CARIBBEAN EXAMINATIONS COUNCIL

REPORT ON CANDIDATES' WORK IN THE CARIBBEAN ADVANCED PROFICIENCY EXAMINATION

MAY/JUNE 2009

ELECTRICAL AND ELECTRONIC TECHNOLOGY

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GENERAL COMMENTS

One hundred and seventeen candidates registered for Unit 1 and ninety-two candidates registered for the Unit 2 examination.

As in previous years, the performance was somewhat poor. There is need for investigation to determine the causes for poor performance in this subject area.

DETAILED COMMENTS

UNIT 1

Paper 01

Short Answers

Candidates were required to do all questions from this paper accounting for 90 marks. One hundred and seven candidates completed this paper. The range of the marks scored by candidates was 14 to 69. Three candidates (12.8 per cent) scored in the 60 – 69 range, three (2.8 per cent) scored in the 50 – 59 range, fourteen (13.08 per cent) scored in the 40 – 49 range, twenty-four (22.43 per cent) scored in the 30 – 39 range, thirty-five (32.71 per cent) scored in the 20 – 29 range. The remaining twenty-seven (25.23 per cent) candidates scored below 20 marks.

Module 1

DC Circuit Theory (Questions 1 – 5)

Candidates were required to use fundamental laws and simple theory to solve simple DC circuits. From a possible 30 marks, the highest score was 29 and the lowest score was two. Approximately fifty-four (50 per cent) candidates scored 50 per cent or above in Module I. Twenty-three candidates (21.5 per cent) scored in the 20 – 30 range, thirty (28.04 per cent) scored in the 15 – 19 range, thirty-six (33.64 per cent) scored in the 10 – 14 range and the remaining eighteen candidates (16.82 per cent) scored below 10 points.

Question 1

Twenty-two candidates (20.56 per cent) were able to provide perfect responses (5 - 6 marks), whereas thirty-seven candidates (35.58 per cent) scored in the 3 – 4 range, and the remaining forty-eight (44.86 per cent) scored between zero and two marks, of which fourteen scored zero from a possible six marks. Many candidates experienced difficulties explaining the term ‘temperature coefficient’ and giving its symbol.

Question 2

Twenty-five candidates (23.36 per cent) provided a perfect response (5-6 marks), whereas 15 (14.02 per cent) scored in the 3 – 4 range. The remaining sixty-eight (63.55 per cent) scored between zero and two marks, from which 15 scored zero from a possible six marks. Most candidates did not know how to calculate the voltage across a capacitor after a given time.

Question 3

This was a relatively good question for candidates. Nineteen candidates (17.76 per cent) provided perfect responses (5 – 6 marks), whereas fifty (46.73 per cent) scored in the 3 – 4 range. The remaining thirty-eight (35.51 per cent) scored between zero and two marks, of which six scored zero from a possible six marks. Most candidates knew how to answer this problem but experienced difficulties with mathematics.

Question 4

This was a relatively good question for candidates. Thirty-four candidates (32.38 per cent) were able to provide perfect responses (5 – 6 marks), forty-four candidates (41.90 per cent) scored in the 3 – 4 range, whereas the remaining twenty-seven (25.71 per cent) scored between 0 and 2 marks, of which eight scored zero from a possible six marks. Many candidates were unable to determine the energy stored in the capacitor.

Question 5

Twenty-one candidates (19.63 per cent) provided perfect responses (5 – 6 marks), whereas forty (37.38 per cent) scored in the 3 – 4 range. The remaining forty-six (42.99 per cent) scored between zero and two marks, of which eighteen scored zero from a possible six marks. Several candidates were not able to calculate mutual inductance.

Module 2

Analogue Electronics and Communications (Questions 6 – 10)

Basic analogue and electronics and communications concepts were covered in this module**.** This module proved to be somewhat challenging as most candidates either did not respond to the questions or scored zero. The highest score was 22 and nine candidates (8.41 per cent) scored zero from a possible 30 points. One candidate (0.93 per cent) scored in the 20 – 30 range, five scored (4.68 per cent) in the 15 – 19 range, eight (7.48 per cent) scored in the 10 – 14 range and the remaining ninety-three (86.92 per cent) scored below 10 points.

