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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

**MATRICULATION CERTIFICATE EXAMINATION
ADVANCED LEVEL
MAY 2013**

SUBJECT:	ENGINEERING DRAWING / GRAPHICAL COMMUNICATION
PAPER NUMBER:	I
DATE:	7th May 2013
TIME:	9.00 a.m. to 12.00 noon

Directions to Candidates

Write your index number where indicated at the top of all drawing sheets.

Attempt **any five** questions.

Programmable calculators **cannot** be used.

Unless otherwise stated:

- drawings should conform to B.S. or equivalent (ISO) standards;
- all dimensions are in millimetres;
- all answers are to be accurately drawn with instruments;
- unless otherwise stated, all construction lines must be left in each solution;
- drawing aids may be used.

Dimensions not given should be estimated.

Careful layout and presentation are important.

Marks will be awarded for accuracy, clarity and appropriateness of constructions.

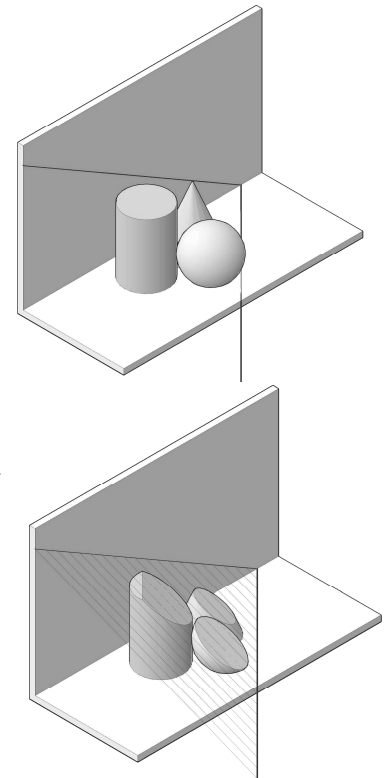
Mark allocations are shown in brackets.

Question 1

The illustrations show a cylinder, a cone and a sphere all resting on the horizontal plane and the resulting curves when the solids are cut by an oblique plane.

Figure 1 shows the position of the right cylinder and the right cone resting on the horizontal plane and parallel to the vertical plane. The apparent angle of the horizontal and vertical plane and the positions of the vertical and horizontal traces, VTH, are also included. A sphere is to be placed on the horizontal plane and in mutual contact with the cylinder and the cone. The sphere is to be placed in front of the other two solids so as to be completely visible in the elevation.

- Construct the plan and the elevation of the three solids in mutual contact with each other, showing the points of contact between the three solids;
- draw an auxiliary elevation showing the oblique plane as an inclined plane and the truncations of the three solids;
- construct an elevation and a plan of that part of the three solids which lie below the oblique plane.



Show all hidden detail.

(20 marks)

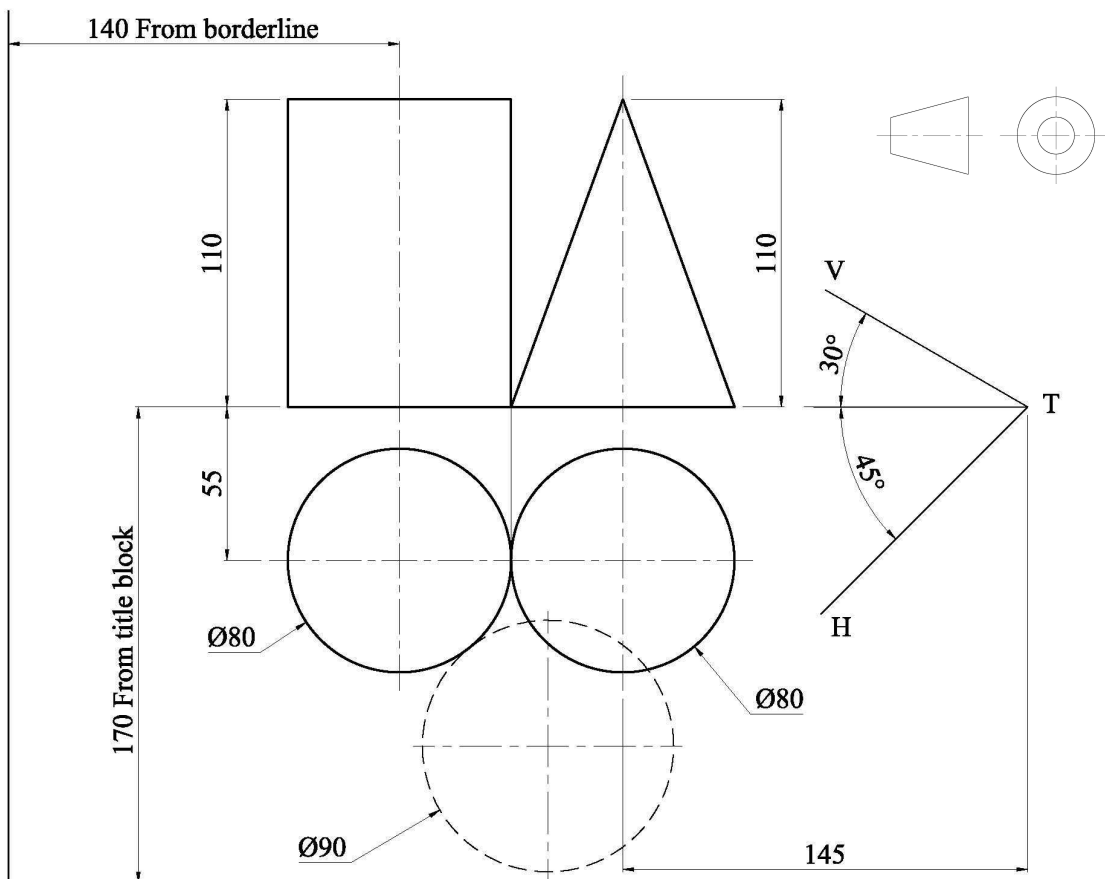
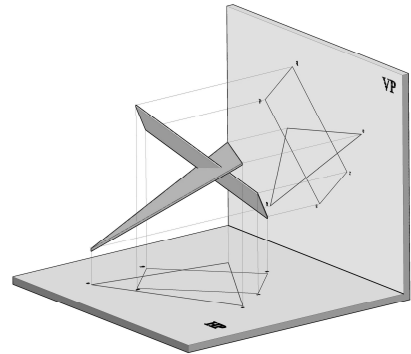


