

CARIBBEAN EXAMINATIONS COUNCIL

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

MAY/JUNE 2003

GEOMETRICAL AND MECHANICAL ENGINEERING DRAWING

GEOMETRICAL AND MECHANICAL ENGINEERING DRAWING**CARIBBEAN ADVANCED PROFICIENCY EXAMINATION****MAY/JUNE 2003****GENERAL COMMENTS**

Generally there was an improvement in candidates' performance over last year. It is evident however, that teachers are still not covering the syllabus fully. Most candidates display good drawing skills, but show a lack of knowledge in certain areas. Candidates should be taken on field trips to industries to expose them to engineering applications and also to engineering tools, equipment and components. Also research papers could be used to compliment the field trips and deeper candidates' learning experiences. Some basic engineering components could be kept in the drawing room to be used as demonstration aid when teaching. This course cannot be taught in isolation.

DETAILED COMMENTS**PAPER 01**

This paper consisted of nine compulsory short answer questions, with three questions from each module. Each question was worth 10 marks.

Module 1 – Plane Geometry**Question 1**

Candidates were required to (i) define a cycloid and (ii) Construct the locus of a point on a generating circle of given diameter as it rolls along a line without slipping.

There was some inaccuracy in stating an accurate definition for the cycloid, however there was a general improvement when compared to previous year's responses. The construction of the cycloid was generally well done with a few candidates drawing an epicycloid instead of a cycloid, although the question explained that it rolled along a straight line.

The mean score was 6.5 with a standard deviation of 3.3

Question 2

Given a figure showing a semi-circular lamina of given radius, candidates were required to use a graphical method to determine the centroid of the lamina.

Candidates' performance on this question was poor. Candidates had problems in finding the first derived figure and most of them avoided the calculation. Some candidates did a short cut approach that was not the graphical method, which was required.

The mean score was 1.3 with a standard deviation of 2.4

Question 3

Candidates were required to define a cam, and then make sketches of (i) a cylindrical cam and (ii) an edge cam.

Candidates experienced some difficulty experienced in giving the definition of a cam. The majority of candidates appeared to be familiar with the cylindrical cam. Some drew the edge cam twice, one with a knife edge follower and the other with a roller follower.

The mean score was 3.1 with a standard deviation of 2.6

Module 2 – Solid Geometry

Question 4

In this question a figure was given showing two cylinders intersecting each other. Candidates were required to construct the curve of the intersection of these cylinders.

The performance on this question was generally good. A few candidates had problems with correct numbering in the plan and elevation and others had problems deciding which of the two curves should be hidden.

The mean score was 5.8 with a standard deviation of 3.1.

Question 5

In this question a figure was given showing an engineering component. Candidates were required to draw in third-angle projection full size views of elevation, end view and plan view in directions indicated in the diagram.

This question was generally well done. A few candidates had a problem distinguishing between first-angle and third- angle projection.

The mean score was 7.5 with standard a deviation of 2.4

Question 6

A figure was given showing a truncated, hexagonal prism. Candidates were required to draw the development of the prism with the joint at a marked edge.

This question was poorly done. Many candidates constructed the hexagon incorrectly and failed to correctly lay out the development of the prism.

The mean score was 2.8 with a standard deviation of 3.3

Module 3 – Mechanical Engineering Drawing

Question 7

Candidates were required to explain a number of given terms: Interference fit, clearance fit, transition fit, unilateral tolerancing, and bilateral tolerancing.

This question was poorly done. Less than 50 percent of the candidates attempted this question and the majority of those who did were unable to explain the terms satisfactorily.

The mean score was 0.4 with a standard deviation of 1.4

Question 8

Given a figure showing certain components, candidates were required to sketch a sectional elevation when looking in a direction indicated in the diagram.

This question was reasonably well done, but most candidates showed poor sketching ability. It is recommended that candidates be trained to do freehand sketching. Their poor sketching ability was evident throughout the paper.

The mean score was 6.2 with a standard deviation of 3.2

Question 9

Candidates were required to make neat sketches of certain hand tools.

This question was poorly done. Most candidates showed a lack of knowledge of tools and poor sketching ability. Candidates need to be exposed to different Engineering tools.

The mean score was 6.5, standard deviation 3.0

PAPER 02

This paper consisted of three sections, each representing one of the three Modules of the Unit. There were three questions in each section and candidates were required to answer two questions, each worth 25 marks.

Questions carry equal weight, and each question may require knowledge of more than one topic in its module.

Module 1 – Plane Geometry

Question 1

Given a figure showing a mechanism, candidates were required to construct the loci of two points for one revolution of the radial arm stated.

This question was generally fairly well done. However some candidates misinterpreted it to mean that the point “B” was sliding horizontally instead of pivoting, and the rod sliding through “B”. It is customary that if the block “B” was sliding there would be the graphical representation of a guide within which it slides.

