L-Università ta' Malta

MATSEC
Examinations Board

Examiners' Report

AM Graphical Communication

First Session 2023

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A. STATISTICAL INFORMATION

The total number of candidates who registered to sit for Graphical Communication was 27.

Table 1 shows the distribution of grades for the First 2023 session of the examination.

GRADE	A	B	C	D	E	F	ABS	TOTAL
NUMBER	1	3	4	4	4	10	1	**27**
% OF TOTAL	3.7	11.1	14.8	14.8	14.8	37.0	3.7	**100**

Table 1: Distribution of grades for Graphical Communication 2023 First Session

B. GENERAL REMARKS

As shown in the statistics, a considerable number of candidates fared badly in Paper I with an average mark of 34%. Candidates are expected to dedicate more time studying Paper 1 subject content and practicing and improving their drafting techniques. The board of examiners was not satisfied with the level of problem-solving skills and tidiness manifested in a considerable number of solutions.
The candidates did better in Paper II attaining an average mark of 58%.
Candidates fared best in the CAD portfolio getting an average mark of 85%.
The candidates were asked to attempt five questions from the six presented.

Question 1: Transition Piece (20 marks)

The candidates were given an illustration and two orthographic views of a transition piece designed to connect a cylindrical inlet to a square outlet. The cylinder was truncated at 45°and was offset with the square prism. The candidates were asked to construct a half-surface development of the truncated right cylinder and a full surface development of the transition piece.

Eighty six percent of the candidates attempted this question. Only one candidate managed to attain full marks. The average mark was 11/20. Marks were lost for the following reasons.

a) About a fourth of the candidates, who attempted this question, just copied the given views.
b) Other candidates proceeded to construct the surface development of the truncated cylinder. Although this topic is very basic and is usually covered at the early stages of the secondary level course, some candidates got it wrong. Some of these candidates treated the cylinder as a cone and used the radial method to construct the development of a cut cylinder.
c) Some other candidates continued the solution by constructing the true lengths of the triangulated transition piece. At this stage, some candidates did not construct the true lengths correctly. Some treated the transition piece as an oblique cone and other started correctly but got confused along the way.
d) The last consisted of the construction of the surface development of the transition piece by using the triangulation method. Most of the candidates did not realise that the perimeter of the curved part of the development had to be equal to the perimeter of the elliptical section of the truncated cylinder. Instead, these candidates erroneously made the curved part equal to the circumference of the cylinder.

Candidates' performance in question 1

1 to 9 Marks	10 to 19 Marks	Full Marks	Not Attempted
11	10	1	5

Question 2. Intersecting Solids (20 marks)

Two orthographic views and an illustration of two intersecting solids were given. A right cone was intersected by a cylinder. The axis of the cone and the cylinder were offset, and the cylinder was inclined by 15° to the horizontal plane. The candidates were asked to project the resulting curves of intersection to the front elevation and the plan.

Around seventy eight percent of the candidates attempted this question. Two candidates attained full marks and the average mark was 6/20. Apart from the two candidates who presented very good solutions, most of the others presented solutions which left much to be desired. The following were the main shortcomings.

a) More than half of the candidates who attempted this question, just copied the given views without advancing any further.
b) A few of these candidates did not copy the given views correctly.
c) To solve this problem, the candidates had to project an auxiliary plan parallel to the axis of the inclined cylinder. It looks like some candidates were aware of the correct method, but most of them projected the auxiliary view incorrectly and sometimes from an angle opposite to that required. These faults obviously resulted in wrongly projected curves of intersection.
d) Some candidates drew the curves of intersection freehand without plotting any points.
e) A few candidates did most of the work correctly but did not complete the plan.

1 to 9 Marks	10 to 19 Marks	Full Marks	Not Attempted
18	1	2	6

Candidates' performance in question 2

Question 3. Solids in Contact (20 marks)

An illustration and two orthographic views of a set of wooden blocks arrangement was given. The set-up consisted of a large, fustrum of a cone resting on the horizontal plane. Four cylinders with conical tops were placed equally spaced around its axis on top of the frustrum. Sphere 'A', of unknown diameter, was to rest tangentially between the four conical caps. The top height of sphere 'A' was given. The candidates were asked to determine the centre and the diameter of the sphere. Another sphere, 'B', of unknown diameter, was to rest on the horizontal plane and to touch the large fustrum at point 'P'. The candidates had to determine the diameter and location of this sphere. Finally, another sphere 'C', Ø30 mm, was to be added. This sphere was to rest on the horizontal plane and to be in mutual contact with the fustrum and sphere 'B'.

Around sixty percent of the candidates attempted this question, none attained full marks. The average mark was 4/20. Only one candidate managed to attain about two thirds of the marks allocated to this question. All the others scored less than 9 marks. The following is a list of common errors noted.

a) Half of the candidates who attempted this question copied the given views and stopped there.
b) Nearly all the candidates, who attempted this question, did not project an auxiliary view to determine the diameter and the points of contact of sphere 'A' with the four conical caps.
c) Without an auxiliary projection all attempts to find the spherical diameter were the outcome of guesswork.
d) None of the candidates realised that the sphere 'A' problem had to be solved by using the inscribed triangle principle using the sides of the cones and the ceiling of 140 mm on the 45° auxiliary view.
e) Very few candidates managed to determine, by construction, the diameter and location of sphere 'B'. This also involved the basic geometric principles of bisecting an angle and drawing a normal tangential to the sloping edge of the frustrum at the given point of contact.
f) Consequently sphere 'C', which had to be in mutual contact with the large cone, the horizontal plane, and sphere 'B', was incorrectly drawn.

