6	Operational results of earthing, minimum size of earth, protection against mechanical damage, restrictions on PEC	66.5	20.5	13
			Jun 2007	8	Restrictions on PEC at distribution board, three methods of mechanical protection, how minimum size of earth determined in multi-phase installation, components of MEN system	86	8.5	5.5

A3.3 – Moderation

There were three moderators for ER 36.

This paper was moderated via a meeting held on 25 May.

A3.4 – Marking

There were seven markers for ER 36.

Teleconferences were held with the markers on 7 and 14 July.

Version 2 of the answer schedule was sent to markers on 7 July.

Version 3 of the answer schedule was sent to markers on 14 July.

Comments

A fair paper, and covered a good range from AS/NZS 3000. The answers did not require many changes during marking period. Credit should go to the moderation team for a good exam.

It is interesting to note that candidates only needed the Standard and Regulations documents. There were no questions from other standards, except the cable rating question (questions 8) where the appropriate information was supplied. There were 96 marks from AS/NZS 3000; 4 marks from the Regulations. There were no questions from the Act.

Maybe it is time for the EWRB to give consideration to re-naming the Exam. Candidates could feel aggrieved, particularly if had studied the Regulations and Electricity Act then only get asked questions totalling 4 marks.

The theory question in the second half of question 9 could have been replaced with regulation type questions from other standards.

Wording of Questions

In question 4, candidates were informed that they had wired a complete new installation. However question 4(a)(ii) led to some confusion among candidates. The answer for 4(a)(ii) focussed on equipment with MIMS elements which should be tested separately, but excludes other parts i.e mains which are still part of the installation and which would also be tested separately.

Following "normal" industry practice

Question 8 required candidates to carry out calculations for voltage drop in a 4 core aluminium neutral screen cable. This type of cable is rarely used by electricians. Questions involving equipment used by electricians in regulations papers should relate to equipment in general use by the industry.

A3.5 – Amendments to ER 36

The significant amendments to ER 36 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(a)	-	Additional option from AS/NZS 3000:2007 added	-
1(b)	-	References corrected	-
1(e)	-	-	Third bullet point removed from answer to AS/NZS 3000:200 solution as being irrelevant to question
1(f)	-	Reference corrected	Two additional options added
1(h)	-	-	Additional option added
1(i)	Rewritten to make intention clearer	-	-
2	Replaced with a more topical question relating to the general experience of electricians	Amended accordingly	-
2(a)	-	-	Reference corrected
2(b)	-	-	Reference to an RCD included in answer
2(c)	-	-	Reference to an RCD included in answer Two additional options added to the double insulation solution
3	Rewritten to make intention clearer	Amended accordingly	-
3(d)(i)		-	Additional option added
5	Preamble rewritten to make intention clearer	-	-
5(a)	Rewritten to make intention clearer. Marks increased from 3 to 4.	Amended accordingly	-
5(b)	-	Amended to better align with question	-
5(b)(iv)	-	-	Additional option added
5(c)	-	Amended to better align with question	-
5(d)	Deleted. mark allocated to part (a)	Amended accordingly	-

The significant amendments to ER 36 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
6	Rewritten to make intention clearer. Amended to provide for lighting demand to be assessed on a points or connected load basis.	Additional solution added	Note added to provide for a different solution due to interpretation of the question
7	Diagram deleted. Question amended to remove reference to diagram.	Amended accordingly	-
7(a)	-	-	AS/NZS 3000:2007 answer amended to align with the Standard
7(b)	-	-	Additional option added
7(f)	Replaced with more topical question	Amended accordingly	-
8	Rewritten to make intention clearer	Amended accordingly	-
8(b)	-	-	Alternative solution added
9(b)	Rewritten to make intention clearer	Amended accordingly	Additional option added

Appendix 4

Electrician Theory Examinations

14 and 15 November 2008

ET 30, a moderated paper, was used for the examination of 20 June 2009.

A4.1 - Overall Candidate Performance

	Number of candidates	Number of candidates who passed	Percentage passed
ET 30	695	422	61
June 2009	**695**	**422***	**61**

* This figure includes the results of the remarking. 19 additional candidates passed.