Figure 1

Question 2

Two plates are shown intersecting each other. The two incomplete views shown in Figure 2 describe the position of the triangular plate ABC and the rectangular plate PQRS.

- Copy, full size, the two given views as shown below;
- project an auxiliary elevation representing one of the plates as a straight line and the other plate as a normal projection;
- complete the elevation and a plan of the two plates showing the common line of intersection between the two plates;
- draw the true shape of the triangular plate and show the common line of intersection.



Show hidden detail.

(20 marks)

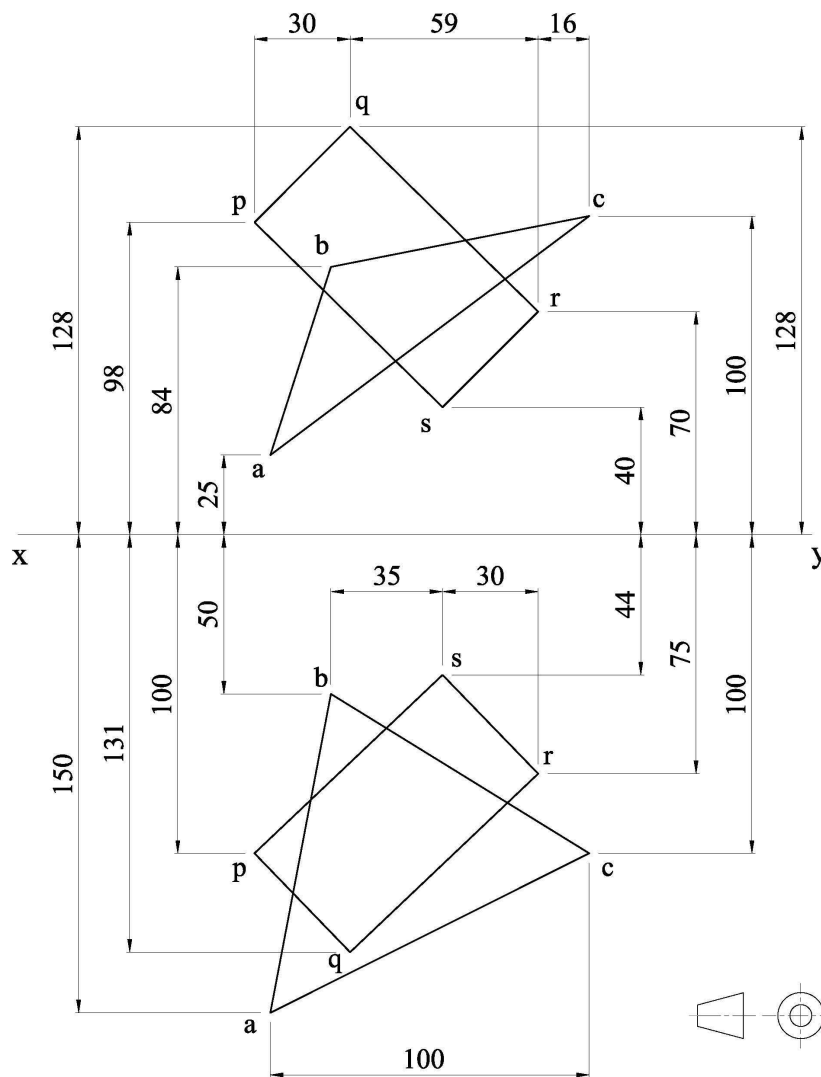
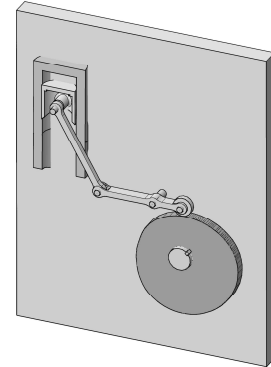


