



SUBJECT:	Graphical Communication
PAPER NUMBER:	I
DATE:	19th May 2025
TIME:	9:00 a.m. to 12:05 p.m.

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:

- 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 in 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.

Question 1.

A three dimensional illustration of two skew lines AB and CD is shown in Figure 1a. Dimensioned orthographic views of the skew lines are given in Figure 1b.

You are requested to:

- a. copy Figure 1b in a carefully planned starting point; (1)
- b. determine and state the shortest distance between the two lines; (10)
- c. label the shortest distance line RS; (1)
- d. project line RS to all views; (4)
- e. determine the true angle that line RS makes with the H.P.; (1)
- f. determine the true angle that line RS makes with the V.P.; (1)
- g. determine the true lengths of lines AB and CD. (2)

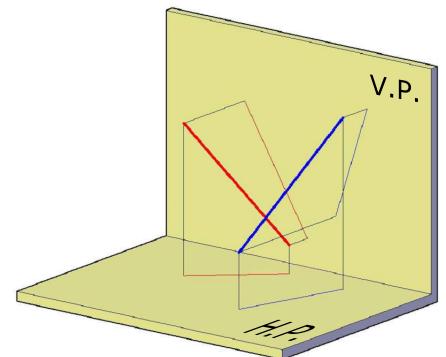


Figure 1a

(Total: 20 marks)

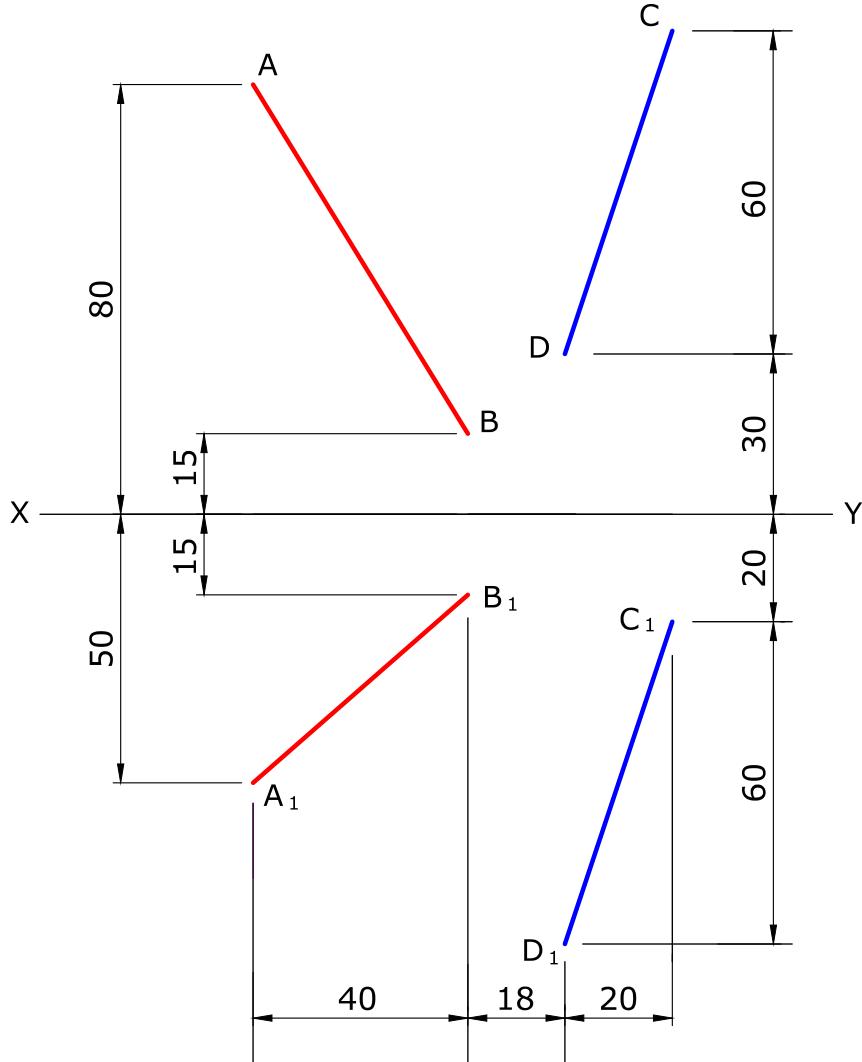
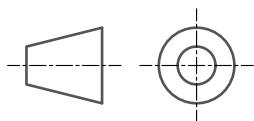


Figure 1b



Question 2.

A pictorial view of a transition piece connecting a truncated cylinder to a hexagonal prism is shown in Figure 2a. A dimensioned front elevation and plan are given in Figure 2b.