Question 6

Twenty-one candidates provided perfect responses (5 – 6 marks), whereas thirty-three candidates (30.84 per cent) scored in the 3 – 4 range. The remaining fifty-three (49.53 per cent) scored between zero and two marks from a possible six marks with eighteen (16.82 per cent) scoring zero. Some candidates were unable to differentiate between function and application of LEDs, also, many candidates were unable to calculate the volt drop across the limiting resistor when given the voltage across the LED.

Question 7

This question proved difficult for most candidates. Two (1.87 per cent) scored in the 3 – 4 range and seven (6.54 per cent) scored in the 1 – 2 range. The remaining ninety-nine (92.52 per cent) either scored zero or did not respond to the question. The term 'static characteristics' was unknown to the candidates. Perhaps input or output characteristics would be better understood by the candidates.

Question 8

This question proved difficult for most candidates. Three (2.80 per cent) provided perfect responses (5 – 6 marks), whereas twenty (18.69 per cent) scored in the 3 – 4 range and seven (6.54 per cent) scored in the 1 – 2 range. The remaining seventy-seven (71.96 per cent) either scored zero or did not respond to the question. Most candidates seemed to be unfamiliar with the terms 'amplitude' and 'frequency modulation', neither did they know that 'depth of modulation' is expressed as a percentage.

Question 9

This question proved difficult for most candidates. Three candidates (2.8 per cent) provided perfect responses (5 – 6 marks), whereas fourteen candidates (13.08 per cent) scored in the 3 – 4 range and forty-eight (44.86 per cent) scored in the 1 – 2 range. The remaining forty-two (39.25 per cent) scored zero or did not respond to the question. Most of the candidates who attempted this question were able to explain what is a "ground wave" and to identify factors on which the range of the wave depends, however, they were unable to write the frequency band for the various carrier waves.

Question 10

This question also proved extremely difficult for most candidates. One candidate (0.93 per cent) provided a perfect response (5 – 6 marks), nine (8.41 per cent) scored in the 3 – 4 range and twenty (18.69 per cent) scored in the 1 – 2 range. The remaining seventy-seven (71.96 per cent) either scored zero or did not respond to the question. A few candidates were able to state what an "oscillator" is. They were unable to identify factors that caused a change in operating frequency of oscillators.

Module 3

Introduction to Electrical Power Systems (Questions 11 – 15)

This was the most challenging of the three modules. The highest score was 21 and four candidates scored zero from a possible 30 points. Of the one hundred and seven candidates, one (0.93 per cent) scored in the 20 – 30 range, nine (8.41 per cent) scored in the 15 – 19 range, twenty-eight (26.17 per cent) scored in the 10 – 14 range, fifty-two (48.60 per cent) scored in the 5 – 9 range, thirteen (12.15 per cent) scored in the 1 – 4 range and the remaining four (3.74 per cent) scored zero. These statistics suggest that the candidates were ill prepared for this module.

Question 11

Only one candidate (0.93 per cent) provided a perfect response (5 – 6 marks), whereas thirty-two candidates (29.91 per cent) scored in the 3 – 4 range and fifty-two candidates (48.60 per cent) scored in the 1 – 2 range. Many candidates could not explain the term 'relative permeability' but were able to state differences between a permanent magnet and an electromagnet.

Question 12

This question proved relatively difficult for most candidates. None provided perfect responses, three (2.80 per cent) scored in the 3 – 4 range, seventy-three (68.22 per cent) scored in the 1 – 2 range and the remaining thirty-one (28.97 per cent) either scored zero or did not respond to the question. Most candidates were able to state a difference between a 'd.c. generator' and a 'd.c. motor' but were not familiar with the use of the commutator and the losses associated with it.