Figure 2

Question 3

The cam shown operates a radial arm roller-ended follower which is linked to a pivoted link and a guide block. The guide block in the mechanism shown reciprocates along the line X-Y by the rotation of the plate cam.



Using the dimensions shown in Figure 3, construct:

- a) a displacement diagram for the guide block during one revolution of the cam;

<i>Cam's angular displacement</i>	<i>Motion given to the block</i>
0° to 120°	The block is to move 68mm downwards with simple harmonic motion.
120° to 180°	The block is to remain stationary.
180° to 300°	The block is to return to its starting position with uniform acceleration and retardation motion.
180° to 360°	The block is to remain stationary.

- b) the cam profile which imparts motion to the roller-ended follower.

Note: The rotation of the cam is anti clockwise.

(20 marks)

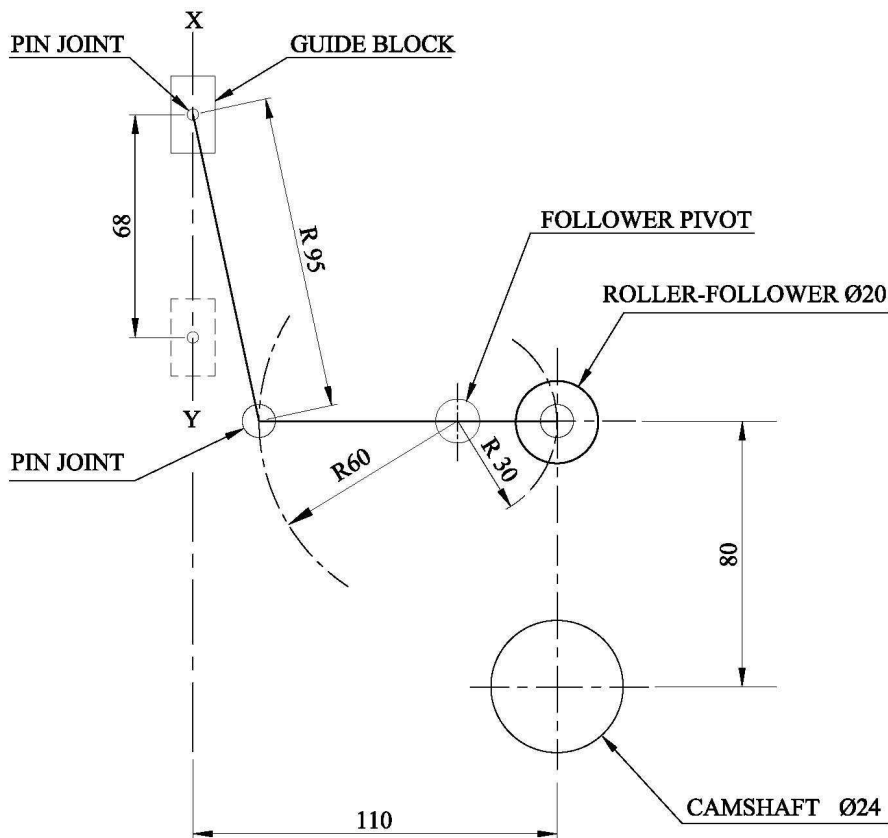
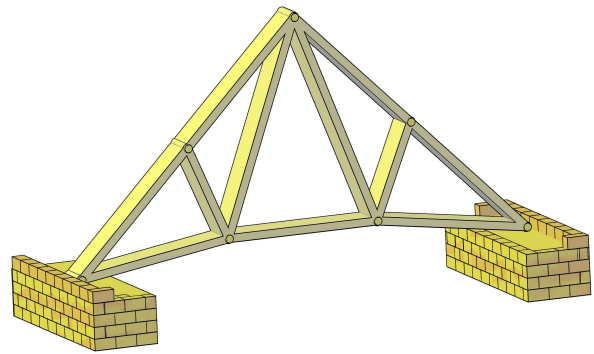


Figure 3

Question 4

The pin jointed structure shown in Figure 4 is simply supported at the left and right reactions.