You are requested to:

- copy the given views; (2)
- project a half surface development of cylinder 'A'; (2)
- draw the crease lines on the transition piece 'B' and label using letters and numbers; (2)
- construct the necessary true lengths; (4)
- draw a half-development of the transition piece 'B' taking X-1 as the seam line. (10)

(Total: 20 marks)

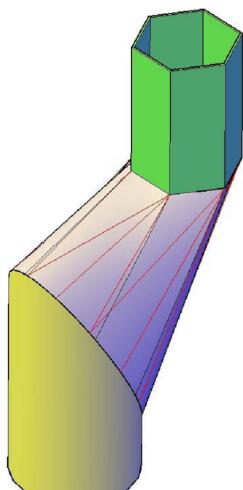


Figure 2a

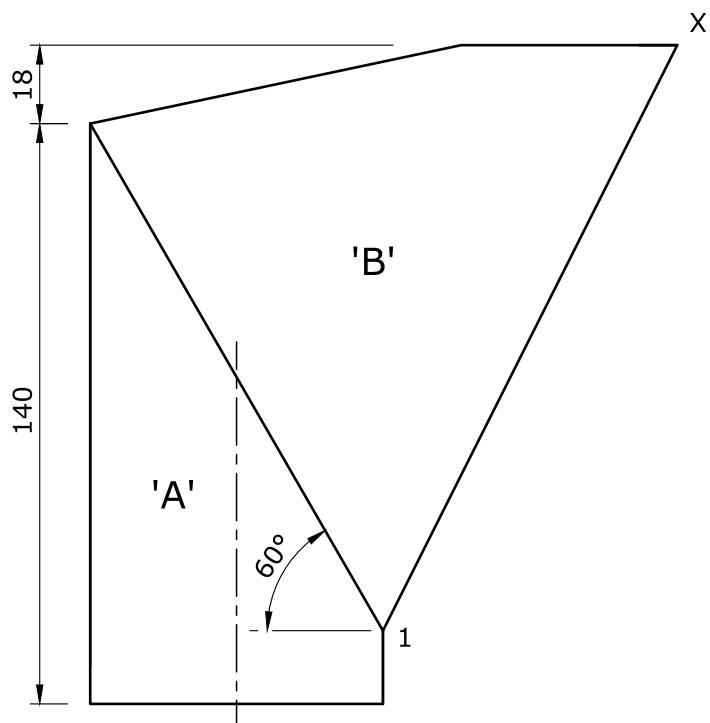
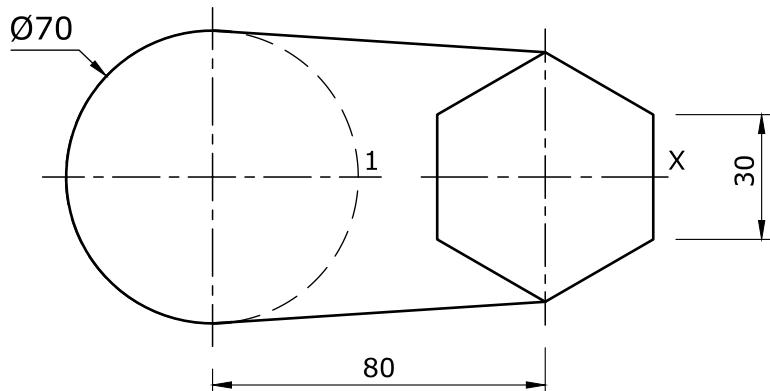
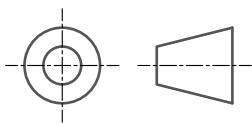


Figure 2b

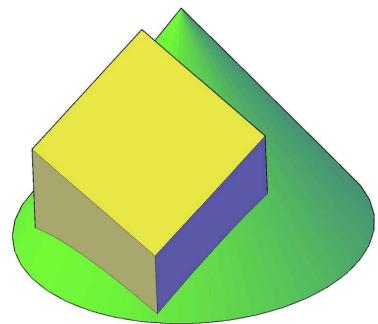


Question 3.

Figure 3a illustrates a pictorial view of right cone intersected by a square prism. Dimensioned orthographic views of the two intersecting solids are given in Figure 3b.

You are requested to:

- a. copy the given orthographic views; (2)
- b. construct the curve of intersection on the front elevation; (10)
- c. project the curve of intersection to the plan. (8)



Note:

Show hidden detail in both views.

(Total: 20 marks)