Question 13

This question was quite challenging for many candidates. Only one provided a perfect response (5 – 6 marks), whereas twenty-two (20.56 per cent) scored in the 3 – 4 range and thirty-six (33.64 per cent) scored in the 1 – 2 range. The remaining forty-eight (44.86 per cent) either scored zero or did not respond to the question. Many candidates were unable to draw a circuit to demonstrate Lenz's Law but were able to calculate the flux density with the parameters given.

Question 14

Fifteen candidates (14.02 per cent) provided perfect responses (5 – 6 marks), whereas seventeen (15.89 per cent) scored in the 3 – 4 range and forty-one (38.32 per cent) scored in the 1 – 2 range and the remaining thirty-four (31.78 per cent) either scored zero or did not respond to the question. Most candidates mis-interpreted Part (a) of the question but were able to explain the term 'half duplex communication'.

Question 15

Seven candidates (6.54 per cent) provided perfect responses (5 – 6 marks), whereas forty-five candidates (42.06 per cent) scored in the 3 – 4 range and forty-one (38.32 per cent) scored in the 1 - 2 range. The remaining fourteen (13.08 per cent) candidates either scored zero or did not respond to the question. The concept of overload and fault current were well known; however, candidates were unable to explain the operation of the thermally actuated circuit breaker.

UNIT 1

Paper 02

Long Answers

One hundred and seven candidates wrote this paper. They were required to do six questions from this paper which accounts for 150 marks. Questions 1, 4 and 7 are compulsory and value 30 marks each. Candidates were required to select one of the remaining two questions in each module for a value of 20 marks each. Most candidates attempted the required two questions from each module.

The range of marks obtained was from a low of five and one hundred and nine. Only four candidates (3.74 per cent) scored 100 or above. Three candidates (2.80 per cent) scored in the 80 – 99 range, fourteen (13.08 per cent) scored in the 60 – 79 range, thirty-seven (34.58 per cent) scored in the 40 – 50 range, thirty-seven (34.58 per cent) scored in the 20 – 39 range, twelve (11.21 per cent) scored in the 1 – 19 range.

Module 1

DC Circuit Theory (Questions 1 – 3)

Candidates were required to do Question 1 and one other from this section. From a possible score of 50 from this module, the highest score was 45. Four (3.75 per cent) candidates scored in the 40 – 50 range, eighteen (16.82 per cent) candidates scored in the 30 - 39 range, thirty-two candidates (29.91 per cent) scored in the 20 – 29 range, forty-one (38.32 per cent) scored in the 10 – 19 range and twelve (11.21 per cent) scored in the 1– 9 range. These scores represents the best obtained by the candidates per module.

Question 1

Twenty-two candidates (20.56 per cent) were able to provide good responses in the (20 – 30 range), thirty (28.04 per cent) scored in the 15 – 19 range, twenty-five (23.36 per cent) scored in the 10 – 14 range and eleven (10.28 per cent) scored in the 1 – 9 range. Generally, candidates understood capacitors and were capable of calculating parameters associated with capacitive circuits.

Question 2

This question was attempted by forty-four candidates (42.90 per cent) but proved quite challenging for them. Twenty-eight candidates scored in the 5 – 9 range, whereas sixteen scored in the 1 – 4 range. The concept of inductance was not widely known by the candidates.

Question 3

Sixty-one candidates (57.33 per cent) chose this question. Of this number fourteen scored in the 15 – 19 range. Eleven candidates scored in the 10 – 14 range, seventeen scored in the 5 – 9 range, and nineteen scored in the 1 – 4 range of marks. In general, this question was not well done by candidates. However, they seemed to understand Kirchoff's first and second laws.

Module 2

Analogue Electronics and Communications (Questions 4 – 6)

Candidates were required to do Question 4 and one other from this section. From a possible score of 50 from this module, the highest score was twenty-eight. Seven candidates (6.54 per cent) scored in the 20 – 30 range, twelve candidates (11.21 per cent) scored in the 15 – 20 range, twelve (11.21 per cent) scored in the 10 – 14 range, thirty-five (32.71 per cent) scored in the 5 – 9 range, thirty-seven (34.58 per cent) scored in the 1 – 4 range and four candidates scored zero.

