

**UNIVERSITY OF MALTA**  
**THE MATRICULATION CERTIFICATE EXAMINATION**  
**ADVANCED LEVEL**

**GRAPHICAL COMMUNICATION**

**May 2009**

**EXAMINERS' REPORT**

**MATRICULATION AND SECONDARY EDUCATION**  
**CERTIFICATE EXAMINATIONS BOARD**

**AM Graphical Communication  
May 2009 Session  
Examiners' Report**

**Part 1: Statistical Information**

<b>GRADE</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>Abs</b>	<b>Total</b>
<b>Number</b>	1	6	9	2	2	8	0	28
<b>% of Total</b>	3.57	21.43	32.14	7.14	7.14	28.57	0.00	100

A total of 28 candidates sat for the advanced matriculation examination in Graphical Communication.

**Overview**

The examination consists of two written papers, each of three hours duration. Each paper carries 100 marks and a candidate's final result is determined by combining the scores obtained in Paper I and Paper II with equal weighting.

**Part 2: Comments regarding performance**

This section gives comments on the performance of the candidates in each of the questions set in the two papers. They are intended to aid teachers and candidates in preparation for future examinations.

**2.1 Comments regarding Paper 1**

Eight questions were set and candidates had to answer any five. All questions carried a total of 20 marks.

**Question 1 - Warren Truss**

The question concerned analysing graphically a Warren truss, finding the support reactions and the forces in the members.

This was the third most popular question, being attempted by twenty-two candidates. A very good performance was recorded, with eight solutions warranting full marks. All the candidates copied the framework using the requested scale and used Bow's notation correctly. Two main approaches were adopted for evaluating the reactions. Some considered the equilibrium of the external forces as a general non-concurrent system, while others preferred to combine the applied loads, to reduce the system to three concurrent forces and solve it using a simple triangle of forces. Both methods are equally correct. Most unsuccessful candidates encountered problems when extending the basic force diagram to represent the equilibrium conditions present at each joint.

**Question 2 - Auxiliary views**

The question tested the construction of first and second auxiliary views.

Twenty-three candidates answered this question making it the second most popular. Whilst one candidate got full marks, thirteen failed to obtain a pass mark, demonstrating no basic knowledge of this important topic. These failed to make good consistent use of XY lines and showed no knowledge of the 'mechanical' procedure to be followed to derive auxiliary views. The candidates scoring average marks got only as far as the first auxiliary plan. Most of the higher scorers managed to establish the corner points of the block in the second auxiliary elevation but then failed to identify the edges which show and which do not.

**Question 3 - Traces of a line and the true shape of a plane**

The question featured the true length of an oblique line, its traces and the true shape of a plane.

The majority of the twelve candidates who attempted this question arrived as far as parts (i)a and (i)b dealing with the true length of the line and its inclination to the principal planes. Only one candidate knew how to handle part (i)c which asked for the points where the extended bracing member would intersect the wall and the ground. Besides being a standard procedure, some careful study of the given pictorial would have also indicated the steps to be taken. The intersection of the bracing member with the ground, or HT, is easily located by extending the elevation to hit the XY line and moving down perpendicularly to intersect the plan produced. The VT is found likewise, however starting with the plan. Only a small minority attempted to deduce the true shape of plane BAC. This involved looking along a side of the plane and then perpendicular to the resulting edge view.

**Question 4 - Torsion spring**

This question featured the subject area of 'helices', particularly the orthographic representation of a torsion spring corresponding to two given schematic views.

The question attracted only five attempts, making it the second least popular. One candidate scored full marks, while the others produced only very poor work, hardly worthy of any credit. This is disappointing when one considers the direct relevance this topic has to engineering and architectural applications like screw threads and geometrical stairs respectively. The solution involved exactly the same effort that the drawing of a standard square-section compression spring or a single-start square thread would entail.

**Question 5 - Oblique plane**

The question tested the candidates' knowledge about oblique planes. The question concerned a tetrahedron cut by an oblique plane.

Nineteen candidates opted for this question, but only four achieved more than half the full marks. For a topic that features so regularly in this examination, this is a very poor performance.

Most candidates found difficulty finding the overall height  $H_1$  of the tetrahedron. As specifically asked by the question, the candidates were required to project a suitable first auxiliary which shows the 100mm edge as a true length. The same view would then also give the required overall height  $H_1$ .

A number of candidates had difficulty understanding the setup of the remaining part of the question. Despite the simple wording used and the plan given mostly as hidden detail, candidates failed to visualise that the truncated solid stood *upside down* on the HP. As a consequence they could not derive the requested views.

On a positive note however, almost all candidates were able to convert the oblique plane into an inclined perpendicular plane

**Question 6 - Interpenetration**

The question featured the interpenetration between a hemisphere and a triangular duct. Nineteen candidates attempted this question, with three getting full marks and another seven getting half the marks or more.

The first part, dealing with the curve of intersection, was well handled by most candidates. Almost all the candidates employed the horizontal slice method to derive the points in the plan view. A minority however failed to visualise the hidden part of the curve of intersection.

A significant number of candidates ignored completely the second part of the question, showing that they had no knowledge how to develop approximately a spherical surface. The method of development requested was that known as the 'zone' method, where the doubly curved surface was given approximated by two lower frusta and a top right cone, all stacked on top of the other. Only a minority of those who managed to develop the surface did in fact succeed to outline the opening that received the triangular duct.

### Question 7 - Rack and pinion

This was the least popular question, with only four candidates choosing it. A very poor performance was recorded with only one candidate obtaining a respectable score. This is alarming, especially when one considers that this was nothing more than a standard question featuring the widely-applied mechanism of a rack and pinion.