ET 30

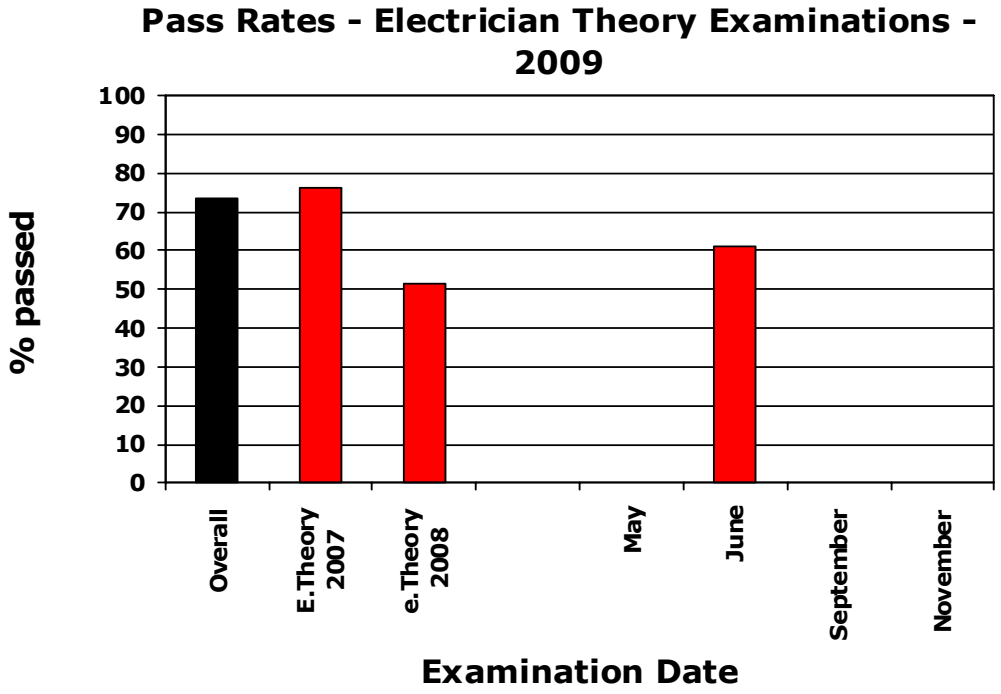
All candidates

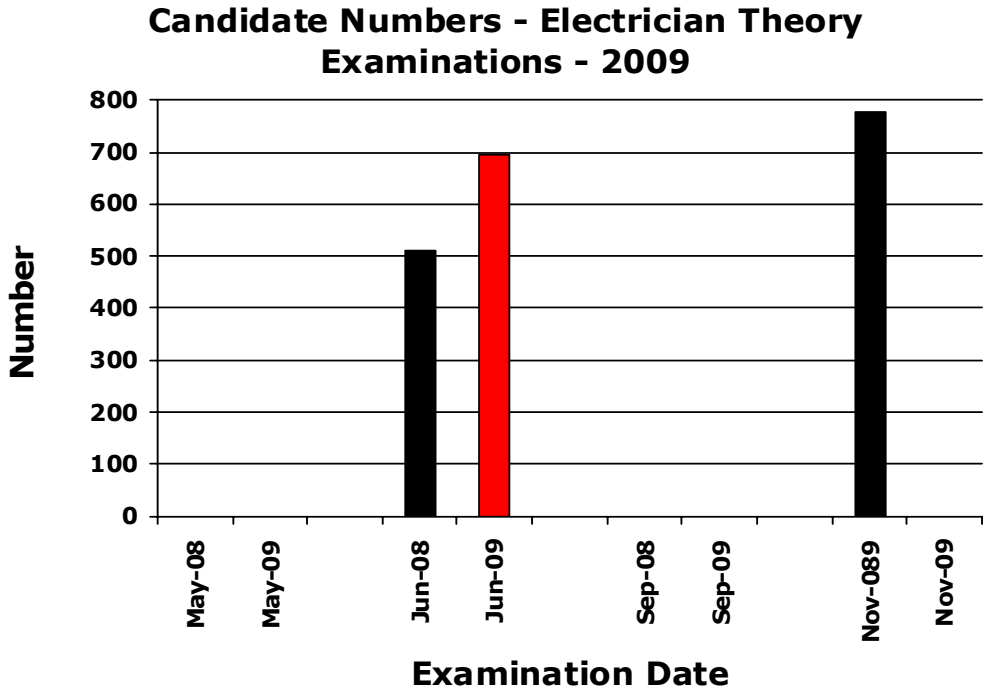
Average pass mark 60.5 %
Median mark 62

Those who passed

Average pass mark 70.5 %
Median mark 69

2 Candidates gained 95 marks


Pass Rates - Electrician Theory Examinations - 2009
% passed
100
90
80
70
60
50
40
30
20
10
0
Overall
E.Theory 2007
e.Theory 2008
May
June
September
November
Examination Date


Candidate Numbers - Electrician Theory Examinations - 2009
Number
800
700
600
500
400
300
200
100
0
May-08
May-09
Jun-08
Jun-09
Sep-08
Sep-09
Nov-089
Nov-09
Examination Date