1 to 9 Marks	10 to 19 Marks	Full Marks	Not Attempted
15	1	0	11

Candidates' performance in question 3

Question 4. Intersecting Triangles (20 marks)

A pictorial illustration of two intersecting triangles was given. The candidates were asked to copy the given views and find the true shape of the two triangles. Interestingly the end result of the true shapes was a pair of set squares commonly used in geometric drawing. Sixty percent of the candidates attempted this question, and the average mark was 8.

To find the true shapes, the candidates had to take any line on one of the triangles on any view, and project an auxiliary elevation from the other view, showing one of the triangles as an edge view. This step, despite being basic and very importantly the first one, was executed poorly by many candidates. Some mistook one edge of one of the triangles for a true length and projected a second auxiliary parallel to it thus drawing an extra unnecessary view. Others attempted a true length but confused the points on different triangle edges from the front to the plan. Only a handful managed to get this stage right, thus leading to many other incorrect solutions. The handful that got this right, did very well through the rest of the stages and showed a clear grasp of the topic.

Once the candidates drew one triangle as an edge view, they had to locate the points of intersection, and project them back to the Front and the Plan to show the line of intersection. The candidates had to then line in the Front and Plan showing hidden and bold lines where the triangles overlap. Then they had to use one of the intersecting lines to project the triangles as two intersecting lines and find the dihedral angle between the two triangles. Two simple perpendicular projections from the last stage would, then help the candidates draw the true shapes. Very few candidates who got confused in the middle stages managed to draw a correct true shape of the two triangles by taking the true lines individually from the Front and Plan views, thus getting only the few marks for the true shapes.

Nearly half of the candidates who attempted this question only copied the given views. Other candidates lost a lot of marks for the following reasons:

a) Inaccuracy and neatness.
b) Some of the candidates carried out several wrong auxiliary views, some going on to their fourth one but in vain.
c) Some other unsuccessful attempts included messy and overlapping workings that apparently confused the same candidates.
d) Some candidates did not place their views centrally and had to squeeze their solution at the edge of the paper.
e) Some candidates confused the hidden and bold lines on the Front and Plan views when lining in the visible parts of the triangles.

1 to 9 Marks	10 to 19 Marks	Full Marks	Not Attempted
11	3	2	11

Candidates' performance in question 4

Question 5. Hinged Beam (20 marks)

The candidates were given a space diagram of a hinged beam. They were asked to copy the space diagram by using given scales. They were also asked to determine graphically the bending moment diagram, the values of the three reactions, the magnitude, the nature and position of the greatest bending moment, the positions along the beam where the bending moment is zero, the shear force diagram and the magnitude of the shear force at the hinge.

Nearly three quarters of the candidates attempted this question. The average mark was 10/20. Only a few candidates managed to attain nearly full marks in this question. Others lost marks for the following reasons.

a) Most of the candidates who attempted this question ignored the fact that the beam was hinged and treated it as a solid beam.
b) Some candidates applied Bow's notation incorrectly.
c) Nearly all the candidates managed to draw a correct load line and polar diagram. However, only a few realised that, when drawing the bending moment diagram, the bending moment at the hinge had to be zero. This necessitated closer 1 to be directed from R_R to the intersection between the line on the bending moment diagram parallel its corresponding counterpart on the polar diagram (between the lines of action of the 80 kN and the 48 kN point loads) and the vertical line projected downwards from the hinge on the space diagram. Closer 1 had then to be extended to the R_M line of action.
d) These candidates did not realise that, to evaluate three reactions, the closer had to consist of two parts. Instead, they erroneously closed the funicular polygon by means of one closer between R_L and R_R.
e) Consequently, the polar diagram, the magnitude of the reactions and the shear force diagram were derived incorrectly.

1 to 9 Marks	10 to 19 Marks	Full Marks	Not Attempted
14	6	0	7

Candidates' performance in question 5

Question 6. Oblique Plane (20 marks)

Two illustrations of a combined solid and the traces of an oblique plane, on which the combined solid had to rest, were given. The candidates were asked to convert the oblique plane into an inclined plane and state its inclination to the horizontal plane by drawing an auxiliary elevation. They were also asked to locate the position of the combined solid resting on the inclined plane, project the plan and finally project the front elevation.