A common general pitfall was the determination of the module,  $m$ . This was superficially hidden under the given value of  $6\pi$  for the tooth thickness. Candidates just had to equate  $6\pi$  to  $\frac{m\pi}{2}$  and by inspection, or otherwise, deduce that  $m = 12$  mm. Two of the four candidates did not know the procedure and standard proportions to be used when designing a spur gear. Also the request to use a scale of 2:1 was not always honoured.

### Question 8 - Cam

This was the most popular question, with just two candidates not opting for it. Fifteen achieved a pass mark or more. It featured the design of a cam profile to satisfy given performance characteristics.

The majority respected the minimum cam diameter geometry and also established the correct zero lift level. A significant number of candidates however mistook the separate UA and UR portions for UAR sections. Other common pitfalls included assuming an incorrect anticlockwise cam rotation and drawing an inappropriate offset circle. In general, a better performance was expected for such a straightforward question.

## 2.2 Comments regarding Paper 2

Five questions were set in all and the candidates had to answer question 1 (compulsory) and any other three. The compulsory question was allotted 34 marks whereas the other four carried 22 marks each.

### Question 1 - Perspective drawing

This compulsory question featured an *estimated perspective drawing* of a traditional bedroom setting. The need for a perspective drawing was explicitly made clear at the beginning of the question. So preliminary sketches and main answers using other drawing systems could not be credited.

In these questions, the construction of a perspective grid, representative of the room, is the key stage towards a well-proportioned illustration. In some cases the 'grids' presented were so poor in quality that they can hardly be called grids. The room internal surfaces were not divided into parts and the 'grid' just outlined the extents of the walls, ceiling and floor. Such inadequate 'grids' can never help represent, with accuracy, the proportional layout of the room. Also some candidates were not able to interpret properly the required viewing direction. A significant number of candidates neither used colours nor did they suggest sample materials, losing easy and precious marks. Other marks were lost for not 'making the best use of the space available' on an A2 drawing sheet. Overall, the performance was poor and left much to be desired.

### **Question 2 - Wallchart**

The question required the candidates to compile a reference wallchart explaining the functions and features of bar charts, pie charts, flow charts and procedural charts.

Of the four optional questions this attracted the lowest uptake. Performance was poor with no one scoring full marks and only five candidates obtaining half the marks or more. Whilst the majority had no problem describing bar, pie and flow charts, only a small minority demonstrated a working knowledge of procedural charts and produced a suitable example. Despite the direct reference in the question, a number of candidates failed to make use of colours and pictorial systems.

### **Question 3 - Computer graphics**

This question dealt with the topic of computer graphics. Along with question 5 this was the most popular, being answered by twenty-one candidates.

Except for a few cases, most candidates deciphered the variables correctly and followed the commands easily to produce the first two images. The colour instructions were also honoured in most cases. Most difficulties were encountered in part (b), where the candidates were required to rotate the inner letter 'F' about a fixed point. Perhaps the easiest approach to go about this would have been to use a set of compasses pivoted on the given fixed point and rotate clockwise every corner of the letter 'F' through the required 180°. In general the question was very well-answered.

### **Question 4 - Ideogrammatic images**

This question was attempted by nineteen candidates and the performance was generally poor. Nobody scored full marks and only nine candidates obtained beyond half marks. The question employed the key stages of the design process towards the design and development of ideogrammatic images that can help raise awareness to curb down the traffic and pollution on our roads.

The written analysis of a design process is meant to outline the requirements of the exercise and identify the important features of the required images and the ways and means of achieving them. Only few candidates took advantage of this stage to plan their work. The stage of graphical analysis follows from the written analysis, which is developed into a series of sketches. It was evident that the few candidates who produced legible, relevant and convincing sketches were the same persons who had earlier devoted effort doing the written analysis. Only a small number of candidates cared to explain the synthesising phase of their design exercise.

Although it was evident that all the candidates had focused most of their effort towards the final solution, only four candidates can be said to have attained a satisfactory final realisation; that is commensurate with advanced level quality. Except for these few, most final solutions were not considered to convey the required message effectively. The examiners also noted that in these cases colour, tone and texture techniques were hardly applied.

### **Question 5 – Graphical comparison and representation**

This question attracted the same highest uptake of 21 candidates as question 3. In this case however, the performance was much poorer, with as many as eight candidates scoring below the pass mark and no one getting full marks.

The question required the candidates to represent and compare graphically, in 2D and 3D, the specifications of a sample of LCD monitors. In either case, few candidates really managed to represent the theme of LCD monitors in a creative original way while using quality graphic techniques to represent the data. Whoever looks at such representations should be able to recognise immediately the theme and also get to rate the monitors from the data displayed.

## AM EXAMINERS' REPORT MAY 2009

Colour plays an indispensable role in such work. For example, contrasting colours may be used to compare the same feature of different models on a single chart, whereas the same colour might be employed on charts representing different features, to relate data to the respective model.

As students of graphical communication, the candidates should also be encouraged to develop complementary symbols for the feature being compared. For example, a plot comparing power consumption would be effectively complemented and enhanced by a symbol of an electrical socket plug. All these improvements would add substantially to the visual impact of this work.

### **General comment**

The standard of responses to this examination varied quite considerably. While a few candidates fared generally well, the remainder displayed great deficiencies in the fundamental concepts associated with graphical communication. The examiners dare say that these candidates are trying to learn this problem-solving subject by 'rote', that is learning to solve problems by repeating the procedure many times, without bothering to understand the concepts underlying the method. Instead Graphical Communication requires prior comprehension and analysis of the problem before the acquired skills and knowledge are applied to its solution.

The Chairperson  
Board of Examiners  
July 2009