- To a scale of 3mm representing 1 metre, draw the space diagram and the framework with the external forces, reactions and Bow's notation as shown in Figure 4;
- using a scale of 10mm representing 1kN, draw a force diagram to represent the external forces and a polar diagram;
- construct a link polygon to determine the magnitude of the left and right reactions;
- determine the magnitude of the forces in each member of the framework;
- present a table showing the magnitude of the various forces. State which members are in tension and which members are in compression.



(20 marks)

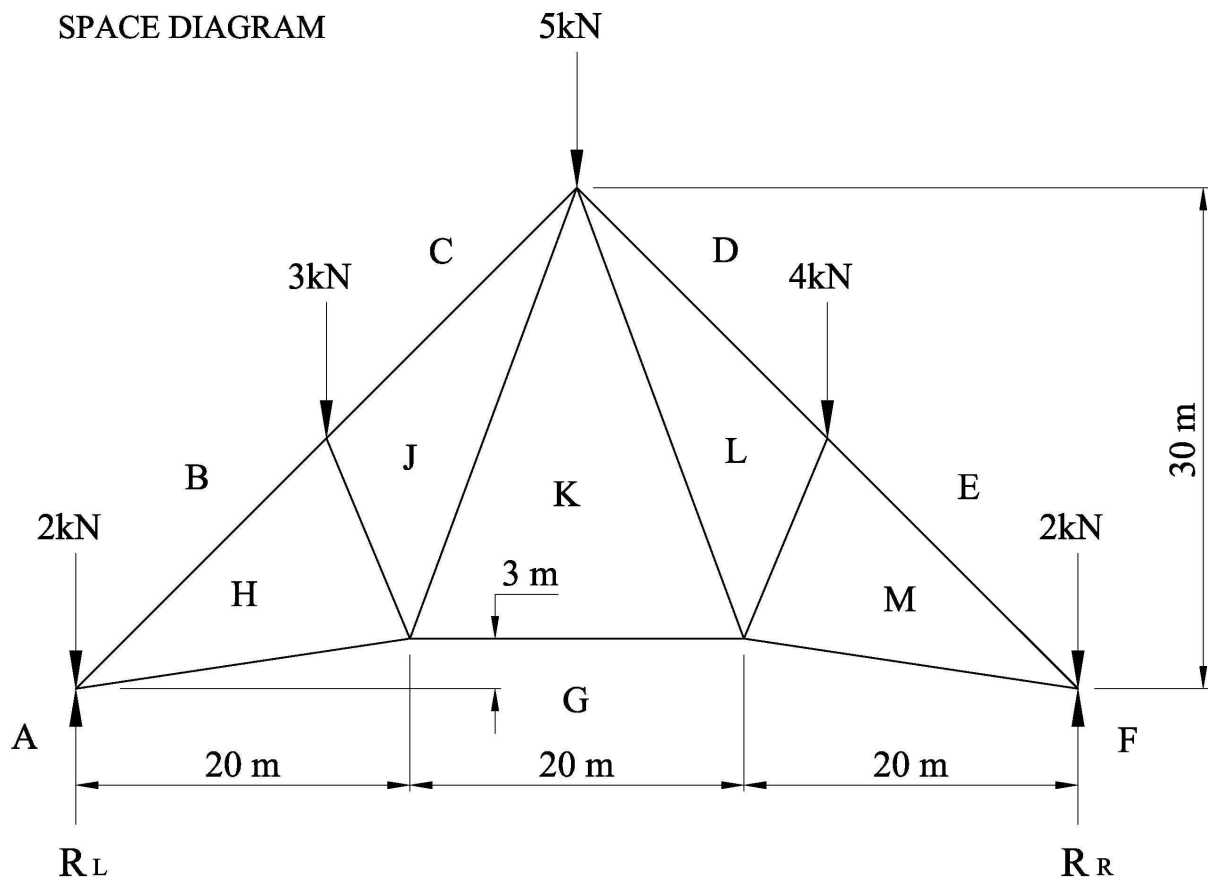
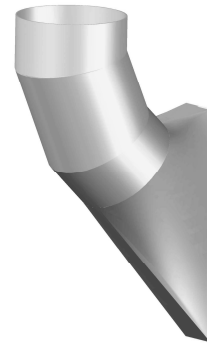


Figure 4

Question 5

The 3-D illustrations represent a transformer connection from a vertical rectangular hole to the segment of a lobster-back bend. For the purpose of development, the projection below presents the circle horizontal and the base inclined. The dimensions of the transformer connection are shown in Figure 5.



- Draw, full size, the given elevations;
- divide the plan into a number of triangles and find their true lengths;
- construct, the complete surface development to show a one-piece pattern of the transformer connection.