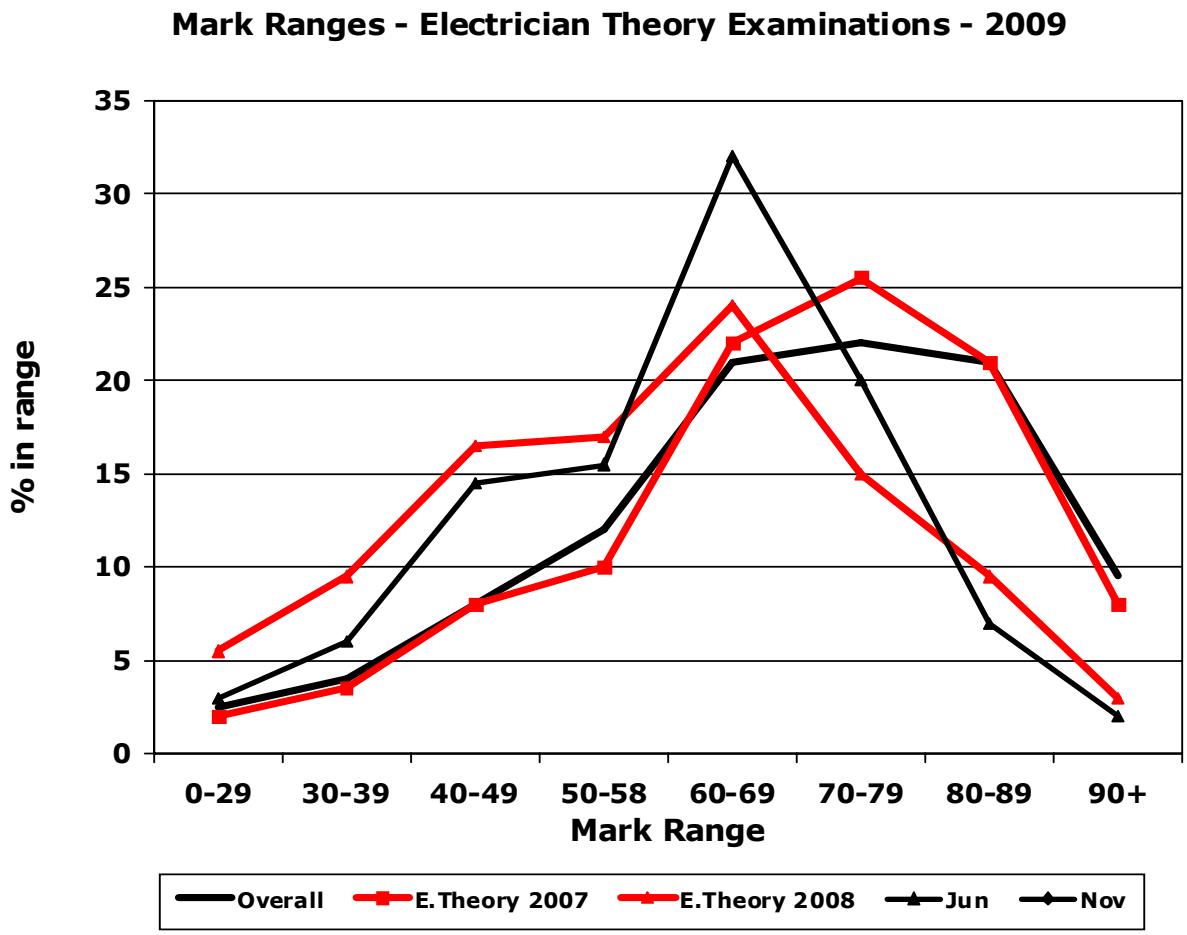
Mark Ranges

Number of candidates

Range	ET 3028			**Jun 2009**	
90 – 100	15			**15**	**candidates**
80 – 89	50			**50**	**candidates**
70 – 79	137			**137**	**candidates**
60 – 69	220			**220**	**candidates**
50 – 58	108			**108**	**candidates**
40 – 49	101			**101**	**candidates**
30 – 39	41			**41**	**candidates**
0 – 29	23			**23**	**candidates**
	695			**695**	

% of candidates

Range	ET 3028			**Jun 2009**	
90 – 100	2			**2**	**% of candidates**
80 – 89	7			**7**	**% of candidates**
70 – 79	20			**20**	**% of candidates**
60 – 69	32			**32**	**% of candidates**
50 – 58	15.5			**15.5**	**% of candidates**
40 – 49	14.5			**14.5**	**% of candidates**
30 – 39	6			**6**	**% of candidates**
0 – 29	3			**3**	**% of candidates**


Mark Ranges - Electrician Theory Examinations - 2009
% in range
35
30
25
20
15
10
5
0
0-29
30-39
40-49
50-58
60-69
70-79
80-89
90+
Mark Range
Overall
E.Theory 2007
E.Theory 2008
Jun
Nov

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**				**25**	**50**	**25**
Q 2	**K4.46**	**Testing and inspection methods**			**Rewired installation – isolate to carry out IR test; describe how IR test carried out; testing to certify IR test result of 0.2MΩ.**	**19**	**31**	**50**
			Jun 2005	2	Insulation test and circuit continuity check of 3 phase and 3 other checks.	39	49	12
			Jun 2006	7	Rewired residence, make safe to carry out IR test, IR testing, instrument and test voltage	23.5	50	26.5
			Nov 2006	9	Three phase motor disconnected – describe IR test, circuit continuity test, other checks before returning to service	56.5	34.5	9