The mean score was 10.6, standard deviation 9.8.

Question 2

Candidates were required to use a graphical method to find the 1st and 2nd moment about an axis.

The graphical part of the question was well done by most of the candidates, however, they experienced problems with the calculations. It appears that this section of the syllabus is not given to the emphasis it deserves.

The mean score was 14.3, and standard deviation 7.0

Question 3

This question required candidates to draw the displacement diagram for the cam shown in a given figure.

The majority of candidates were uncertain about which of the circles should be divided. Some candidates divided the wrong circle and the angular displacement was done incorrectly. On the displacement diagram they divided the circumference into 12 equal parts instead of measuring off from the cam profile diagram. A few candidates made their own displacement diagrams and constructed a cam profile. Candidates should be taught how to construct cam profiles from displacement diagrams, and also how to construct displacement diagrams from cam profiles.

The mean score was 5.4 and standard deviation 4.9.

Module 2 – Solid Geometry

Question 4

Given a figure showing a cylinder intersecting with a right cone, candidates were required to draw the curve of intersection and the development of the cone with the edge at a marked point.

The inter-penetration was reasonably well done, however, the development was poorly done as some candidates divided the wrong circle. This would indicate that the concept was not fully understood when it was taught. Interestingly, some candidates used the section method and demonstrated an understanding of what they were doing.

The mean score was 9.0 and standard deviation 7.8.

Question 5

Given a figure showing three views of a sliding block, candidates were required to produce an isometric drawing of the block with a stated corner as the lowest point.

This question was well done. Only a small percentage of candidates experienced difficulty constructing the isometric circles.

The mean score was 16.6 and standard deviation 6.9.

Question 6

In this question a figure was given showing two views of a bracket in third-angle projection. Candidates were required to reproduce the drawing and to project an auxiliary view on a plane and in a given direction.

The reproduction of the drawing was well done. The auxiliary view, however, for the most part, was not attempted. This suggested that the topic was not properly covered. It also shows the difference in preparation among candidates from different Centers.

The mean score was 10.2 and standard deviation 5.2

Module 3 – Mechanical Engineering Drawing

Question 7

Given a detailed working drawing of an adjustable shaft support, candidates were required to draw a front elevation.

This question was fairly well done, however the assembling of the parts was unsatisfactory. Some candidates placed the shaft inside the bearing. More practice with assembly drawings and exposure to Engineering components is needed.

The mean score was 9.4 and standard deviation 5.9.

Question 8

Given a figure showing an isometric drawing of a lathe tool post, candidates were required to produce a set of detailed working drawings of two parts shown in the diagram, and to provide machining instructions by means of symbols.

Most candidates showed a lack of knowledge of detailed working drawing. The insertion of machining symbols was not done. It appears that candidates are not taught the different drawing symbols and conventions used in Engineering Drawing.

The mean score was 6.0 and standard deviation 6.5.

Question 9

Candidates were required to produce a neat isometric sketch of a Vee-Block and clamp

This question was poorly done. It shows a lack of exposure to Engineering Tools and components.

The mean score was 7.7 and standard deviation 6.8.

INTERNAL ASSESSMENT

PAPER 03A

Portfolio

Composition of Portfolio

The portfolio consisted of six assignments, at least one of which was required to be CAD-based. There were two assignments set on each module.

Candidates were required to submit hard copies of assignments as well as diskettes, and these were used in the moderation process.

There was no significant difference between candidates' performance in 2003 and that of 2002 as assignments were generally of a good standard reflecting the specific objectives identified for testing these assignments.

There was good agreement between teachers' and moderators' scores. However, there was indication that difficulty was experienced in completing the syllabus as intended.

APPENDIX**PAPER 01**

	Mod I	Mod II	Mod III	Total
Maximum	30	30	30	90
Mean	10.9	16.0	13.2	40.1
Std. Dev.	5.3	6.0	4.8	11.8
Range	0-27	0-29	0-28	7-75

PAPER 02

	Mod I	Mod II	Mod III	Total
Maximum	50	50	50	150
Mean	21.6	24.3	11.7	57.7
Std. Dev.	12.5	11.0	9.0	23.7
Range	0-48	2-49	0-45	7-124

PAPER 03

	Mod I	Mod II	Mod III	Total
Maximum	20	20	20	60
Mean	16.4	16.1	13.0	45.5
Std. Dev.	3.5	3.6	5.3	10.8
Range	0-20	0-20	0-20	5-60

SUMMARY

	Mod I	Mod II	Mod III	Composite
Maximum	100	100	100	300
Mean	52.7	60.2	38.8	151.7
Std. Dev.	16.2	15.6	13.4	37.7
Range	18-85	13-92	6-74	43-239