Figure 3a

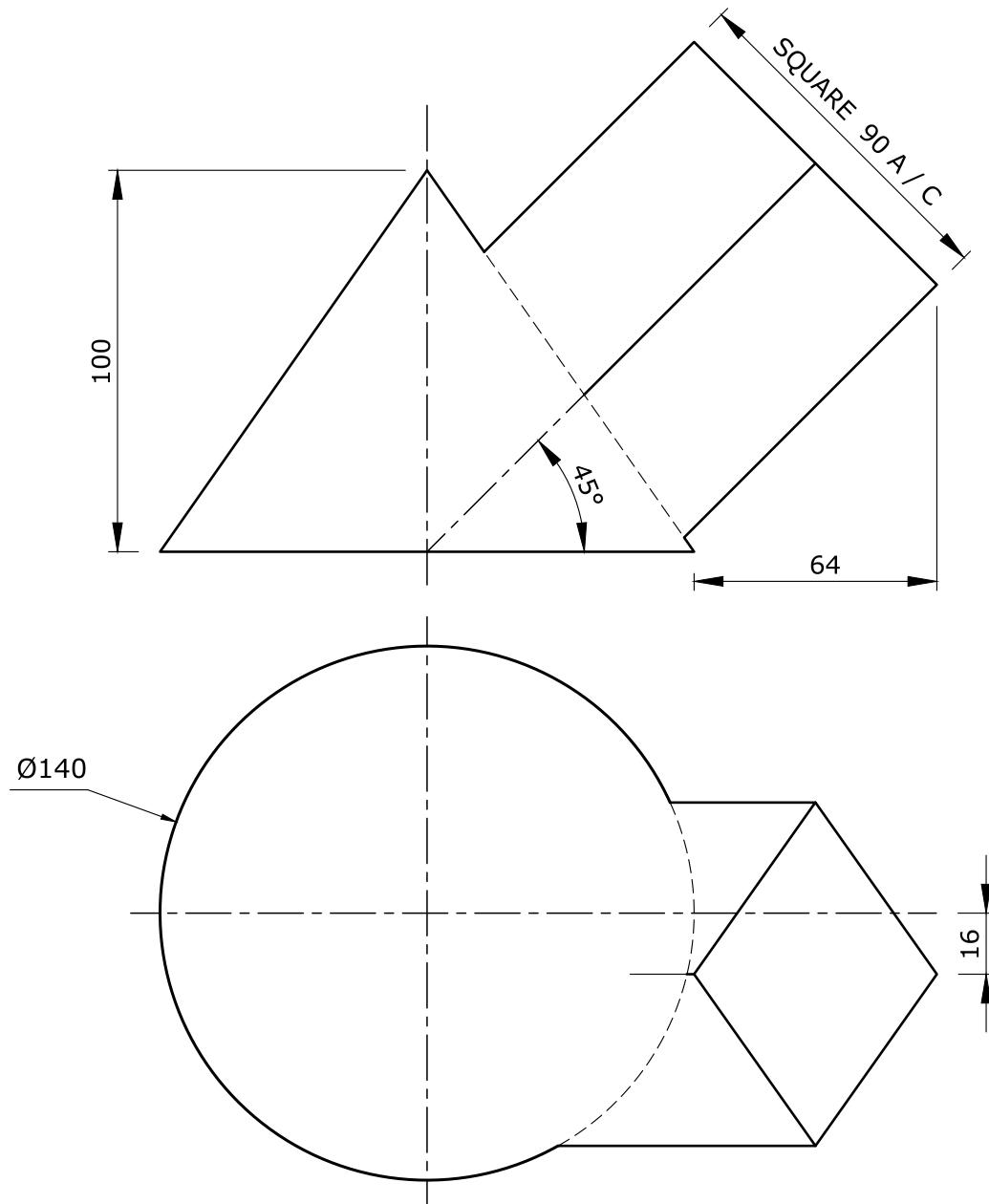
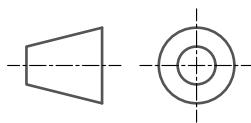


Figure 3b



Question 4.

Figure 4a shows a right cone with a machined square hole. The object is cut by an oblique plane VTH. Two orthographic views and the vertical and horizontal traces are shown in Figure 4b.

You are requested to:

- a. copy the given views and the traces VTH; (1)
- b. project an auxiliary view of the cone showing the oblique plane as an inclined cutting plane; (2)
- c. project the truncation of the cone to the plan; (4)
- d. project to the front elevation; (4)
- e. project the true shape of cut; (3)
- f. state the name of the resulting conic section; (1)
- g. locate by construction the upper focal sphere; (2)
- h. locate the foci and directrix of the conic section; (2)
- i. derive its eccentricity. (1)

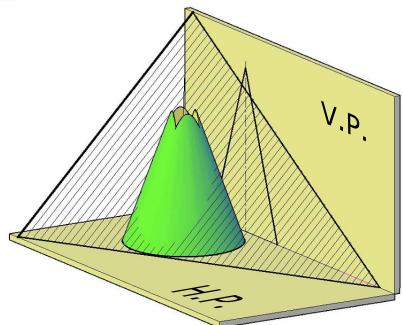


Figure 4a

Note: Show hidden detail of the square machined hole.

(Total: 20 marks)