Notes:

- The joint line is to be presented along line 7b.
- Ignore sheet metal thickness and allowance for seam.

(20 marks)

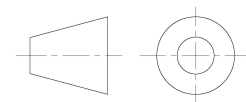
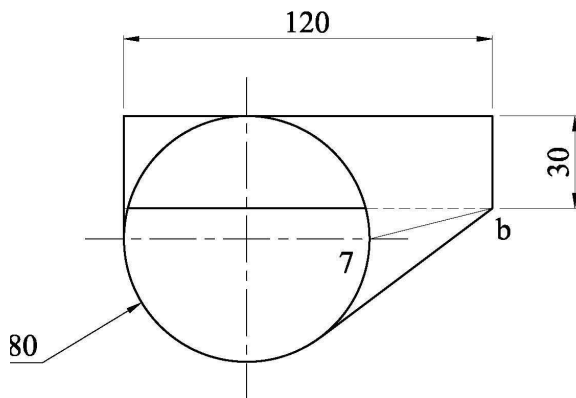
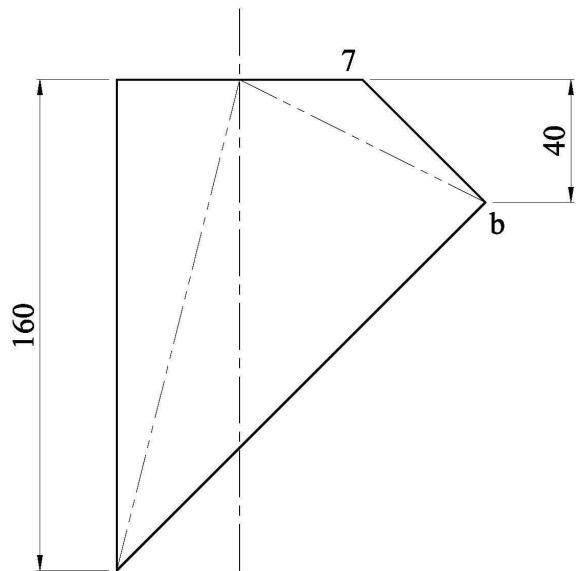


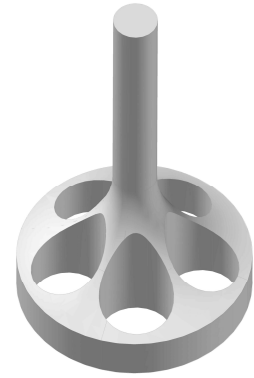
Figure 5

Question 6

An illustration of a solid of revolution pierced by five drilled holes is shown. The elevation and plan in Figure 6 show the machined solid after being turned and drilled respectively.

- Draw full size, the given views and construct the interpenetration curves resulting in the elevation of the holes marked A and B.
- Project an end elevation showing clearly the lines of intersection between the cylindrical holes A and B and the solid.

Do not show hidden detail.



(20 marks)