Question 4

All candidates were required to answer this question. The highest score was twenty from a possible 30 marks. Only one candidate (0.93 per cent) was able to score in the 20 – 30 range and five (4.67 per cent) scored in the 15 – 19 range. Twelve (11.21 per cent) candidates scored in the 10 – 14 range, twenty-nine (27.10 per cent) scored in the 5 – 9 range, fifty-four (50.47 per cent) scored between 1 and 4 marks, while six (5.61 per cent) either did not attempt the question or scored zero. Candidates experienced difficulties in calculating the voltage and currents requested.

Question 5

Seventy-three (68.22 per cent) candidates chose this question and scored a high of 11 marks from a possible 20 marks. Three candidates (2.80 per cent) scored in the 10 – 14 range, eighteen (16.82 per cent) scored in the 5 – 9 range, while twenty-four (22.43 per cent) either did not attempt the question or scored zero. Most candidates were unfamiliar with the op-amp.

Question 6

Thirty-four candidates attempted this question and scored a high of 10 from a possible 20 marks One candidate scored in the 10 – 15 range, whereas 8 scored in the 1 – 9 range, eleven (10.28 per cent) scored in the 1 – 4 range, while fifteen (14.02 per cent) scored zero. Most candidates were unfamiliar with amplitude modulation and side bands.

Module 3

Introduction to Electrical Power Systems (Questions 7 – 9)

Candidates were required to do question seven and one other from this section. From a possible score of 50 from this module, the highest score was thirty-eight. Ten (9.35 per cent) candidates scored in the 30 – 39 range, seventeen candidates (15.89 per cent) scored in the 20 – 29 range, fifty-four (50.47 per cent) scored in the 10 – 19 range, twenty-three (21.50 per cent) scored in the 1 – 9 range and two (1.87 per cent) scored zero.

Question 7

All candidates were required to answer this question. The highest score was 24 from a possible 30 marks. Five candidates ((4.67 per cent) were able to score in the 20 – 30 range and five (4.67 per cent) in the 15 – 19 range. Seventeen candidates (15.89 per cent) scored in the 10 –14 range, thirty-three (30.84 per cent) scored in the 5 – 9 range, thirty-nine (36.45 per cent) scored between 1 and 4 marks, while seven (6.54 per cent) either did not attempt the question or scored zero. Most candidates were able to answer at least one segment of this question.

Question 8

Sixty-one candidates (57.00 per cent) attempted this question and scored a high of 15 from a possible 20 marks. Two candidates (4.17 per cent) scored in the 15 – 19 range, 5 (10.42 per cent) scored in the 10 – 14 range and thirty-six (81.25 per cent) scored in the 0 – 9 range. Most candidates demonstrated a fair understanding of the SCADA system.

Question 9

Forty-six candidates (43.00 per cent) attempted this question and scored a high of 15 from a possible 20 marks. Two candidates scored in the 15 – 19 range, five candidates scored in the 10 – 14 range whereas twenty-three scored in the 5 – 9 range, fourteen scored between 1 and 4 marks, and two scored zero. Most candidates were unable to state common types of overload relay.

UNIT 2

Paper 1

Short Answers

Candidates were required to do all questions from this paper which accounts for 90 marks. The range of the marks scored by candidates was from a low of 7 to a high of 64. Of the 88 candidates who wrote the paper, eight (9.10 per cent) scored in the 50 – 70 range, eight (9.10 per cent) scored in the 40 – 49 range, nineteen candidates (21.59 per cent) scored in the 30 – 39 range, twenty-three candidates scored in the 20 – 29 range, twenty-three (26.14 per cent) scored in the 10 – 19 range and seven (7.95 per cent) scored below 10 points.

