

UNIVERSITY OF MALTA

**MATRICULATION CERTIFICATE EXAMINATION
ADVANCED LEVEL**

GRAPHICAL COMMUNICATION

MAY 2017

EXAMINERS' REPORT

**MATRICULATION AND SECONDARY EDUCATION
CERTIFICATE EXAMINATIONS BOARD**

**Graphical Communication
Advanced Level
May 2017**

Part 1: Statistical Information

The table below shows the distribution of grades awarded in the May 2017 session.

GRADE	A	B	C	D	E	F	abs	TOTAL
NUMBER	2	4	6	1	2	2	0	17
% OF TOTAL	11.8	23.5	35.3	5.9	11.8	11.8	0.0	100

Part 2: Comments regarding performance

The written examination

Paper 1 (Maximum marks)

"Paper 1 is common to both Graphical Communication (AM 15) and Engineering Drawing (AM 09). It will contain six questions of which the candidates are required to answer any five. All questions carry equal marks. All questions are to be answered on A2 size sheets, which will be provided".

General Comments

Examiners wish to draw the attention of candidates taking this examination at Advanced level that they are to be well prepared and that the syllabus has been covered adequately. A few candidates showed that they were not familiar with certain topics and the application of basic engineering principles and basic drawing skills. Candidates are advised to be familiar with first and third angle methods of projection. They are advised to acquire the facility in the first and third angle system by using it in the solutions of problems. Candidates are to be careful when using colour in Paper 2. The application of colour varies from careful and even tone work to heavy crude examples.

It is important that instructions are read carefully before responding a question. It was apparent that candidates did not appear to work out their solutions in sketch form before making their final responses. They are advised to look carefully at the mark allocation so as to divide and devote the time they are to spend on the questions accordingly, (and) so as to be able to answer all the questions.

The distribution of grades for the Graphical Communication May 2017 examination session is presented below:

Grade	A	B	C	D	E	F	ABS	TOTAL
No. of Candidates	2	4	6	1	2	2	0	17

PAPER 1

FIVE questions had to be attempted.

Question 1: Hinged beam

The beam shown in the figure consisted of two girders joined together by a hinge, each girder carried a load and three supports were required. The hinged girders were presented resting on two end supports and a support acting as a prop on one of the girders. The beam carried a uniformly distributed load of 10 kN/m on the left girder and two concentrated loads of 50 kN and 80 kN on the right girder, respectively.

Candidates were to copy the space diagram part (a) and using Bow's notation print letters between the adjacent forces. Certain candidates did not even jot down the letters between the adjacent forces, nor used capital and small letters for the rest of the question on the diagrams.

A few solutions showed the uniformly distributed load as a single point load. The term U. D. L. represented by 10 kN/m was replaced by a single load of 10 kN. This mistake rendered the results of the solution/reactions incorrect.

Most candidates correctly set out and produced the load line and the polar diagram. Some candidates were stuck after drawing the link lines in the funicular polygon parallel to the vector lines in the polar diagram.

Some of the candidates were not aware that there can be no bending moment at the hinge and (the value of the b.m.) is zero. The 'closer line 1' from the right reaction had to intersect the funicular line and the vertical line from the hinge, (as there is no value of bending moment at this point) and stops on the line of the middle reaction. 'Closer line 2' completes and closes the funicular polygon by drawing a line from the middle reaction and joining to the end of the left reaction.

Candidates who did not include and adopt this method gave the magnitude of the reactions incorrectly. The final part of the shear force diagram was also (graphically) drawn incorrect. Some candidates submitted the correct solutions by presenting the two 'closer lines' and graphically determined the magnitude of the three reactions correctly.

The last part of the question part (d) was left out by many candidates.

Candidates' performance

Marks	1 to 9 marks	10 to 19 marks	Full marks
P. 1. Gr. Comm	2	9	1

Question 2: First and Second Auxiliary

An illustration and orthographic views of a hexagonal bar machined at the top end and resting on one edge on a horizontal plane were given.

Orthographic views, in first or third angle, are the standard method of depicting items in engineering drawing. Additional projections - such auxiliary projections are used to meet special requirements - are projected from the normal orthographic views. A 'first' auxiliary view is drawn on a new auxiliary $x_1 - y_1$, line. This view is then in turn projected to a 'second' auxiliary $x_2 - y_2$, line to present the second auxiliary view required, appearing as a form of pictorial view.

The use of an extra 'shadow' $x_1 - y_1$ line makes it easier to transfer height of points from the standard views to the second auxiliary views.