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	**H1a.27**	**<u>Protection and Control</u> Protection characteristics**			**From graph - determine fuse rating; example of inverse-time. Fusing current of fuses. Define discrimination. Back-up protection.**	**62**	**27**	**11**
			Jun 2006	2	Light circuit – protection of MCB and RCD, protection of HRC, discrimination	61	30	9
			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
			Nov 2007	2	Describe how discrimination occurs, define markings on fuse, back-up protection, inverse time characteristics	51	31	18
			Jun 2008	4	Describe characteristics of graph, fusing factor of fuse, describe discrimination, why back-up protection installed in motor circuit, meaning of current rating	61.5	27	11.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 4	**C2.11**	**a.c. – Measurements V, A, P, pf**			**Three-phase installation with different resistive loads – determine neutral current. Why balancing loads important**	**47**	**9.5**	**43.5**
			Nov 2008	4	Three-phase installation – calculate line current in each phase, total power of installation. Determine neutral current by vectors. Balancing loads	39	10	51
Q 5	**D4.22**	**System theory - MEN systems**			**Installation – why neutral and earth are carrying the same current, why main earth effective. Features that distinguish MEN switchboard from distribution switchboard. Factors that limit PSSC. Where neutral is earthed in MEN system**	**33**	**49.5**	**17.5**

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	**G2.24**	**<u>Transformers</u> Operating principles**			**Three- phase transformer – calculate full load secondary line current and kVA rating. Calculate fault level and PSSC current.**	**8**	**25**	**67**
			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
			Nov 2007	8	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 2008	8	Three phase transformer supply to commercial site. Calculate kVA of heaviest laded phase, minimum size of transformer. Calculate line current in 11kV system	10.5	15	74.5
			Nov 2008	9	Three- phase transformer – calculate secondary phase and line voltages, full load current and secondary line current. Calculate percentage regulation.	49.5	21	29.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 7	**E2.16**	**<u>3ph-Motor/Alternators</u> Selection, starting, protection**			**Wire remote emergency stop and remote start/ stop into existing control circuit. Draw forward and reverse power circuit for motor for garage door**	**25**	**20**	**55**
			Jun 2004	6	Connect remote stop/start station; 3 phase motor – calculate input power, kVA, kVAr, phase angle, line current	37	25	38
			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

	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**			**Describe when danger and out-of-service tags used. Precautions when attaching danger tag. Difference between switching off and isolating. Prove test prove method.**	**74.5**	**20**	**5.5**
			Jun 2005	7	4 safety precautions when disconnecting appliance, isolation and switching off, continued isolation	49	41	10
			Nov 2007	9	Danger and Out-of-Service tags, precautions when attaching tag to switch, how prove-test-prove is carried out	51	34	15
			Jun 2008	6	Precautions after isolating motor. Difference between isolating and switching off. Methods for continued isolation. Why prove-test-prove method used.	64	29	7

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	**H1a.27**	**<u>Protection and Control</u>** **Protection characteristics**			**Why rewireable fuses are replaced when fault level is 1.2kA. Functions of MCBs. Earthing of MEN system**	**66**	**27**	**7**

A4.3 - Moderation

There were three moderators for ET 30.

This paper was moderated via a moderation meeting on 26 May

A4.4 - Marking

There were six markers for ET 30.

Teleconferences were held with the markers on 29 June and 6 July.

Version 2 of the answer schedule was sent to markers on 30 June.

Comment

This was a well constructed examination that set a good standard. As has been the case over recent years, it clearly split the competent candidates from those who struggle.

Many candidates struggled to answer questions correctly. There were also issues relating to candidates seeming not to understand what the question and the ability to express an understandable answer.

It was often hard to see if the candidate had any idea of what was being tested. Ignoring poor spelling, handwriting and sentence construction, candidates often provided no useful information such as "isolation is when the pump is isolated". Answers were often far too brief and cryptic. For example, in question 8(d) in answer to "what tests would you make" many replied the one word "voltage".

A4.5 - Amendments to ET 30

The significant amendments to ET 30 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(a)	Preamble rewritten to make intention clearer	-	-
1(a)(ii)	-	-	Additional option added
1(b)	Amended to better align with answer	-	-
1(c)(i)	-	Additional option added	Additional option added to (ii)
1(d)	Replaced with more topical question relating to insulation resistance testing	Amended accordingly	-
1(e)	Replaced with more topical question relating to power factor	Amended accordingly	-
1(f)	Replaced with more topical question PSSC	Amended accordingly	-
1(g)	Rewritten to make intention clearer	Amended accordingly	(ii) amended to refer to remote earth
1(h)	Replaced with more topical question. Original duplicated in question 4	Amended accordingly	-
1(j)	Replaced with more topical question relating to insulation resistance testing	Amended accordingly	-
2	Rewritten to make intention clearer. Expanded into 4 parts	Amended accordingly	-
3(a)(i)	Rewritten to require a reason to be given	-	-
3(a)(ii)	-	Example corrected	-
3(b)(ii)	-	Answer corrected	-
3(c)	Rewritten to make intention clearer	-	-
4(a)	Parts (i) and (ii) collapsed into one question	Amended accordingly	-
4(b)	Rewritten to make intention clearer	-	-