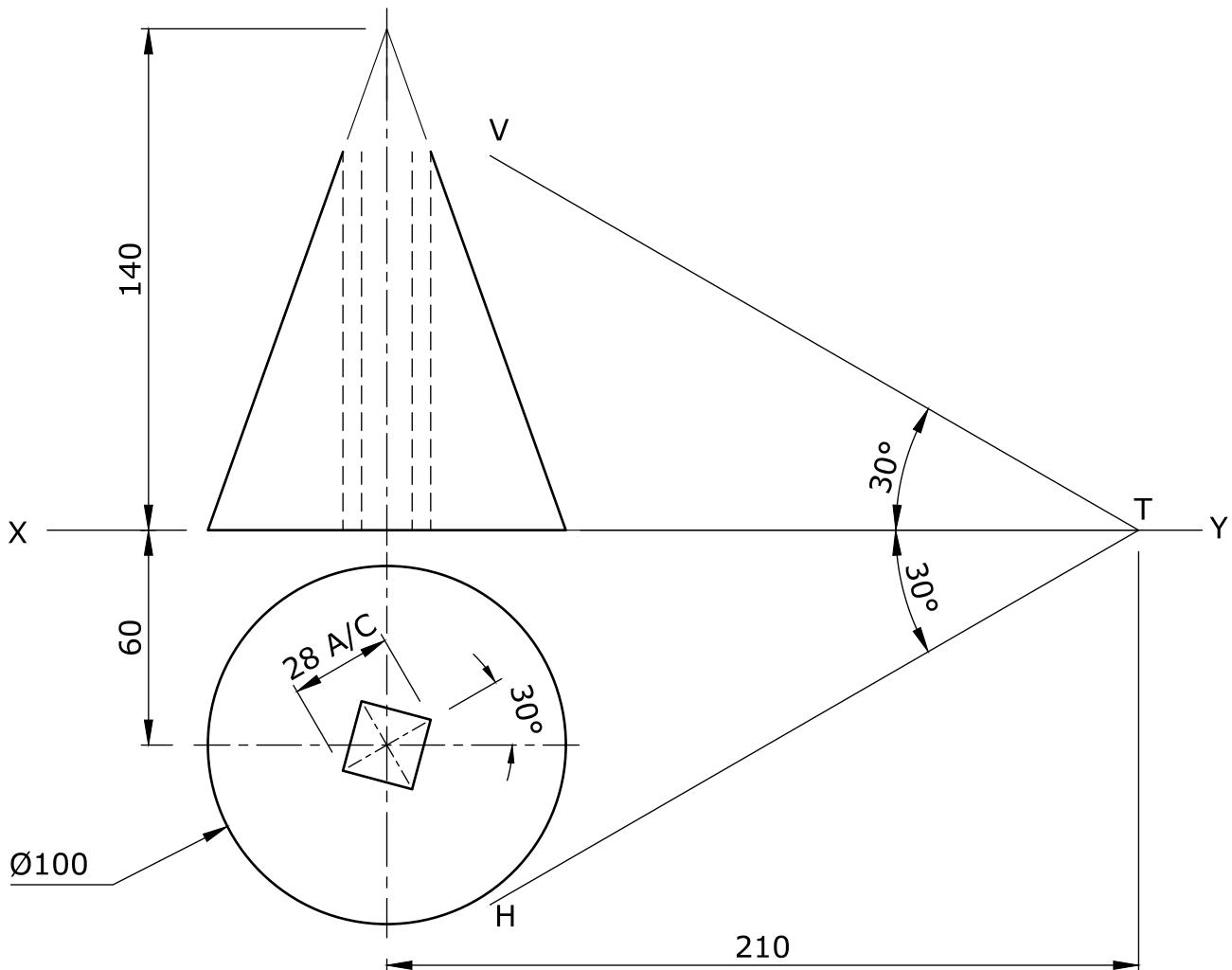
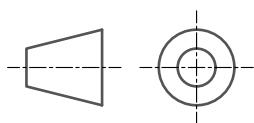


Figure 4b



Question 5.

The space diagram of a roof truss supported by two overhang reactions is shown in Figure 5.

You are requested to:

- a. copy the space diagram using a scale of 10 mm representing 1 m; (1)
- b. label the adjacent forces by using Bow's notation; (1)
- c. draw the polar diagram using a scale of 10 mm representing 1 kN; (4)
- d. determine the reaction forces of R_R and R_L ; (4)
- e. determine graphically the forces developed in the members; (5)
- f. state which members are in tension and which are in compression; (4)
- g. organise your results in a tabulated format. (1)

(Total: 20 marks)

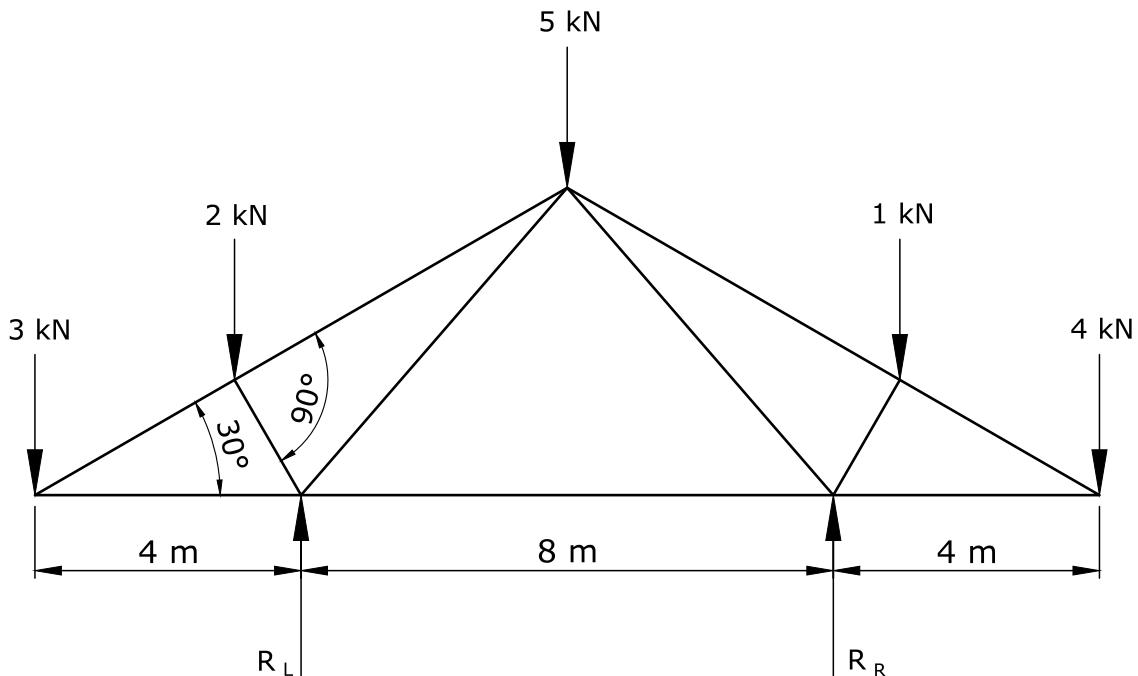
SPACE DIAGRAM

Figure 5

Question 6.