Three quarters of the candidates attempted this question. Only one candidate attained nearly full marks. Three other candidates attained around half the marks. The average mark was 5/20. The following are the main errors that led to the loss of marks.

a) Nearly half of the candidates who attempted this question just copied the given figure without advancing any further.
b) Despite the written instructions and the clear illustration in Figure 6b, most of the remaining candidates did not realise that the compound solid had to rest on the oblique plane. Instead, they mistakenly assumed that the oblique plane was a cutting plane. These drew the combined solid resting on the horizontal plane.
c) Some of the candidates who understood this question and placed the compound solid on the inclined plane drew the hexagonal pyramid without first constructing the auxiliary plan of the hexagon.
d) Other candidates who managed to advance in the solution projected a distorted plan and front elevation. This was due to the wrong setting of the angle of the compound solid axis.

1 to 9 Marks	10 to 19 Marks	Full Marks	Not Attempted
17	3	0	7

Candidates' performance in question 6

C. CONCLUDING COMMENTS (PAPER 1).

Only a few candidates were well prepared for Paper I. They fared worse in Question 3 which was a "solids in contact" problem. This poor performance indicated lack of problem-solving skills and shortage of knowledge of basic geometric constructions. Candidates also fared badly in Question 5 which was an "oblique planes problem". It is evident that most of the candidates assumed that the oblique plane was a cutting plane. In fact, the combined solid was resting on the oblique plane. Candidates fared better in Question 1 and Question 5 which consisted of a transition piece and a hinged beam respectively.

As indicated earlier, prospective candidates need to work more past papers to improve their drafting, problem-solving skills, and timing.

The exam consisted of four different questions: a two-point perspective of a meditation room, an infographic poster regarding the agricultural sector in Malta, the design of a honey jar label, and a pictorial image of a food mixer. Each question was assessed based on specific criteria, including drawing construction, scaling, creativity, rendering in colour, coherence, freehand sketching, and overall presentation. The following evaluation provides insight into the strengths and weaknesses of the candidates' work on each task.

The candidates were asked to attempt all of the four questions presented.

Question 1. Two-point perspective drawing (34 marks)

Several candidates struggled with the 2-pt perspective task. It was observed that most of the crates were not well-scaled since they did not employ the standardized perspective scaling method. Consequently, the drawings lacked accuracy and proportionality. This contributed to candidates misplacing items within the perspective crate, compromising the visual composition. Furthermore, some items were completely omitted from the drawings, indicating either a lack of attention to detail or ineffective time management. The rendered items were generally below the accepted standard, with limited and haphazard colour application. Overall, candidates need to improve their understanding and implementation of perspective scaling and composition techniques as a foundation to their construction work.

1 to 15 Marks	16 to 29 Marks	30 to 34 Marks	Not Attempted
7	12	6	2

Question 2. Infographic poster (22 marks)

The performance of candidates in the infographic poster task was inadequate. The main issue observed was the incoherent presentation of the given solutions. Candidates did not effectively organize and present information, resulting in lack of clarity and logical flow. Moreover, most of the graphs presented were devoid of any coherent information and lacked proper colour usage. When colour was utilized, it was often applied in a messy manner, detracting from the overall visual appeal. Additionally, many candidates neglected the inclusion of freehand sketches, which would have aided in the creation of icons that would have enhanced the poster's visual impact. The main title of the poster was often presented in plain pencil without any particular style, suggesting a lack of attention to detail and creativity.

1 to 10 Marks	11 to 21 Marks	Full Marks	Not Attempted
8	14	0	5

Question 3. Honey jar label (22 marks)

In contrast to the previous tasks, the honey jar label displayed various positive outcomes. Several candidates demonstrated good interpretations and expressed coherent ideas in their design work. Their drawings exhibited an understanding of the purpose and aesthetic requirements of a honey jar label. Additionally, a couple of answers were very neatly presented, indicating attention to detail and precision. However, there is always room for improvement in terms of colour application, as some candidates clearly struggled to neatly apply colour to their designs. Overall, this task revealed the potential of candidates to create visually appealing and cohesive designs that would certainly improve with further refinement and practice.

1 to 10 Marks	11 to 21 Marks	Full Marks	Not Attempted
2	20	2	3

Question 4. Pictorial drawing of food mixer (22 marks)

Most renditions in the food mixer task exhibited significant shortcomings. Most notably, the drawings were out of proportion, lacking accuracy and attention to specific detail. Using a drawing crate to encompass all items would have helped maintain scale and proportionality. The rendering of the drawings was generally poor, indicating a lack of technical skill and understanding of shading and texture. Additionally, some candidates completely omitted colour from their answers, further diminishing the visual appeal and realism of the designs. To improve their performance, candidates should focus on developing their proportion and rendering skills while realizing the importance of colour in enhancing their drawings.

1 to 10 Marks	11 to 21 Marks	Full Marks	Not Attempted
8	15	0	4

D. CONCLUDING COMMENTS (PAPER 2).

The AM Graphical Communication Paper 2 exam revealed various strengths and weaknesses in candidates' performance across different tasks. While the honey jar label task displayed promising interpretations and coherent ideas, the 2-pt perspective, infographic poster, and food mixer tasks highlighted several areas for improvement. These include the proper scaling and placement of elements within drawing settings, attention to detail, accurate rendering, coherent presentation, effective use of colour, and the inclusion of freehand sketches to help generate ideas. By addressing these areas, candidates can enhance their graphical communication skills and produce work that meets accepted and expected standards.

Chairperson
Examiners Panel 2023