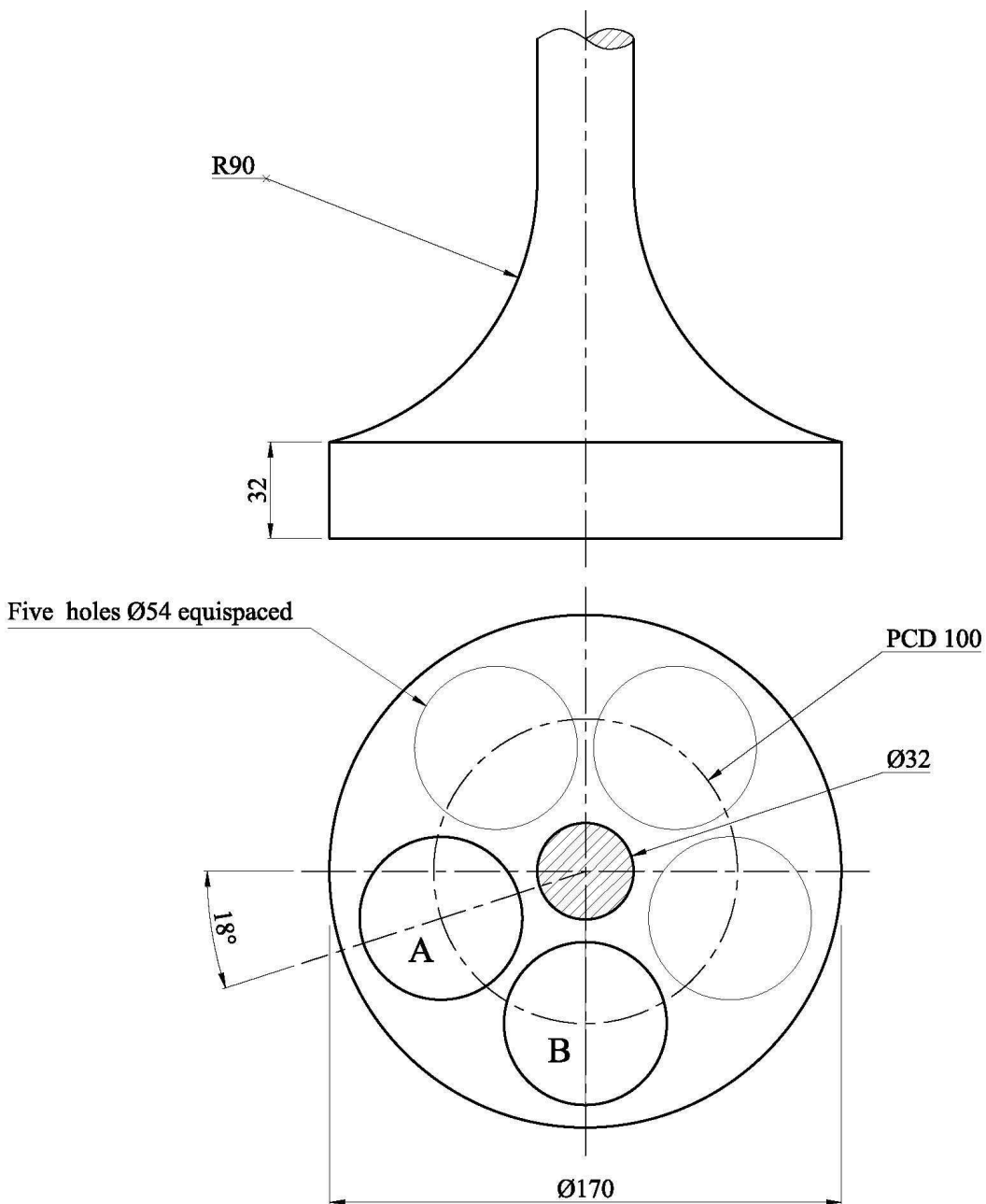


Figure 6

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

MATRICULATION CERTIFICATE EXAMINATION
ADVANCED LEVEL
MAY 2013

SUBJECT:	GRAPHICAL COMMUNICATION
PAPER NUMBER:	II
DATE:	8th May 2010
TIME:	9.00 a.m. to 12.00 noon

Directions to Candidates

Write your index number where indicated at the top of all drawing sheets.

Attempt **question 1** and any other **three** questions.

Programmable calculators **cannot** be used.

Unless otherwise stated:

- a. drawings should conform to B.S. or equivalent (ISO) standards;
- b. all dimensions are in millimetres;
- c. all answers are to be accurately drawn with instruments;
- d. all construction lines must be left on each solution;
- e. drawing aids may be used.

Dimensions not given should be estimated.

Careful layout and presentation are important.

Marks will be awarded for accuracy, clarity and appropriateness of constructions.

Colour/shading should be used where appropriate.

Mark allocations are shown in brackets.

Question 1 carries 34 marks. Questions 2, 3, 4 and 5 carry 22 marks each.

Question 1 (This question is compulsory)

The front view and the plan of a **clinic reception/waiting room** are shown in Figure 1. This central room leads to the general practitioner's and specialists' consulting rooms. The furniture in the room consists of a reception counter, a desk chair, three waiting benches, a wall-mounted flat television, three hanging framed paintings above the waiting benches, a hanging clock and two flower pots. The drop-down ceiling, positioned on top of the counter and having the same profile, is fitted with two spot lights. The remaining ceiling consists of lay-in square tiles mineral fibre panels and flash light fixtures. Two floor tile colours were used to create the pattern that represents the clinic's logo.

The given views constitute an integral part of the design process, but fail to convey a feeling of the **3D** proportions of this room.

You are to meet this requirement by drawing a **single-point estimated perspective drawing**. The viewing direction required is indicated by the arrows at the bottom of the figure.

- i) Using **three** preliminary sketches, in rectangles 45mm x 30mm, explore alternative positions of the horizon line and identify the one which, in your opinion, best describes the spaciousness of the reception area/waiting room.
(3 marks)
- ii) Based on your choice made in (i), produce the required illustration on a single side of an A2 size paper making the best use of the space available (the suggested floor tile size is 30mm).
(25 marks)
- iii) Enhance your answer graphically using colours, tone and texture.
(6 marks)

*You are not expected to apply colour/tone/texture to your whole illustration. You are advised to limit their use to a small area on each **different** item appearing in your illustration.*

(34 marks total)