An illustration of a wheel and a pinion is shown in Figure 6a. These involute spur gears provide a speed reduction of 2:1. The driver gear (pinion) is connected to an electrical motor while the driven (wheel) turns at half the speed. Both gears are coplanar with a pressure angle of 20° and a module of 14. The wheel has 24 teeth. The starting lines and an illustration of the gear teeth are shown in Figure 6b.

You are requested to:

- calculate all the necessary measurements and input the derived data in table format; (4)
- construct the base circles and **ONE** involute of each gear tooth; (6)
- draw **THREE** gear teeth on the wheel and **TWO** on the pinion; (8)
- indicate on the drawing the diameters of both gears' base circles. (2)

Note:

- One tooth of each gear must be drawn using the true involute form, while the others may be constructed using approximate geometrical methods.

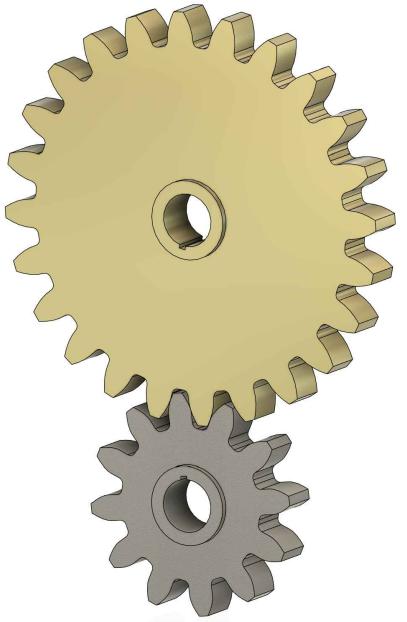


Figure 6a

(Total: 20 marks)

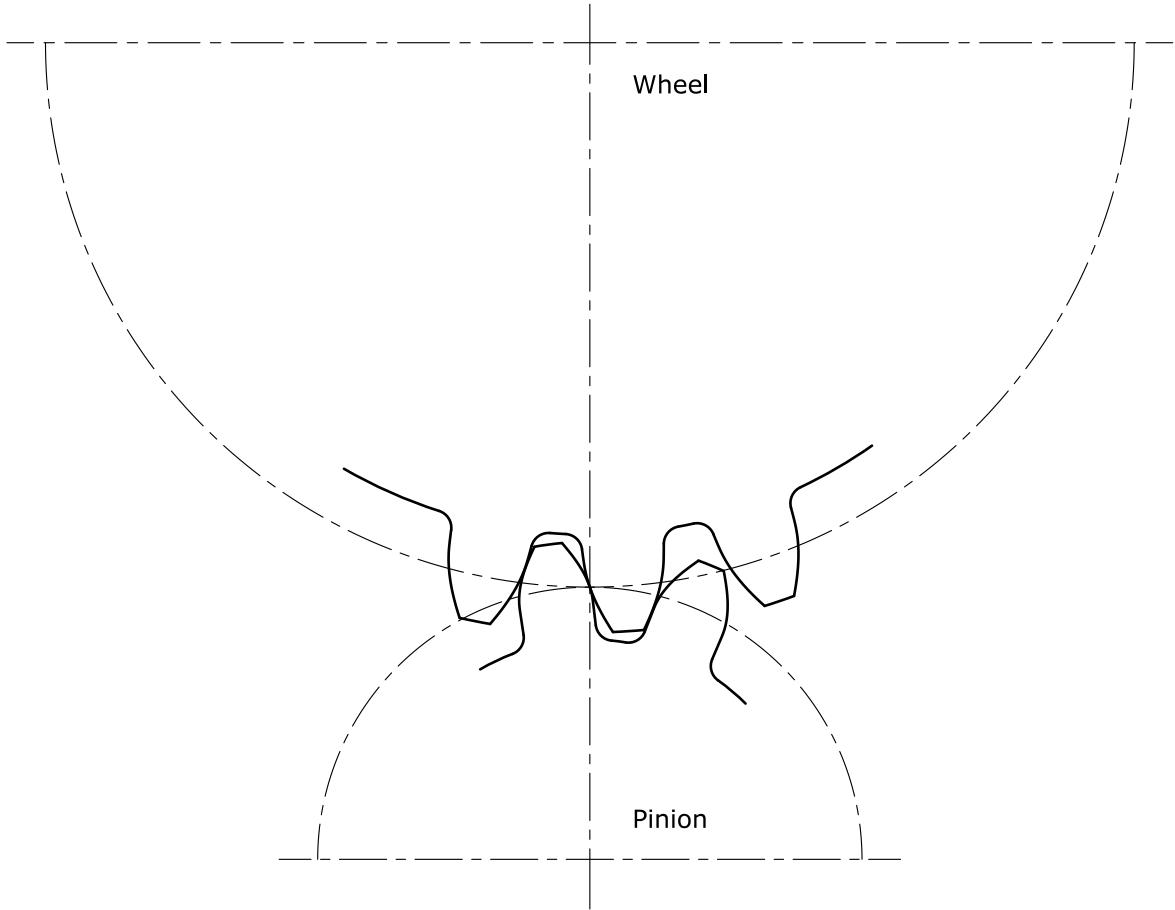


Figure 6b



SUBJECT: **Graphical Communication**
PAPER NUMBER: II
DATE: 19th May 2025
TIME: 4:00 p.m. to 7:05 p.m.