The significant amendments to <u>ET 30</u> arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
5(a)(i)	Rewritten to make intention clearer. Reduced from 3 to 2 marks	Amended accordingly	Amended to better reflect the question asked
5(a)(ii)	Rewritten to make intention clearer. Reduced from 2 to 1 mark	Amended accordingly	Amended to better reflect the question asked
5(b)	Amended to require 3 features. Marks increased from 2 to 3.	Amended accordingly	-
5(c)	Deleted. (d) becomes (c)	Amended accordingly	Additional option added
5(d)	New question to replace original (c)	Amended accordingly	Amended to provide more specific answers
6	Preamble rewritten to make intention clearer	-	-
6(a)	-	Amended to align with new preamble	-
6(b)	-	Amended to align with new preamble	-
6(c)(i)	Rewritten to make intention clearer	-	-
6(c)(ii)	-	-	Answer corrected
7(a)	Rewritten to make intention clearer. Drawing replaced with one that relates to answer	Amended accordingly	-
7(b)	Replaced with more topical question relating to a forward and reverse starter for a single phase motor	Amended accordingly	Marks reallocated. Additional option added
8(b)	-	-	Editorial amendment
9	Rewritten to make intention clearer	Amended accordingly0	-
9(a)	-	-	Amended to group answers relating to rewireable fuses together and those relating to MCBs together.

Appendix 5

Electrical Inspector Examinations

20 and 30 June 2009

IT 17, a moderated paper, was used for the examination of 20 June 2009.
IT 18, a composite paper, was used for the examination of 30 June 2009.

A5.1 - Overall Candidate Performance

	Number of candidates	Number of candidates who passed	Percentage passed
IT 17	56	33	59
IT 18	1	0	0
June 2009	**57**	**33**	**58**