Module 1

AC Circuit Theory (Questions 1 – 5)

Candidates were required to use fundamental laws and simple theory to solve simple AC circuits. From a possible 30 marks, the highest score was 26 and the lowest score was 4 marks. Twenty-five candidates (28.41 per cent) scored in the 20 – 30 range, fourteen (15.51 per cent) scored in the 15 – 19 range, twenty-six (29.55 per cent) scored in the 10 – 14 range and twenty-three (26.14 per cent) scored in the 10 – 14 range and twenty-three (26.14 per cent) candidates scored below 10 marks.

Question 1

This question was generally understood by most candidates. Twenty-six (29.55 per cent) provided excellent responses to this question (5 scored in the 5 – 6 range from a possible 6 marks). Twenty-nine (32.95 per cent) scored in the 3 – 4 range, twenty-nine (32.95 per cent) scored in the 1 – 2 range and four (4.55 per cent) either scored zero or did not respond to the question.

Question 2

This question was generally understood by most candidates. Twenty-six (29.55 per cent) provided excellent responses and scored in the 5 – 6 range. Twenty-five (28.41 per cent) scored in the 3 – 4 range, thirty-one (35.23 per cent) scored in the 1 – 2 range and six scored zero or did not respond to the question. Most candidates were able to draw the phasor diagram for the circuit and were able to calculate the currents.

Question 3

This question posed difficulties for more than fifty per cent of the candidates. Only three candidates (3.41 per cent) provided perfect responses for this question, that is, either 5 or 6 (scored in the 5 – 6 range from a possible 6 marks. Nineteen (21.59 per cent) scored in the 3 – 4 range, fifty (56.81 per cent) scored in the 1 – 2 range and sixteen (18.18 per cent) either scored zero or did not respond to the question. Most candidates were unable to sketch and label the high pass frequency response and describe the function of this filter.

Question 4

Most candidates were comfortable with this question. Fifteen (17.05 per cent) scored from a possible 6 marks, twenty-four (27.27 per cent) scored in the 3 – 4 range, 28 (31.81 per cent) scored in the 1 – 2 range and twenty-one (23.86 per cent) either scored zero or did not respond to the question. Most candidates were able to define reactive and active power but experienced difficulties in calculating the r.m.s. voltage.

Question 5

This question can be considered the favourite for most candidates. Twenty-nine (32.95 per cent) scored in the 5 – 6 range from a possible 6 marks, thirty-six (40.91 per cent) scored in the 3 – 4 range, twelve (13.64 per cent) scored in the 1 – 2 range and eleven (12.50 per cent) scored zero or did not respond to the question. Most candidates were able to calculate reactance and impedance. Few candidates experienced difficulties sketching the phasor diagram.

Module 2

Digital Electronics and Data Communications (Questions 6 – 10)

Basic analogue and electronics and communications concepts were covered in this module which was understood by most candidates. From a possible 30 marks, the highest score was 23 and the lowest score was zero. One candidate (1.14 per cent) scored in the 20 – 30 range, three (3.42 per cent) scored in the 15 – 19 range, twenty-one (23.85 per cent) scored in the 10 – 14 range, sixty-one (70.45 per cent) scored in the 1 – 10 range and one scored zero.

Question 6

This question posed difficulties for most candidates. Only one candidate (1.14 per cent) provided a perfect responses for this question, nine (10.23 per cent) scored in the 3 – 4 range, twenty-eight (31.82 per cent) scored in the 1 – 2 range and fifty (56.82 per cent) scored zero. One-third of the candidates had very little knowledge about MOSFETs.

Question 7

One candidate (1.14 per cent) provided a good response for this question whereas forty-seven (53.41 per cent) scored in the 3 – 4 range, twenty-one (23.86 per cent) scored in the 1 – 2 range and nineteen (21.59 per cent) either scored zero or did not attempt the question. Most candidates were able to complete the truth table for the logic circuit but did not understand the terms "fan-in" and "fan-out".