Directions to Candidates

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

Attempt all **FOUR** 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. 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, and 4 carry 22 marks **each**.

Question 1.

Figure 1 shows three orthographic views of an office booth at a trades fair convention. These orthographic views feature the proportion of every element within the entire setting. Use this information to construct a one-point estimated perspective of this setting. The arrows on the front elevation and the plan indicate the viewing direction.

- Using **THREE** preliminary sketches, explore alternative positions of the horizon line and identify the one which, in your opinion, best describes the spaciousness of the entire area. These sketches should show the setting in question and executed with purpose. (3)
- Based on the choice made in part (a), use a suitable scale to produce the required illustration on a single side of an A2 size paper, making the best use of the space available. (26)
- Enhance your drawing by colouring small areas of the different items appearing in your illustration. (5)

Notes:

- The main structure is made of painted timber.
- The floor level of the booth is tiled.

(Total: 34 marks)

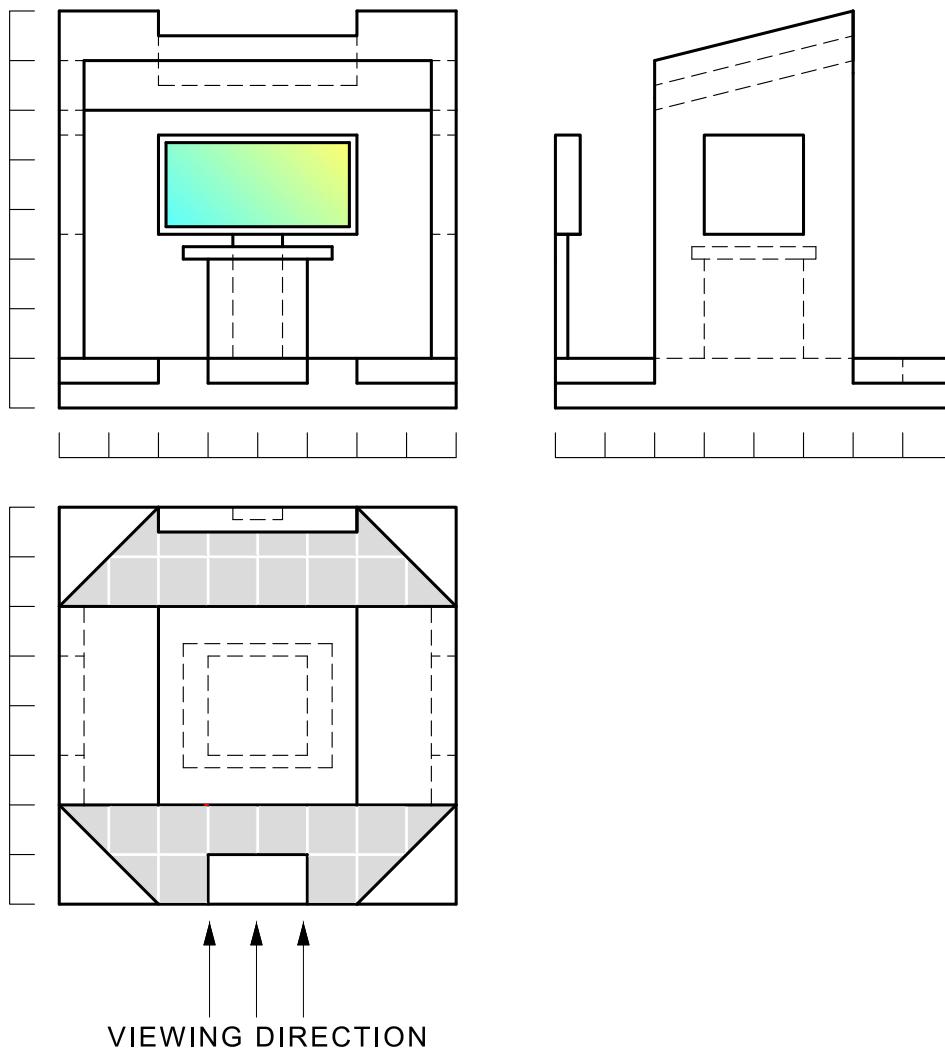


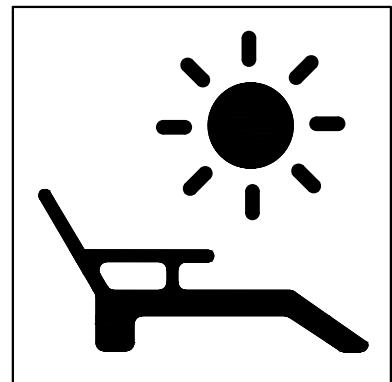
Figure 1.

Question 2.

The management of a cruise liner needs a set of pictograms for passengers to find their way round onboard venues. The one for SUN DECK has already been designed, as it appears in Figure 2a.

