SMARTWIZ

GRADE 12 ENGINEERING GRAPHICS AND DESIGN (EGD) EXAM

MARKS: 100

MARKS	

TIME: 2 HOURS

SCHOOL _____

CLASS (eg. 4A) _____

SURNAME _____

NAME _____

Instructions for Learners:

- Read all instructions carefully before you begin the exam.
- Write your full name and student number clearly on the answer sheet/book.
- Answer all questions unless otherwise instructed.
- Show all your work/calculations where necessary.
- Write neatly and clearly.
- Use only a blue or black pen. Do not use correction fluid or tape.
- Electronic devices (calculators, cell phones, etc.) are not allowed unless explicitly permitted.
- Raise your hand if you have any questions.
- Do not talk to other learners during the exam.
- Any form of dishonesty will result in immediate disqualification from the exam.

This exam consists of Five pages, including the cover page.

✅ QUESTION 1: ORTHOGRAPHIC PROJECTIONS [25 marks]

Visual Description:

A 3D **L-shaped object** composed of two rectangular prisms:

- **Base block**: 80 mm long, 50 mm wide, and 20 mm high.
- **Vertical block**: 40 mm long, 50 mm wide, and 30 mm high, placed centrally on the back of the base block.

Tasks:

1. Draw the **Front View**.
2. Draw the **Top View**.
3. Draw the **Left Side View**.

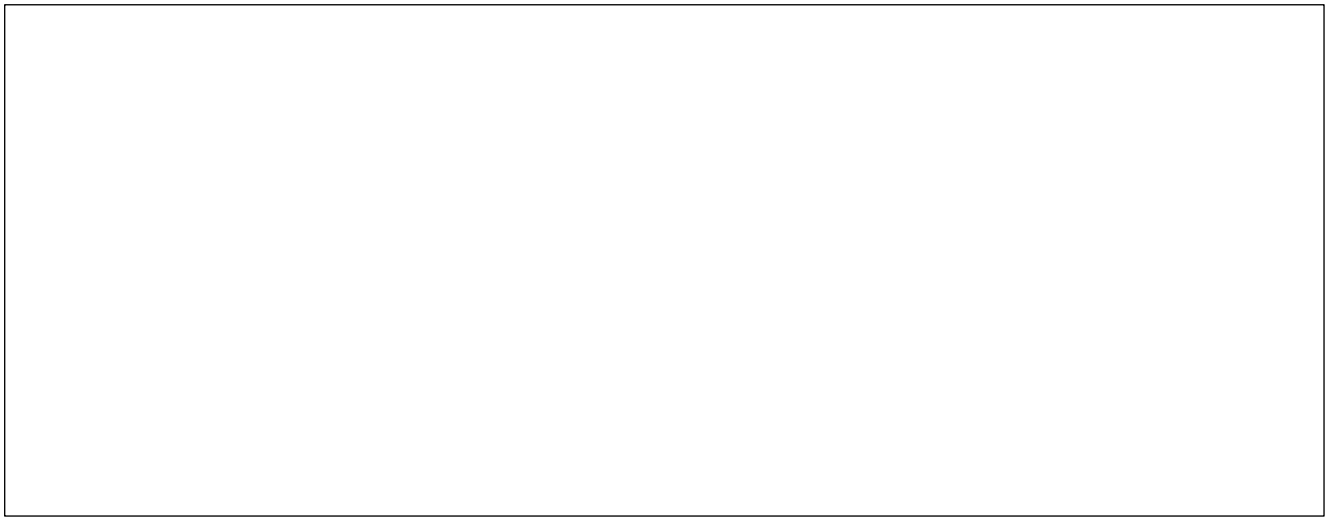
Use third-angle projection. Use the space below:

✅ QUESTION 2: ISOMETRIC DRAWING [20 marks]

Task:

Draw an **isometric view** of the L-shaped object described in **Question 1** using isometric projection techniques.

Indicate visible and hidden edges clearly.



✅ QUESTION 3: DEVELOPMENT OF A FRUSTUM [20 marks]

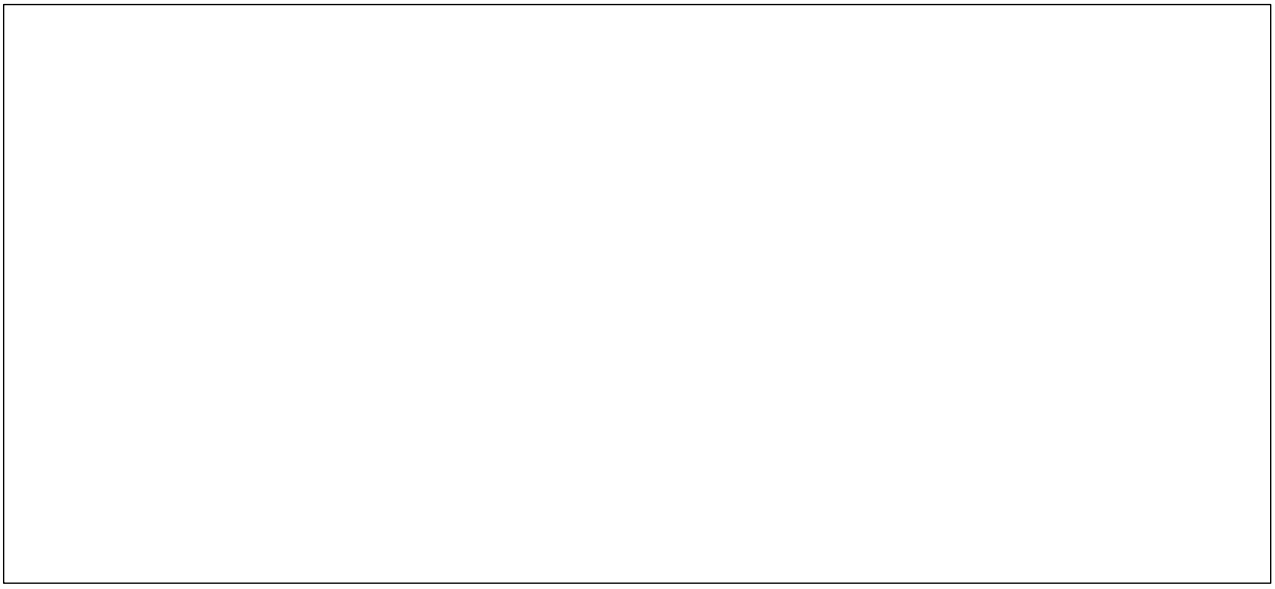
Visual Description:

A **frustum of a cone** has a bottom diameter of 60 mm, top diameter of 30 mm, and vertical height of 50 mm.

Tasks:

1. Draw the **front elevation** of the frustum.
2. Draw the **development (net)** of the lateral surface.
    - Use appropriate arc length and slant height formula.

Use the space below for construction:



✅ QUESTION 4: INTERPRETING DRAWINGS [15 marks]

Scenario:

You are given a technical drawing of a **flat mounting plate**:

- Dimensions: 100 mm × 60 mm × 5 mm thick
- Two M10 holes drilled 20 mm from the left and right edges, centered vertically
- A slot of 40 mm × 10 mm centered horizontally, 10 mm from the top

Tasks:

1. Sketch a **fully dimensioned front view** of the plate.
2. Label all holes, dimensions, and material thickness.

✅ QUESTION 5: THEORY [20 marks]

Answer briefly:

5.1 What is a cutting plane in sectional views?

5.2 List two advantages of CAD over manual drawing.

5.3 Explain the term tolerance in engineering drawings.

5.4 Describe what is meant by a datum in dimensioning.

✅ **END OF EXAM**

TOTAL : 100

MEMO

QUESTION 1: ORTHOGRAPHIC PROJECTIONS [25 marks]

Visual Recap: L-shaped object:

- Base: 80 × 50 × 20 mm
- Vertical block: 40 × 50 × 30 mm, centered at back
- **Front View:**
  - Correct height: 50 mm total (20 mm base + 30 mm top block)
  - Width: 80 mm
  - Vertical block starts at back half of base
  - All visible edges shown (9 marks)
- **Top View:**
  - Width: 80 mm
  - Depth: 50 mm
  - Vertical block centered at rear 40 mm × 50 mm
  - Visible outlines clear (8 marks)
- **Left Side View:**
  - Height: 50 mm
  - Depth: 50 mm
  - Base 20 mm high; vertical block 30 mm high sitting on base
  - All visible edges shown (8 marks)

QUESTION 2: ISOMETRIC DRAWING [20 marks]

- Correct isometric angles (30° projection) (5 marks)
- Base block: 80 mm × 50 mm × 20 mm drawn correctly (5 marks)
- Vertical block: 40 mm × 50 mm × 30 mm placed centrally at the back (5 marks)
- Lines neat and hidden edges shown (5 marks)

QUESTION 3: DEVELOPMENT OF A FRUSTUM [20 marks]

- **Front Elevation:**
  - Trapezoid shape: 60 mm base, 30 mm top, 50 mm height (5 marks)
- **Development (Net):**
  - Slant height calculated:
    $l=(502+(60−302)2)=2500+225=2725≈52.2$ mml = \sqrt{(50^2 + (\frac{60 - 30}{2})^2)} = \sqrt{2500 + 225} = \sqrt{2725} ≈ 52.2 \, mml=(502+(260−30)2)=2500+225=2725 ≈52.2mm
  - Arc length based on bottom circumference:
    $C=π×D=π×60≈188.5$ mmC = \pi × D = \pi × 60 ≈ 188.5 \, mmC=π×D=π×60≈188.5mm
  - Arc with radius ≈ 52.2 mm and arc length ≈ 188.5 mm

- Top arc (inner curve) for 30 mm diameter also included (15 marks)

QUESTION 4: INTERPRETING DRAWINGS [15 marks]

- **Front View:**
  - Plate 100 mm × 60 mm
  - Two holes, 20 mm from sides and centered vertically (diameter 10 mm shown with M10)
  - Slot 40 mm × 10 mm, 10 mm from top, centered horizontally
  - All dimensions labeled and correct (10 marks)
- **Material thickness labeled as 5 mm** (2 marks)
- Holes and slot labeled clearly (3 marks)

QUESTION 5: THEORY [20 marks]

5.1 Cutting plane:

- Imaginary plane used to cut through a component to show internal features in a sectional view. (5 marks)

5.2 Advantages of CAD:

- Faster modifications
- Higher accuracy
- Easier storage and duplication
- 2 valid points required (4 marks)

5.3 Tolerance:

- Permissible variation in a dimension. Ensures parts fit even if they vary slightly. (6 marks)

5.4 Datum:

- A reference point, line, or surface from which dimensions are measured. (5 marks)

✅ **TOTAL: 100 MARKS**