Question 8

This question proved to be quite challenging for most candidates. Twelve candidates (13.64 per cent) scored in the 3 – 4 range from a possible 6 marks, whereas thirty-six (40.91 per cent) scored in the 1 – 2 range and forty (45.45 per cent) scored zero. Many candidates knew what were 'multivibrators' but knew little about Flip Flops.

Question 9

This was a relatively good question for most candidates. Twelve candidates (13.64 per cent) provided good responses (scored in the 5 – 6 range from a possible 6 marks), thirty-nine (44.32 per cent) scored in the 3 – 4 range, twenty-seven (30.68 per cent) scored in the 1 – 2 range and ten (11.36 per cent) scored zero. Most candidates could state the function of a multiplexer and a de-multiplexer and could describe the difference between EPROM and PROM.

Question 10

This question proved quite challenging for all candidates. One candidate (1.15 per cent) scored in the 3 – 4 range and ten (11.36 per cent) scored in the 1 – 2 range. A total of seventy-seven (87.50 per cent) candidates either scored zero or did not attempt the question. None of the candidates was able to describe the function of the UART in computer systems.

Module 3

Introduction to AC Machines (Questions 11 – 15)

This module posed significant challenges to candidates. From a possible 30 marks, the highest score was 24 and many candidates scored zero. Two (2.28 per cent) scored in the 20 – 30 range, seven (7.95 per cent) scored in the 15 – 19 range, nine (10.23 per cent) scored in the 10 – 14 range, thirty (34.09 per cent) scored in the 5 – 9 range, thirty-one candidates (35.23 per cent) scored in the 1 – 4 range and nine candidates (10.23 per cent) either scored zero or did not attempt the module.

Question 11

This question proved quite challenging for most candidates. One candidate (1.14 per cent) provided a good response (scored in the 5 – 6 range from a possible 6 marks), eight (9.09 per cent) scored in the 3 – 4 range, thirty-six (40.91 per cent) scored in the 1 – 2 range, whereas forty-three (48.86 per cent) either scored zero or did not attempt the question. Most candidates were able to explain the purpose of the field and armature windings of a generator and explain 'voltage regulation'. Only a few candidates knew what was a synchronous generator.

Question 12

Surprisingly, candidates faced challenges with this question which tested knowledge of the single phase transformer. Only two candidates (2.28 per cent) scored in the 5 – 6 points range and twelve (13.64 per cent) scored in the 3 - 4 range. Thirty-four candidates (36.64 per cent) scored in the 1 – 2 range and forty (45.45 per cent) either scored zero or did not attempt this question.

Question 13

Response to this question was similar to that of Question 12. However, many candidates were able to explain the operation of an induction motor and define the term SLIP. Three (3.42 per cent) scored in the 5 – 6 range, seventeen (19.32 per cent) scored in the 3 – 4 range, twenty-eight (31.82 per cent) scored in the 1 – 2 range, whereas the remaining forty (45.45 per cent) either scored zero or did not attempt the question.

Question 14

The response profile for this question was similar to the previous two questions. Candidates were required to calculate parameters for a single-phase transformer when given the secondary winding information. Eight (9.09 per cent) scored in the 5 – 6 range, eighteen (20.45 per cent) scored in the 3 – 4 range, twenty-five (28.41 per cent) scored in the 1 – 2 range, whereas the remaining thirty-seven (42.05 per cent) either scored zero or did not attempt the question.

Question 15

The response profile for this question was similar to the previous three questions. Many candidates were able to describe the construction of a squirrel-cage, induction motor, and state why induction motors are the preferred choice for industrial motors; however, most candidates were unable to state disadvantages of speed control of WRIMs by means of external resistors. Five (5.68 per cent) scored in the 5 – 6 range, twelve (13.64 per cent) scored in the 3 – 4 range, twenty-two (25.00 per cent) scored in the 1 – 2 range, whereas the remaining forty-nine (55.58 per cent) either scored zero or did not attempt the question.