Candidates not familiar with the first and second auxiliary views should have avoided answering the question. Some candidates use a wrong approach when attempting a question. They analyse the given figure before reading the question and copy immediately the given views, read the second part of the question and unfortunately notice that they are not able to construct the second auxiliary view. Some were lost, confused and were not even able to present the first auxiliary plan (part c). This method is a waste of time.

To make the question easier to solve, candidates were instructed to use letters/numbers on each view drawn. This method renders the solution easier to follow the sequence adopted, especially if a few arrow heads are included showing the direction of flow of the projection lines.

Careful presentation of the types of lines used is important when dealing with this topic, for hidden lines used on one view may result in visible lines in the next view.

Only a few candidates managed to present the second auxiliary and attain full marks.

Marks	1 to 9 marks	10 to 19 marks	Full marks
P.1. Gr. Comm	5	7	2

Question 3: Interpenetration of solids

The base of a trophy stand consisting of a triangular prism joined to a semi-cylindrical solid interpenetrating a hemi-sphere was illustrated.

The shape of the curves of intersections, which are caused by the meeting of solid objects, depend upon the shape of the surfaces in contact. This question showed a combined triangular and semi-circular prism solid inserted into a hemi-spherical piece.

Only a few candidates attempted this question, a significant number of solutions submitted did not progress beyond the re-drawing of the given elevation and plan, even though intersection of geometrical solids forms a part of the most important topics.

Three orthographic views were to be drawn, a given plan, which was shown complete and two other elevations which were to be projected from this view showing the curves of intersection formed between the combined triangular prism and semi-cylinder when inserted into the hemi-sphere.

The method used involved taking an adequate number of imaginary horizontal cutting planes passing through the whole solid on the front and end views. These sections had to be represented by circles in the plan. The intersection of the arc with the points/lines of the triangular prism and cylinder showed the necessary points of the curve of intersection and were to be projected on the elevations. The points plotted were to be joined by a smooth curve to complete the solution. The extreme points on the curves and hidden detail were often missing.

Marks	1 to 9 marks	10 to 19 marks	Full marks
P.1. Gr. Comm	2	6	1

Question 4: Oblique planes

A transition solid gradually turned from a pentagonal base to a triangular top, was shown resting on a horizontal plane together with the traces of the oblique plane which were to section the solid. The concept of oblique planes was not fully understood by most of the candidates, for the given vertical trace was mistaken and taken as a cutting plane inclined to the horizontal plane and perpendicular to the vertical plane.

The oblique plane illustrated in the figure, was inclined to both principal planes, represented in orthographic projection by its traces. After copying the given views, candidates had to convert the oblique plane to an inclined plane, by presenting an auxiliary view showing the oblique plane as an inclined plane, as requested in part (b) of the question. An auxiliary projection of the solid had to be drawn and the sectional plan determined from it by projection. The sectional elevation had to be projected from the sectional plan with the correct corresponding heights measured accurately. Accuracy and attention is required for this construction, failing to do this, the rest of the question will be irrelevant and a waste of time.

The rest of the question was a matter of proper projection. Some candidates did not present the true shape of the section.

Marks	1 to 9 marks	10 to 19 marks	Full marks
P.1. Gr. Comm	5	6	1

Question 5: Folded plate

A quadrilateral plate was shown folded along the diagonal forming two unequal triangles.

Candidates had to read carefully the question and follow the instructions by answering the step by step procedure, to satisfy and present a correct solution.

Some candidates did not present correctly the first auxiliary view showing the true length of the common edge AB of the two triangles. The second auxiliary projected from the first auxiliary view was therefore not correct and (i) the common edge did not appear as a point, (ii) triangles were not represented as an edge view and (iii) the angle between the triangles was not correctly determined and stated.

The true shape of one of the triangles was to be drawn by using the second auxiliary view. For some candidates, this was not possible, since the previous view was either not constructed or constructed incorrectly. Candidates could at least have presented a true shape of one triangle by finding the true length of each line of the triangle.

Marks	1 to 9 marks	10 to 19 marks	Full marks
P. 1. Gr. Comm	2	9	3

Question 6: Radial cam

A design of a radial cam to transmit a given motion to a roller-ended follower when the line of stroke does not pass through the cam axis was requested in this question.

A popular question, which was attempted by the majority of the candidates. The motion displacement diagram was well constructed, apart from some minor difficulties. A few mistakes were noticed when drawing the uniform acceleration and retardation curve made up of parabolas. Some candidates were not

careful enough to draw the height of the displacement diagram equal to the total lift and fall of the follower movement.