Design the remaining pictograms with the same style and format of the one shown by:

- a. drawing preliminary sketches in squares 50 X 50; (6)
- b. drawing the final drawings in squares 100 X 100; (12)
- c. rendering only one of the final drawings. (4)



SUN DECK

The pictograms to be designed are the following:

1. Bar and Restaurant;
2. Gym;
3. Clinic;
4. Indoor pool;
5. Theatre for music performance;
6. Casino.

Note: The suggested layout is shown in Figure 2b below.

(Total:22 marks)

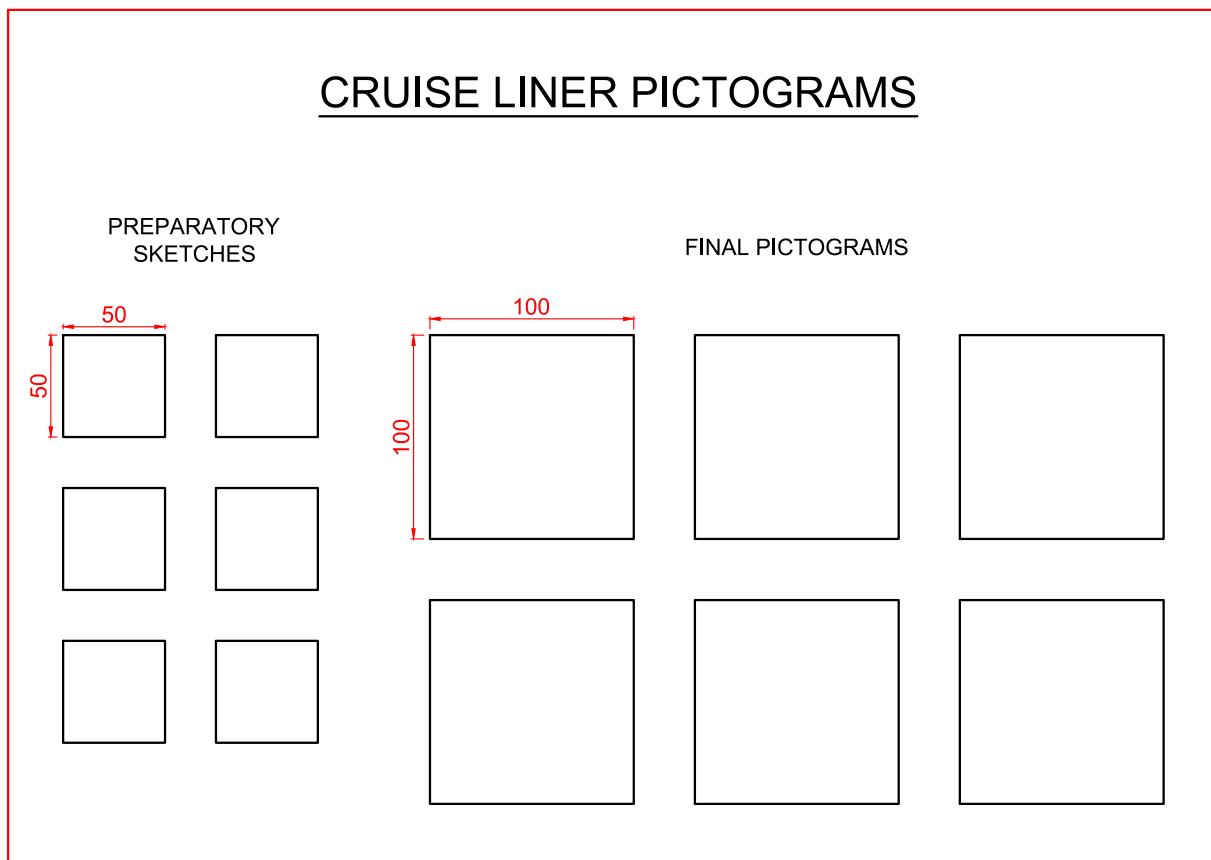


Figure 2b.

Question 3.

Figure 3a shows the assembled pictorial view of a key chain that is given as a token by a gaming company by the name of 'PLAY RIGHT'. This token is composed of four separate pieces; namely an upper part, a lower part, a dowel, and a metal key ring, screwed into the upper part.

- Sketch a well-proportioned freehand exploded view of this token, showing clearly how the four separate parts are assembled together. Use arrows to aid your explanation. (10)
- Draw a monogram (logo) using the initials of the gaming company (PR). This monogram will be printed on the token by the gaming company for advertisement purposes. Draw preparatory sketches to illustrate your developing ideas. (12)

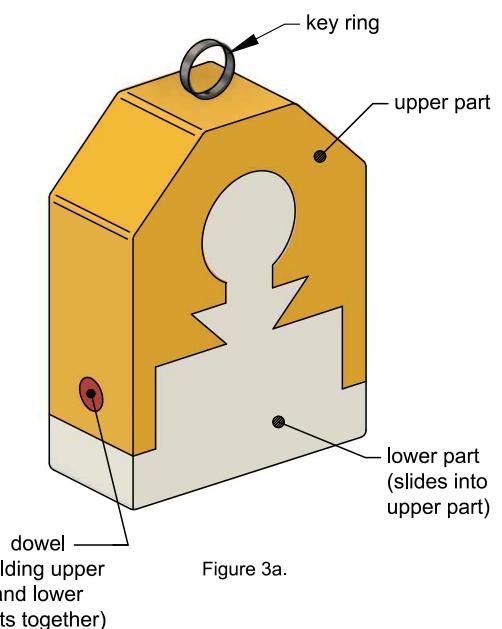


Figure 3a.