UNIT 2

Paper 02

Long Answers

Eighty-eight candidates wrote this paper. They were required to do six questions from this paper which accounts for 150 marks. Questions 1, 4 and 7 are compulsory and value 30 marks each. Candidates were required to select one of the remaining two questions in each module for a value of 20 marks. Most candidates attempted the required two questions for each module.

The range of marks obtained was from a low of three to a high of one hundred and eight. Only two candidates (2.27 per cent) scored 100 or more marks. Three candidates (3.41 per cent) scored in the 80 – 99 range, seven (7.95 per cent) scored in the 60 – 79 range, twenty-one (23.86 per cent) scored in the 40 – 59 range, thirty-nine (44.32 per cent) scored in the 20 – 39 range, sixteen (18.82 per cent) scored in the 1 – 19 range. These results are encouraging when compared to previous years. It is evident that the marks scored by candidates have improved.

Module1

AC Circuit Theory (Questions 1 – 3)

Candidates were required to do Question 1 and one other from this section. From a possible score of 50 from this module, the highest score was 46 and one candidate (1.14 per cent) scored zero. Three candidates (3.41 per cent) scored in the 40 – 50 range, ten (11.36 per cent) scored in the 30 – 39 range, twelve (13.66 per cent) candidates scored in the 20 – 29 range, thirty-four (38.66 per cent) scored in the 10 – 19 range and twenty-eight (31.82 per cent) scored in the 1 – 9 range.

Question 1

This question tested candidates' knowledge of filters. Most candidates had a general understanding about filters but many were unable to compute bandwidth and determine capacitance and inductance for filters. The maximum score obtained was 28 from a possible 30 marks. Four candidates (4.55 per cent) scored in the 20 – 30 range, eight (9.10 per cent) scored in the 15 - 19 range, five (5.68 per cent) scored in the 10 – 14 range, twenty-six (29.55 per cent) scored in the 5 – 9 range, thirty-four (38.66 per cent) scored in the 1 – 4 range and the remaining eleven candidates (12.50 per cent) either scored zero or did not respond to the question.

Question 2

This question tested the candidates' knowledge of the sinusoidal wave form as well as apparent and reactive power. Eighty-one (92.05 per cent) candidates attempted the question and three (3.70 per cent) scored 20 marks, the maximum for this question. Two candidates scored zero. Twenty (24.69 per cent) candidates scored in the 15 – 20 range, 21 (25.93 per cent) scored in the 10 – 14 range, twenty-seven (33.3 per cent) scored in the 5 – 9 range, eleven (13.58 per cent) scored in the 1 – 4 range and as previously mentioned two candidates either scored zero or did not respond to the question.

Question 3

This question tested the candidates' knowledge of resonance and how to determine circuit parameters for RLC circuits. Only seven candidates (7.95 per cent) attempted and scored a maximum of 13 marks from a possible 20 marks. Three candidates scored in the 10 – 14 range, whereas the remaining four candidates scored in the 1 – 4 range. It is evident that this question was challenging for most of those that attempted it.

Module 2

Digital Electronics and Data Communications (Questions 4 – 6)

Candidates were required to do Question 4 and one other from this section. From a possible score of 50 marks from this module, the marks obtained by candidates ranged from zero to thirty-one. Three candidates (30.41 per cent) scored in the 30 – 39 range, thirteen (14.77 per cent) scored in the 20 – 29 range, twenty-nine (32.95 per cent) scored in the 10 – 19 range, thirty-two (36.36 per cent) scored in the 1 – 9 range and four (4.55 per cent) candidates scored zero.

Question 4

This question tested candidates' knowledge of thyristor and bipolar transistors. The marks for this question ranged from zero to twenty from a possible 30 marks. Five candidates (5.68 per cent) scored in the 15 – 19 range, seven (7.95 per cent) scored in the 10 – 14 range, thirty (34.09 per cent) scored in the 5 – 9 range, twenty-seven (30.68 per cent) scored in the 1 – 4 range and the remaining nineteen candidates (21.59 per cent) either scored zero or did not respond to the question.