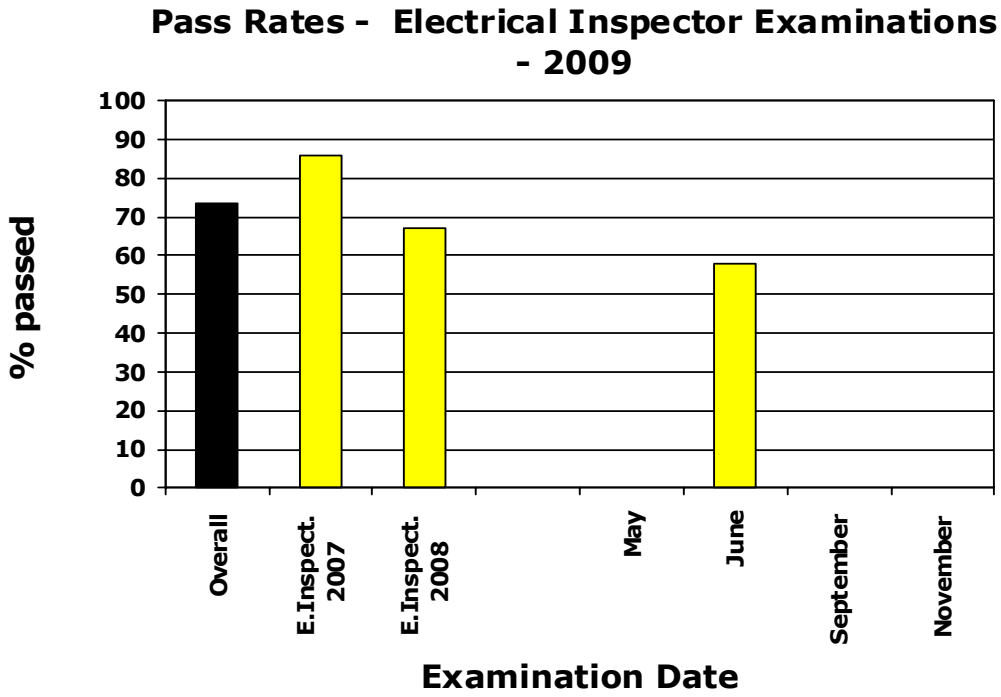
IT 17

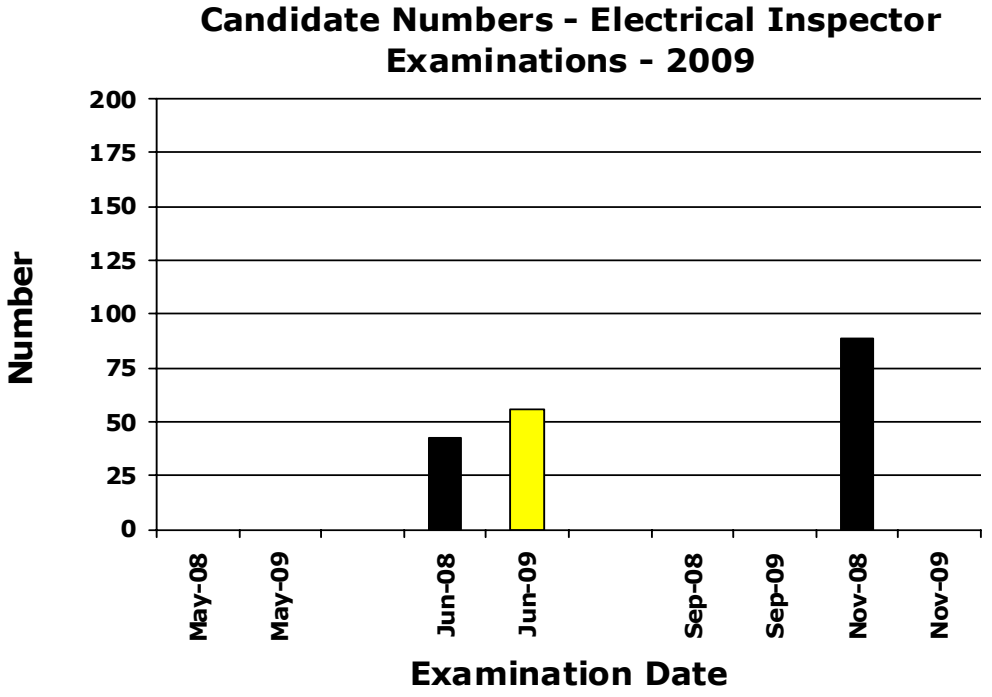
All candidates

Average pass mark 59 %
Median mark 61.5

Those who passed

Average pass mark 67.5 %
Median mark 67


Pass Rates - Electrical Inspector Examinations - 2009
% passed
100
90
80
70
60
50
40
30
20
10
0
Overall
E.Inspect. 2007
E.Inspect. 2008
May
June
September
November
Examination Date


Candidate Numbers - Electrical Inspector Examinations - 2009
Number
200
175
150
125
100
75
50
25
0
May-08
May-09
Jun-08
Jun-09
Sep-08
Sep-09
Nov-08
Nov-09
Examination Date

