

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION**

MAY/JUNE 2003

ELECTRICAL AND ELECTRONIC TECHNOLOGY

ELECTRICAL AND ELECTRONIC TECHNOLOGY
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION

MAY/JUNE 2003

GENERAL COMMENTS

Twenty-two candidates sat the examination for this subject. Of the 22 candidates, only 18 scripts for Paper 01 were received from candidates for grading. This number reflects a fall in registration since 59 entered in 2000.

The examination offered a wide coverage of the syllabus, in fact, the two papers when combined, covered all modules in the syllabus.

It is quite evident that the schools are doing a better job of preparing students for this subject. However, more work is needed to get candidates to perform at the standard required for this level examination. Of the candidates who entered for the examination, a significant number of them attempted more questions in this examination than in the past examinations.

PAPER 01 – Short Answers

Candidates attempted questions in all three modules. Seven candidates scored between 50 per cent and 72 per cent of the available scores. Seven scored between 33.3 per cent and 48.33 per cent and the remaining four scored between 15 per cent and 32 per cent. The time allocated for the paper seems adequate even though many candidates appeared to experience difficulties with Modules 2 and 3.

Of the 18 scripts marked, all candidates attempted the majority of the questions in Module 1 – Circuit Theory. Eight candidates scored above 50 per cent of the total mark with four candidates scoring 66.6 per cent or above. Many candidates appear to be struggling with basic Circuit Theory concepts that should have been covered at the CSEC level.

In Module 2 – Analogue and Digital Electronics, only one candidate scored above 50 per cent while six scored in the 33.3 per cent range. The remaining candidates scored between 10 per cent and 30 per cent of the available scores for the module. This reveals that most candidates were ill prepared for this module.

Responses to Module 3 – Electrical Energy Systems, were less than expected. No candidate scored in the 50 per cent range whereas all others scored between 0 per cent and 47 per cent with 12 candidates scoring only 13 per cent of the available scores. It is evident from this performance that candidates were not prepared for answering questions related to Electrical Energy Systems. Simple concepts such as transformer turns ratio, losses, synchronous impedance and others were not known by the candidates.

PAPER 02 – Structured Essay/Problem Questions

Candidates were required to answer all six questions in this paper. Two candidates scored above 50 per cent of the available scores, three candidates scored between 33.3 per cent and 46 per cent, six scored between 23 per cent and 33.3 per cent, and the remaining 11 scored between 3 per cent and 22 per cent.

DETAILED COMMENTS

MODULE 1 – Circuit Theory

Question 1

This question tested candidates on the topic DC Theory. In particular, they were required to:

- (i) calculate the equivalent resistance for two or more resistors in series or parallel;
- (ii) derive and use the voltage and current divider to solve problems;
- (iii) derive and apply the relationships $P = V^2/R = I^2R = IV$;
- (iv) apply Kirchhoff's laws for the analysis of DC networks involving meshes or nodes.

The response to this question was very good. Thirteen candidates scored above 50 per cent of the available grades with a high of 100 per cent. The remaining nine scored between 16 per cent and 40 per cent.

Question 2

Candidates were required to calculate: impedance; phase difference between current and supply voltage and the Q factor for a given circuit. Candidates were also required to calculate the capacitance value that would cause a system to be in resonance, if the capacitor were variable.

Only four candidates scored above 50 per cent of the available grades for this question. Another five candidates were able to score 44 per cent and the remaining 13 scored between 0 per cent and 2 per cent. Most candidates appear unfamiliar with calculation of impedance and Q-Factor. Many were unfamiliar with the term resonance and could not determine the condition under which resonance occurs.

MODULE 2 – Analogue and Digital Electronics

Question 3

Candidates were presented with a summing amplifier and required to explain its operation. They were also given the specifications for a transistor and required to distinguish between pnp and npn transistors and perform load line analysis.

Only three candidates scored above 50 per cent of the available marks for this question. Nine scored between 4 per cent and 40 per cent. The remaining candidates did not score any marks. Many candidates did not know the relationship for the output of the adder. Many were also unable to draw the load line for the transistor amplifier.

Question 4

Candidates were presented with a truth table and required to: convert between various number systems; perform minimisation of logic expressions using Boolean algebra and Karnaugh maps; implement logic circuits from Boolean expressions and; design an asynchronous counter (up to Mod 10).

Two candidates scored 44 per cent of the available grades for this question. The remaining candidates scored between 0 to 20 per cent. Many candidates were able to complete the truth table but were unable to write out the minterms from the table and to draw the circuit for the output derived.

MODULE 3 – Electrical Energy Systems

Question 5

This question which was based on transformers, tested candidates' ability to: explain the function of the core material and its effect on the hysteresis loop of a transformer; solve equations on voltage regulation, losses and efficiency using the equivalent circuit of a transformer; explain the concept and significance of eddy currents, core loss and leakage reactance of a transformer.

Five candidates scored above 50 per cent of the available marks for this question. None scored between 25 and 40 per cent. The remainder of the candidates scored between 0 and 20 per cent. Most candidates knew that the transformer was used to step-up or step-down voltage but did not seem to be familiar with the other functions such as isolation and voltage stabilization. Many candidates experienced difficulties applying the transformer turns-ratio relationship.

Question 6

This question was based on the synchronous rotating machine. Candidates were tested in their ability to describe the essential feature of construction of a conventional DC machine sketch the speed torque characteristic, and solve problems using this equation.

Only two candidates scored above 50 per cent of the available marks for this question. Ten scored between 4 and 30 per cent. The remainder of the candidates did not score any marks. Most candidates were unable to draw the cross-section of the DC dynamo, neither did they know the parts of the armature.

Internal Assessment

Only written reports for the Internal Assessment were submitted for moderation. For the most part, the reports were poorly written. It would appear that candidates were not encouraged to prepare their reports on projects in a timely manner. Consequently they appeared to be rushed when due by CXC.

RECOMMENDATIONS

1. Candidates need to spend more time on the electrical and electronics specialisations. Only few candidates have demonstrated competency in electronics and fewer in electrical energy systems.
2. Practical exercises for the Internal Assessment should be more closely monitored by teachers. It appears that candidates are allowed to focus primarily on electronics at the expense of the electrical areas.
3. Internal Assessment is an integral part of student assessment in the course covered by this syllabus. It is intended to encompass formative, diagnostic and summative assessment strategies and should therefore be administered in a timely manner. Written reports on projects that have been rushed fail meet the given assessment criteria to the detriment of candidates.