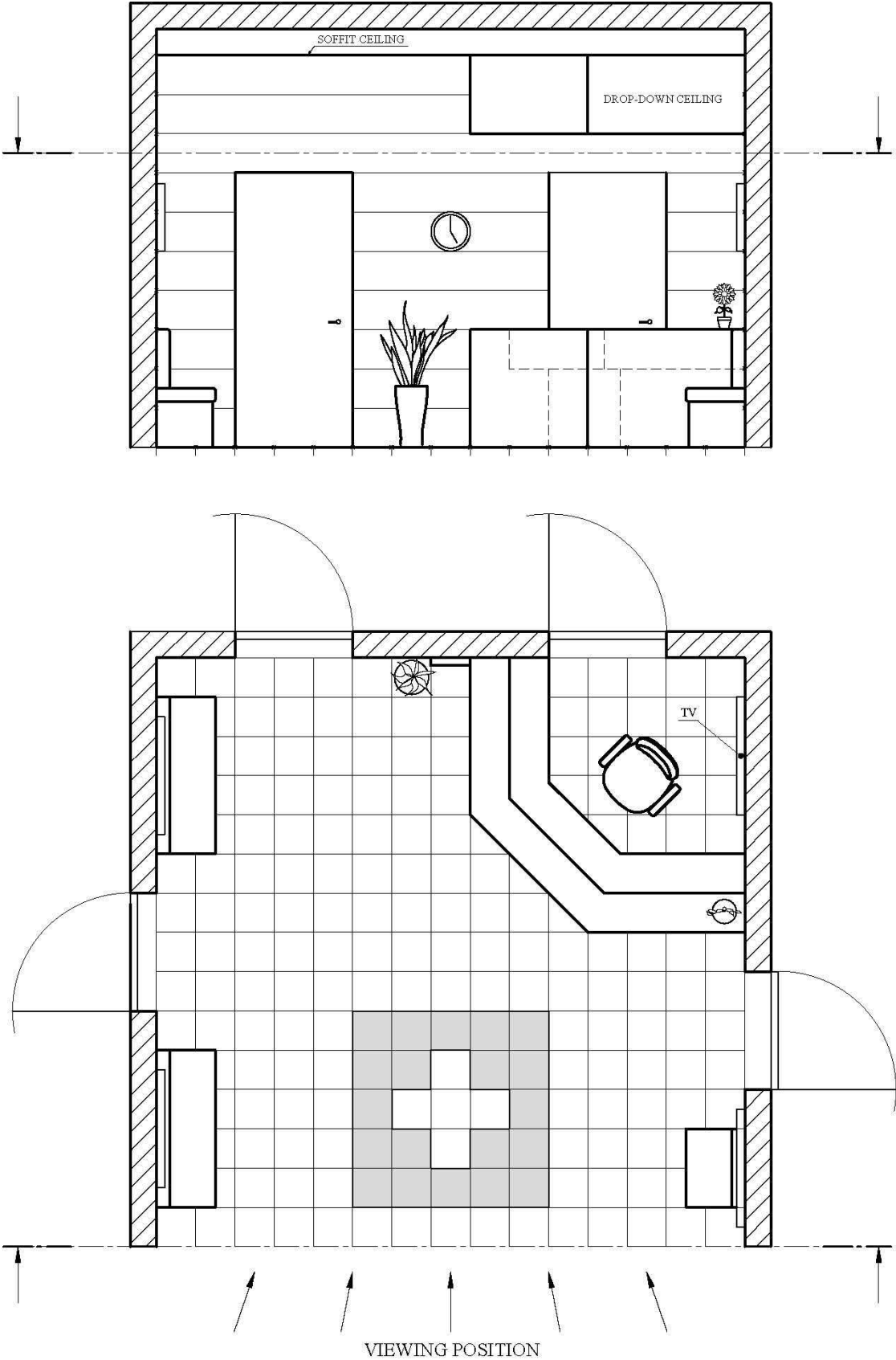


Figure 1

Question 2

A hands-on activity in a Graphical Communication classroom consists of making a cardboard model of a **Dustpan** shown in Figure 2.

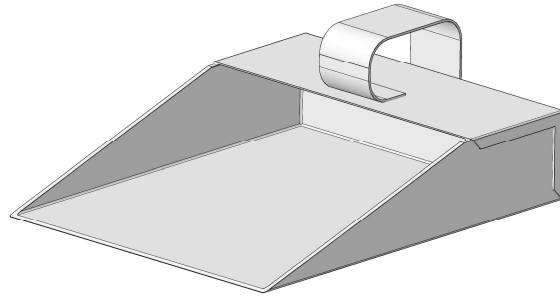


Figure 2

The process of producing this familiar item is divided into the following steps.