Question 5

This question tested the candidates' knowledge about the Shannon Hartley Theorem and 'noise' in communication systems. Seventy-six candidates (86.36 per cent) attempted the question and scored marks ranging from zero to seventeen. Only one candidate scored in the 15 – 20 range, twenty (22.73 per cent scored in the 10 – 14 range, thirty-four (38.64 per cent) scored in the 5 – 9 range, eleven (12.5 per cent) scored in the 1 – 4 range and nine (10.23 per cent) candidates either scored zero or did not respond to the question. Candidates experienced difficulties with the concept of noise, but were able to state how data flow is simplex and duplex modes.

Question 6

This question tested the candidates' knowledge about digital to analogue converters. Twelve candidates attempted this question and scored marks in the range zero to thirteen. Three (3.41 per cent) candidates scored in the 10 – 14 range, three (3.41 per cent) scored in the 5 – 9 range, four (4.55 per cent) scored in the 1 – 4 range and two candidates either scored zero or did not respond to the question. Most candidates revealed a lack of general understanding of D/A converters. In Part (b) a typo error was detected, T-Bit should have been 7-Bit.

Module 3

Introduction to AC Machines (Questions 7 – 9)

Candidates were required to do Question 7 and one other from this section. From a possible score of 50 marks from this module, the marks obtained by candidates ranged from zero to thirty-seven. Three candidates (3.41 per cent) scored in the 30 – 39 range, eight candidates (9.10 per cent) scored in the 20 – 29 range, fifteen (17.05 per cent) scored in the 10 – 19 range, fifty-two (59.09 per cent) scored in the 1 – 9 range and ten candidates (11.36 per cent) scored zero.

Question 7

This question focused on transformer losses, voltage regulation and reduction of leakage flux. The marks obtained by candidates for this question ranged between zero and twenty-six from a possible 30 marks. Three (3.41 per cent) scored 20 marks or above, nine (10.23 per cent) scored in the 15 – 19 range, three (3.41 per cent) scored in the 10 – 14 range, seventeen (19.32 per cent) scored in the 5 – 9 range, forty-six (52.27 per cent) scored in the 1 – 4 range and the remaining ten candidates (11.36 per cent) either scored zero or did not respond to the question. Candidates experienced difficulties with calculations (Part (b). It appeared that they did not know the formulae.

Question 8

This question required candidates to state differences between SCIM and WRIM; explain the term "SLIP" and calculate a SLIP and rotor frequency. Sixty-eight candidates (77.27 per cent) attempted the question and scored marks ranging from zero to fourteen. Six (6.82 per cent) candidates scored in the 10 – 14 range, twelve (13.63 per cent) scored in the 5 – 9 range, twenty-four (27.27 per cent) scored in the 1 – 4 range and twenty-six (29.55 per cent) candidates either scored zero or did not respond to the question. Most candidates did not know the term "SLIP".

Question 9

This question tested candidates' knowledge on synchronous motor. Candidates were asked to explain terms such as armature reaction, synchronous speed and per unit regulation. In general, this question was quite challenging for the candidates. Twenty candidates (22.73 per cent) attempted this question and scored marks ranging from zero to nine. Three candidates (3.41 per cent) scored in the 5 – 9 range, ten scored in the 1 – 4 range and seven candidates (7.95 per cent) either scored zero or did not respond to the question.

Internal Assessment (IA)

Fourteen Schools submitted forty-nine IAs for Unit 1 and forty-three for Unit 2 for moderation. The grades submitted from some of the schools appear inflated. In general, the candidates' reports were properly written. In many instances, however, the candidates failed to discuss the findings of the experiment or outcome of the project.

Some schools failed to submit the appropriate report form with the samples. Likewise, some schools failed to submit project activity books.

It was apparent that candidates might have performed better on the Internal Assessment component if they had benefitted from closer supervision by their class teachers.