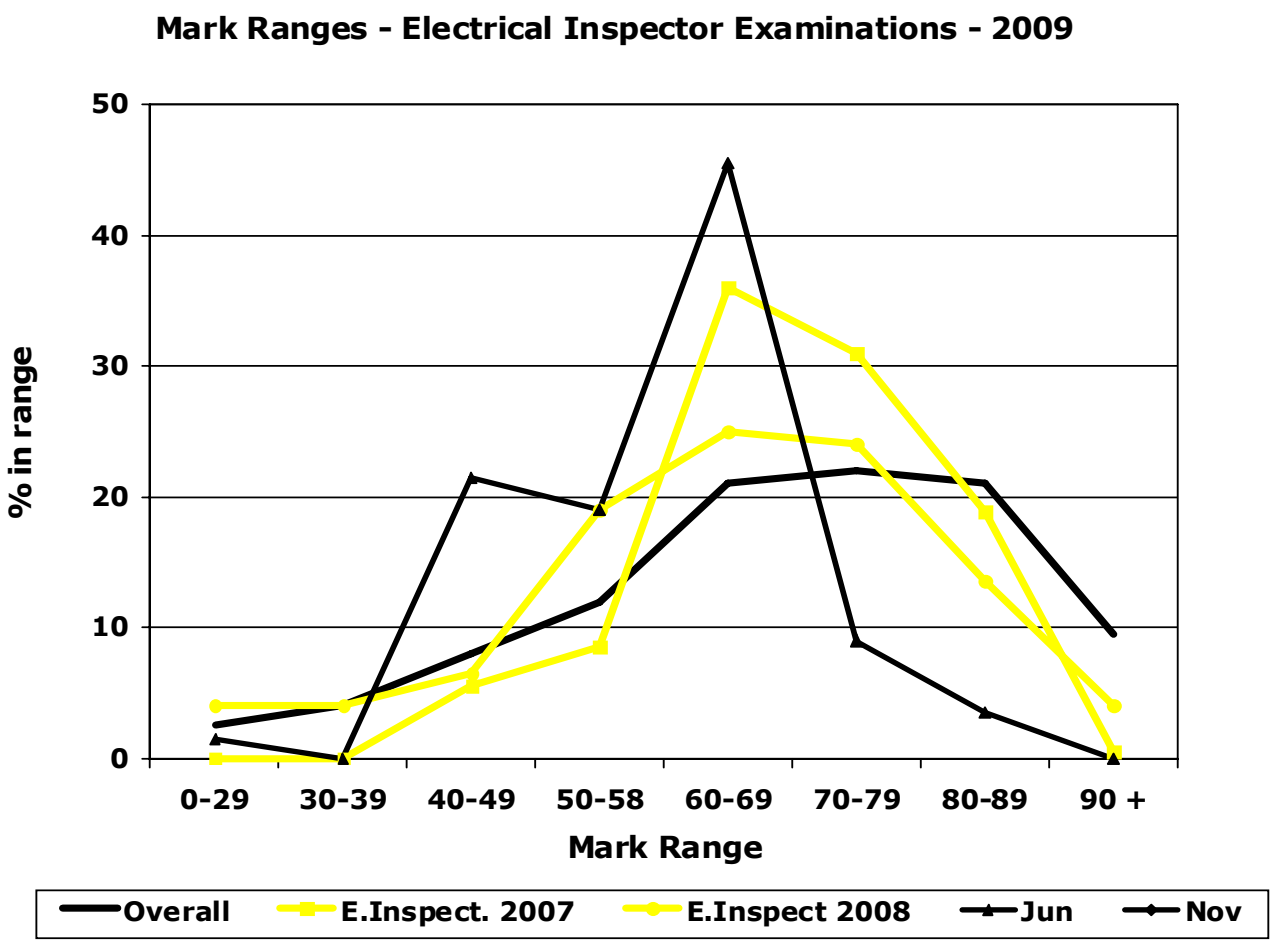
Mark Ranges

Number of candidates

Range	IT 17	IT 18		**June 2009**	
90 – 100	0	0		**0**	**candidates**
80 – 89	2	0		**2**	**candidates**
70 – 79	5	0		**5**	**candidates**
60 – 69	26	0		**26**	**candidates**
50 – 58	10	1		**11**	**candidates**
40 – 49	12	0		**12**	**candidates**
30 – 39	0	0		**0**	**candidates**
0 – 29	1	0		**1**	**candidates**
	56	**1**		**57**	

% of candidates

Range	IT 17	IT 18		**June 2009**	
90 – 100	0	0		**0**	**% of candidates**
80 – 89	3.5	0		**3.5**	**% of candidates**
70 – 79	9	0		**9**	**% of candidates**
60 – 69	46.5	0		**45.5**	**% of candidates**
50 – 58	18	100		**19**	**% of candidates**
40 – 49	21.5	0		**21.5**	**% of candidates**
30 – 39	0	0		**0**	**% of candidates**
0 – 29	1.5	0		**1.5**	**% of candidates**


Mark Ranges - Electrical Inspector Examinations - 2009
50
40
30
20
10
0
% in range
0-29
30-39
40-49
50-58
60-69
70-79
80-89
90 +
Mark Range
Overall
E.Inspect. 2007
E.Inspect 2008
Jun
Nov

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	**-**	**20, 1 mark questions**				**50**	**39**	**11**
Q 2	**H1a.27**	**Protection and Control Protection characteristics**			**Fault current on fuse. Replacing HRC fuse with old markings. marking of fuses and MCBs**	**34**	**39**	**27**
			Jun 2008	4	Mains protected by 125A HRC fuses – why it does not comply with Standard, hazard if livened, solution to make it comply. Motor protection	16.5	36	47.5
			Nov 2008	9	Two terms relating to current rating. Characteristics of short circuit devices. Maximum touch voltage. Final subcircuits and disconnection times	46	27	27

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 3	**H3a.29**	**<u>Cables and Cords</u> Selection of mains and submains**			**Determine heaviest loaded phase on residential development using maximum demand tables**	**0**	**41**	**59**
			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
			Nov 2007	9	Maximum demand of low rise residential development comprising living units and communal areas	3	17	80
			Jun 2008	8	Calculate maximum demand of low rise development, determine size of cable based on maximum demand	21.5	7.5	71
			Nov 2008	8	Determine transformer size for shop complex based on calculating kVA	32.5	12.5	55

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 4	**H1b.28**	**<u>Protection and Control</u> RCD characteristics**			**Draw circuit diagram of three-phase RCD that protects a 5-pin socket outlet. Requirements for testing three-phase RCDS**	**23**	**29**	**48**
			Nov 2005	8	Characteristics of HRC characteristic curves, operation of RCD, PSSC of transformer	46	26	28
			Nov 2006	5	RCDs installed in a motel, Type A RCDs.	57	32	11
			Nov 2008	4	Four situations where RCD protection not required. Identifying Type A RCDs. Describe operation of RCD when earth fault occurs	47	42	11

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 5	**D4.22**	**<u>System theory</u> - MEN systems**			**Diagram MEN system – why neutral and earth share equally share load current; why earth is effective. Explain circumstances of why earth would carry 10A and neutral 30A. Why neutral is earthed at transformer star-point**	**12.5**	**32**	**55.5**
			Nov 2005		Hazards if mains transposition occurs, name and describe aspects of polarity diagram.	59	15	26
			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
			Nov 2007	8	Hazards of open-circuited N/S cable feeding duplex unit, metal that must be earthed, draw fault paths	40	49	11
			Jun 2008	7	Hazards of open-circuited neutral. Use for information from EFLI tests, Minimum size earth, PSSC calculation. Power factor correction	50	24	26
			Nov 2008	2	Describe the circuit tested by an earth fault loop impedance tester. Why installation requires larger earthing lead. Why path through main neutral more important. Main switch requirements with two points of supply	50.5	28	21.5