Note:

Space your work as shown in Figure 3b below.

(Total: 22 marks)

<p>SPACE FOR EXPLODED PICTORIAL VIEW</p>	<p>PREPARATORY SKETCHES FOR MONOGRAM</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 100px; height: 50px;"></div> <div style="border: 1px solid black; width: 100px; height: 50px;"></div> </div> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 100px; height: 50px;"></div> <div style="border: 1px solid black; width: 100px; height: 50px;"></div> </div> <p>FINAL PRESENTATION OF MONOGRAM</p> <div style="border: 1px solid black; width: 100%; height: 100px;"></div>
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Figure 3b.

Question 4.

Figure 4 shows three orthographic views of a drone.

- a. Make a well-proportioned pictorial (3D) freehand drawing of this drone. (16)
- b. Colour and shade your drawing using the following instructions: (6)

- upper body - durable plastic metallic finish (silver grey);
- lower body - durable plastic matte finish (green);
- propellers - durable plastic matte finish (yellow);
- propeller bases - durable plastic metallic finish (red);
- landing arms - durable plastic matte finish (yellow).

Note:

The colour and finish of the other components not mentioned above is left to your discretion.

(Total: 22 marks)

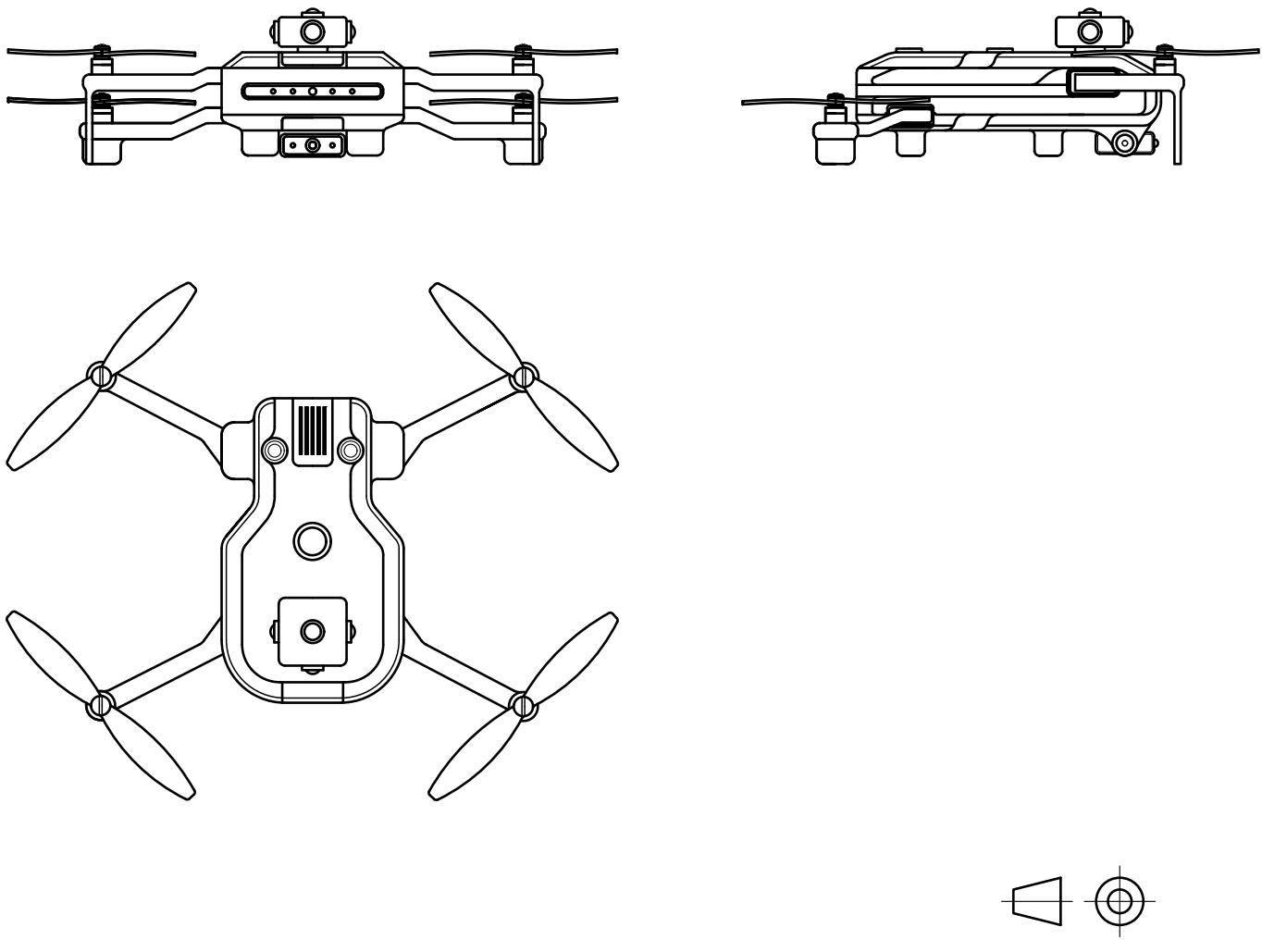


Figure 4.