- a) Construct the surface developments of the dust pan and the handle on a sheet of cardboard. Draw folding lines to indicate where to make folds and make an allowance for glue tabs.
- b) Cut carefully around the surface development and handle, making sure not to cut off the glue tabs.
- c) Fold along the folding lines.
- d) Put a little glue on each tab.
- e) Tuck the tabs over the places where the cardboard shapes join, and leave to dry.
- f) Bend the handle.
- g) Glue the handle to the dust pan.

Design a pictorial instruction chart replacing the step by step written instructions with neat, easy to understand, step by step illustrated instructions.

You are to explore different chart layouts and the types of technical drawings/sketches you intend to use in order to make the chart easy to follow. Your investigation must be organized and clearly identified according to the steps given below.

- i. **Written analysis**
Identify, using keywords/short phrases, the main parameters you consider relevant when designing the chart. **(2 marks)**
- ii. **Graphical analysis**
Based on your response to (i), produce sketches to explore different layout possibilities. **(4 marks)**
- iii. **Graphical synthesis**
Clearly identify those elements produced in your response to (ii) that you intend to use in your final image. **(2 marks)**
- iv. **Final realisation**
Produce the final illustrated chart. **(14 marks)**

Marks will be awarded for appropriateness of design and the neat use of colour.

(22 marks total)

Question 3

The management of a local hotel, situated close to a popular beach, decided to place an advert in a travel magazine. The aim of this advert is to promote the qualities of the hotel and its surrounding environment as an ideal destination for tourists who enjoy swimming, scuba diving and sunbathing. The advert is to accentuate the swimming related services offered by the hotel namely:

- Scuba diving;
- Snorkeling;
- Indoor swimming pool;
- Swimming pool for kids and the family;
- Springboard diving;
- Comfortable sunbathing;
- Shower.

To make the advert more eye-catching, it was decided that the services offered be illustrated by means of a set of pictograms, similar to the scuba diving pictogram shown in Figure 3.



Figure 3

Your task is to design the **six** other pictograms, (having the same style and format as the one given), to illustrate the other services offered.

- Draw the preliminary sketches (stick figures) in squares 50mm X 50mm; **(6 marks)**
- draw the final drawings in squares 100mm X 100mm; **(12 marks)**
- render **only one** of the final drawings. **(4 marks)**

Note:

All the pictograms are to include the human figure.

(22 marks total)

Question 4

A kayak manufacturing company has recently launched four different kayak models to satisfy the growing demands of its clients. All the models have a single seat and two sealed dry storage compartments in the front and in the rear. The model shown on the right is already proving to be the most popular among first time buyers. The other models, which have the same width, are longer, faster but more difficult to handle. In fact they are targeted to meet the requirements of the more experienced kayakers.



Figure 4

The specifications of the four different models are given in the table below.

Model	Length	Kayak Weight	Storage Volume	Speed	Price
A	3 m	20 kg	100 L	3 knots	€500
B	4 m	25 kg	150 L	4 knots	€600
C	5 m	30 kg	200 L	5 knots	€700
D	6 m	35 kg	250 L	6 knots	€800

The company requires an infographic reflecting the theme **KAYAKS** in a creative manner to represent the above information in a graphic format in order to make it understandable at a glance.

- a) Produce a 3D graphic representation to compare models A, B, C and D by way of their:
- length;
 - weight;
 - storage volume;
 - price.

(12 marks)

- b) Produce a 2D line graph to illustrate that the length of the kayaks has a major influence on their speed. Draw the horizontal axis to represent speed and the vertical axis to represent the length of the kayaks. The words speed and length of kayak must not be written but are to be represented in graphic form.

(6 marks)

- c) Use suitable colours to enhance your infographic.

(4 marks)

(22 marks total)

Question 5

The picture on the right shows the logo of **HEXAGON INSURANCE** company which offers a varied range of insurance products including **car, home, travel, health, boat** and **commercial** insurance.

As part of its publicity campaign, the company has launched a flyer (leaflet) competition with the following design brief:

" The company would like a dynamic and sophisticated flyer design that attracts the attention of new and returning clients. The design, which is intended to be printed on A4 glossy paper in either landscape or portrait format, must include the following elements:



- The company logo,
- The tagline *You're in good hands*
- Six graphic symbols/icons to represent the insurance products that we offer.
- A suitable colour scheme. "

You have been asked to submit your design. Your work must be broken down in the steps given below, with each part being clearly identified.

- Written analysis**
Write down keywords/short phrases associated with the graphic symbols/icons to illustrate the insurance products and the flyer layout.
(2 marks)
- Graphical analysis**
Based on your response to (i), produce a series of sketches that graphically illustrate your developing ideas.
(4 marks)
- Graphical synthesis**
Clearly identify those elements produced in your response to (ii) that you intend to use in your final design.
(2 marks)
- Final realization**
Produce your final solution in a rectangle 297 x 210 (A4 size) in either landscape or portrait format .
(14 marks)

(22 marks total)