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 6	**H5e.37**	**<u>Caravan parks caravans</u>**			**Requirements for permanently connected lead to caravan. Why socket outlets and leads have to comply with standard. Why RCD must open phase and neutral, MCB ratings**	**22**	**39**	**39**
			Nov 2005	9	Connectable installation requirements, requirements of AS/NZS 3014	26.5	41	32.5
			Nov 2007	6	Supply of electricity to connectable installations, methods of connecting, socket outlets and protection devices for pleasure crafts	42	49.5	8.5
			Jun 2008	6	Requirements for permanently connected lead to caravan. Supply arrangement and supply to caravans	45	24	31
Q 7	**H3a.29**	**<u>Cables and Cords</u> Selection of mains and submains**			**Cable size of three-phase mains to house on lifestyle block - volt drop and load**	**62.5**	**21.5**	**16**
			Jun 2008	8	Calculate maximum demand of low rise development, determine size of cable based on maximum demand	21.5	7.5	71

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 8	**H10.66**	**<u>Fault diagnosis</u>**			**Hazards of phase and neutral transposition on three-phase system. Describe test method, expected readings.**	**80.5**	**14**	**5.5**
			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
			Nov 2007	5	Hazards of phase and neutral transposition, describe test method, expected reading, shocks off washing machine – likely causes	81.5	16.5	2

	Topic No.	Topic	Year	Q.No.	Subject	75-100% (%)	50 – 70% (%)	0 – 45% (%)
Q 9	**D4.22**	**System theory - MEN systems**			**New industrial main switchboard – calculate short circuit fault MVA at transformer and PSSC at switchboard. Hazards of open-circuited neutral**	**9**	**68**	**23**
			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
			Nov 2007	2	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
			Jun 2008	7	Hazards of open-circuited neutral. Use for information from EFLI tests, Minimum size earth, PSSC calculation. Power factor correction	50	24	26
			Nov 2008	2	Describe the circuit tested by an earth fault loop impedance tester. Why installation requires larger earthing lead. Why path through main neutral more important. Main switch requirements with two points of supply	50.5	28	21.5

A5.3 - Moderation

There were three moderators for IT 17.

This paper was moderated via a meeting held on 25 May.

A5.4 - Marking

There were twp markers for IT 17.

Teleconferences were held with the markers on 29 June and 7 July.

Version 2 of the answer schedule was sent to markers on 29 June.

Comment

The examination content was fair to all candidates. Those who fared poorly struggled with question 3, 4 and 5. The paper contained a wide range of complexity to test the candidates understanding of testing (transpositions), maximum demand, protection, caravan park requirements, voltage drop, compliance responsibility, and MEN theory.

There were few changes to the answer schedule during the marking period. Credit should go to the moderation team for a good examination.

The standard of accuracy in writing the answers was generally poor, while there was a mixed response to calculation questions. The volt drop question was generally well answered, but the maximum demand question was generally poorly answered.

A5.5 - Amendments to IT 17

The significant amendments to IT 17 arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
1(a)	-	2nd bullet point amended to be more accurate	-
1(e)	Rewritten to make intention clearer	References added	-
1(f)	Rewritten to make intention clearer	-	-
1(j)	-	Editorial amendment	-
1(k)	Replaced with question more suited to electrical inspector candidates	Amended accordingly	-
1(o)	Rewritten to make intention clearer	Amended accordingly	-
1(q)	Editorial amendment	-	-
1(r)(i)	-	Additional option added	-
1(t)	-	-	Additional option added
2(a)(i)	-	Amended to be more accurate	-
2(a)(ii)	Amended to require one reason. marks reduced from 2 to 1	Amended accordingly	-
2(b)	Marks increased from 4 to 5	Amended to be more accurate	-
3	Explanation added relating to lighting tracks Oven and hob changed to electric range	Amended accordingly	Calculation (but not answer) corrected
4(b)	Replaced with question relating to testing three-phase RCDs	Amended accordingly	-
5(a)	Preamble rewritten to make intention clearer	-	-
5(a)(i)	-	-	Amended to be more accurate
5(a)(ii)	Rewritten to make intention clearer	Amended accordingly	Amended to be more accurate
5(b)	Rewritten to make intention clearer	Amended accordingly	-
5(c)	-	Amended to be more accurate	-

The significant amendments to <u>IT 17</u> arising from the moderation and marking were as follows:			
No.	**Question (Moderation)**	**Answer (Moderation)**	**Answer (Marking)**
6(a)(i)	Rewritten to make intention clearer	-	-
6(a)(ii)	Replaced with question relating compliance with standard	Amended accordingly	-
6(b)	Replaced with question relating to RCDs in connectable installations	Amended accordingly	-
6(c)	Replaced with question relating to MCBs protecting connectable installations	Amended accordingly	-
7	Preamble rewritten to make intention clearer	-	-
7(a)	-	Calculation corrected	-
7(d)	-	Answer corrected	-
8	Preamble removed from (a), so it applies to entire question	-	-
8(a)	-	Last 3 bullet points replaced with a generic answer	Last bullet point amended to be more accurate
8(b)	Rewritten to make intention clearer Note added relating to the tests results must relate to test method used	Amended accordingly	Amended to be more accurate
9(a)	Rewritten to make intention clearer	-	-
9(a)(i)	-	Answer corrected	-