A few candidates failed to appreciate the importance of the given configuration and were unable to cope with an offset roller-ended follower. Some did not take into consideration that the roller-ended follower was offset and forgot to draw the inner circle radius equal to the amount of the follower offset. Tangents to the radial lines of this circle had to be drawn in the opposite 'sense' to the cam rotation. Transferring the points from the displacement diagram to the correct point on the line of action was not always accurate. The roller-ended circle of the follower was not drawn in each place where the appropriate incremental cuts its radial line. The required cam profile was not tangential to all of the follower circles and was not presented by a smooth curve. None of the candidates included extra 15° divisions to produce an accurate curve.

Marks	1 to 9 marks	10 to 19 marks	Full marks
P.1. Gr. Comm	1	12	3

Graphical Communication Paper II

Question 1: Single-point perspective drawing (34 marks)

The candidates were given two orthographic views of a wedding gazebo. They were requested to produce an estimated single-point perspective drawing of the structure. The gazebo consisted of an octagonal platform, eight curtain columns and a pyramidal roof with hanging top curtains. One step led to the front entrance of the gazebo. A carpet and a table were also included. Although this was an outdoor structure, for construction purposes, it had to be considered as if it were built in an enclosed space.

- All the candidates attempted this question. Solutions ranged from very good to very poor. Few candidates did the preparatory sketches only while another few redrew the given front elevation. The average mark was 19.5 marks.
- Some candidates, who completed the drawing, did not use an appropriate method to determine the correct proportions of the perspective grid to draw the floor tiles. This resulted in a disproportionate (elongated depth) perspective drawing.
- Some candidates found difficulty in locating the position of the apex of the pyramid.
- One candidate placed the vanishing point at the extreme left-hand side of the drawing paper. This resulted in a distorted solution.
- Some candidates rendered the drawing correctly and neatly. Others were insensitive to the use of coloured pencils and thus failed to represent the material texture and the light and shade on the structure.

Question 2: Designing a logo (22 marks)

In this question, the candidates were asked to design a logo for a company that provides property maintenance services. All the candidates answered this question, the marks ranging from 7 to 20. The average mark was 13, which is slightly above the pass mark. The following are some observations made by the markers:

- Some candidates tend to confuse logo design with an advertising poster design.
- Some candidates had good ideas at the graphical analysis stage, which were discarded in the final realisation.
- A number of candidates were inclined to include a lot of unnecessary detail in their logo. These details will disappear when the drawing is reduced to the size of an embroidery on a worker's

uniform. It is important to bear in mind that simplicity makes a *logo design* easily recognisable and memorable.

- Some solutions did not convey a clear message that indicates the nature of the service being offered.
- Some solutions were left uncoloured or unshaded thus diminishing the visual impact of the design.

Question 3: Freehand sketching and colouring (22 marks)

Three pictorial views of a sewing machine were given. The candidates were asked to draw two preparatory freehand sketches in order to determine the best viewpoint. They were also asked to draw and colour a larger freehand pictorial drawing of the chosen angle.

- Most of the candidates answered this question, the marks allotted ranged between 7 and 18. 75% attained a pass mark and the average mark of those who attempted this question was 13. Candidates sitting for this examination are encouraged to learn and practice the sketching techniques.
- Some of the sketches were drawn using rulers and other instruments. It is important that the candidates sketch freely, using faint lines, to look for the correct proportions. Line thickness is only added when needed and the right balance is achieved.
- Some candidates manifested weak drawing skills and lack of practice when drawing the ellipses and when establishing the proportions.
- A number of candidates did not shade or colour their solutions. Line drawings leave room for many interpretations. Shading is necessary to express volume.
- Some other candidates used colour pencils in an insensitive manner defeating the objective of representing texture and producing the light and shade effect on the product.

Question 4: Designing a poster (22 marks)

In this question the candidates were asked to design a poster. The purpose of this poster was to illustrate the theme "Music boosts happiness, which improves productivity".

Most of the candidates answered this question, the average mark of those who answered was 12, while the marks ranged from 4 to 19.

There was quite a variety in the way this question was answered. The candidates who simplified the graphic symbols, conveyed a clear message, made use of appropriate typography and used suitable colours attained most marks. Other solutions had the following shortcomings.

- Some messages were unclear.
- The graphic symbols were poorly drawn.
- Some solutions lacked proper preparation and were rather sketchy and weak.
- Use of plain font, which was not appropriate for the title.
- Poor application of colour.

**Chairperson
2017 Examination Panel**