National Exams May 2012

04-BS-15, Engineering Graphics & Design Process

3 hours duration

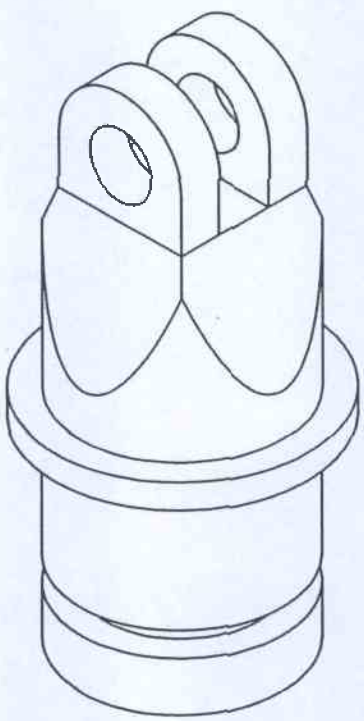
NOTES

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a closed book examination. Candidates may use one of two calculators, the Casio or Sharp approved models.
3. *Aids allowed:*
    a. Straight edge
    b. Engineering squares or rolling ruler
    c. Pencil and eraser
    d. Engineering scale
    e. Protractor
    f. Compass
4. Ten (10) questions constitute a complete exam paper. Clearly label the answers in the answer book.
5. All questions are of equal value.
6. Failure to follow the above directions will result in grade penalties.
7. All questions have a grading rubric attached. The rubric (with headings *criterion* and *grade*) is a guideline that will be used to assign marks and penalties.
8. All sketches must be made freehand and must be easy to read and neat.

EXAMINATION QUESTIONS

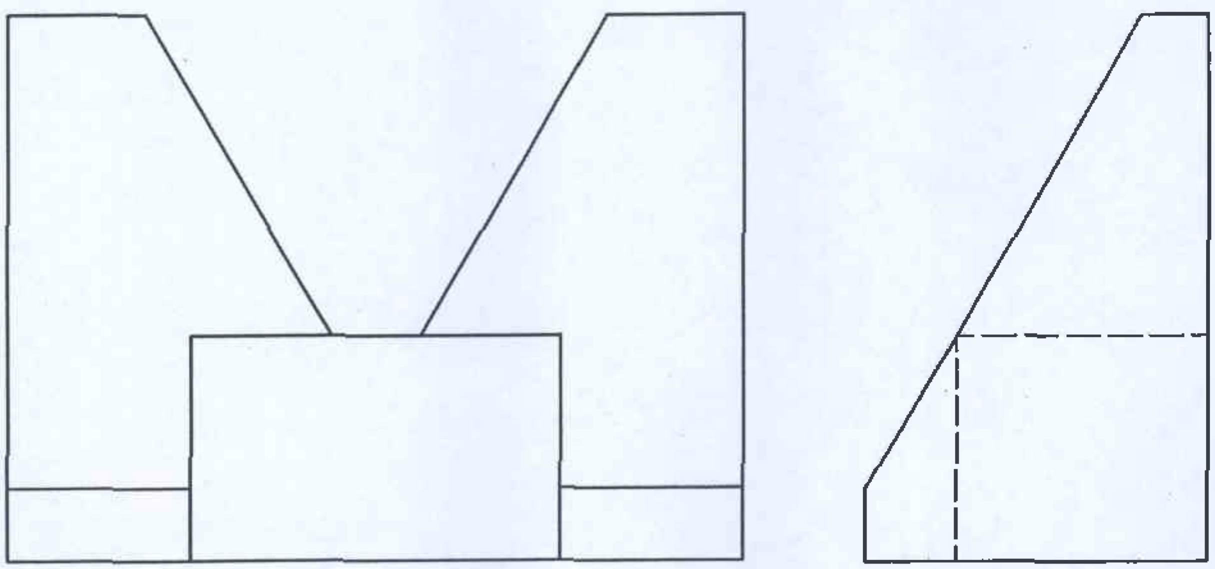
1. Shown below is an isometric pictorial of a single component. Sketch or draw an orthographic projection of the component. Select and position principal, section, and auxiliary views as necessary. *Use common Canadian* (CSA/ANSI) conventions and practises. Do not dimension. All holes are through.

Criterion	**Grade**
Selection of views	3: Minimum necessary views 2/1: More views present than necessary 0: Missing views
Adherence to conventions	3: Flawless 2: Minor omissions 1/0: Incorrect application of conventions
Correctness of projections	4: Flawless 3: Minor errors 2: One or more significant omissions 1/0: Part could not be manufactured



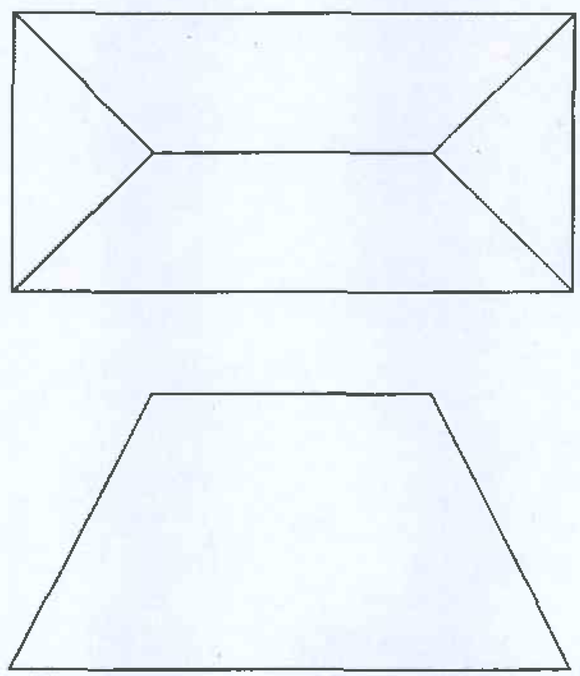
2. Sketch an isometric pictorial of the following orthographic projection. Sketch. Do not draw. Do not use a straight edge.

Criterion	Grade
Isometric pictorial	4: Correct angles of horizontal lines 3: Near correct angles of horizontal lines 0: Not an isometric pictorial
Correctness of projection	4: Flawless 3: Minor errors 2: One or more significant omissions 1/0: Part could not be manufactured
Penalties	-10: use of straight edge



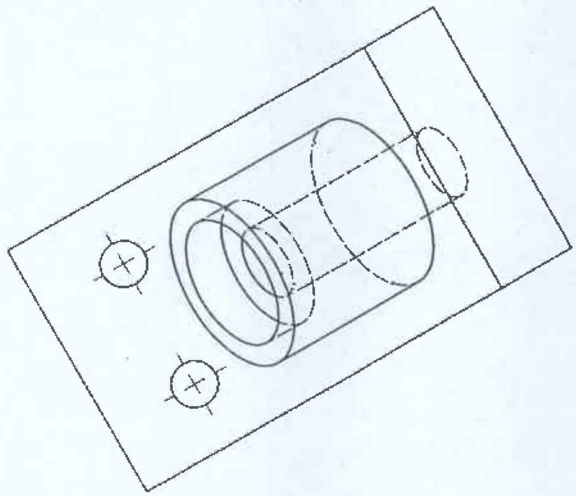
3. Draw two oblique faces of the following component in true shape. Show all work. Clearly label auxiliary views. Complete the answer in the space provided below.

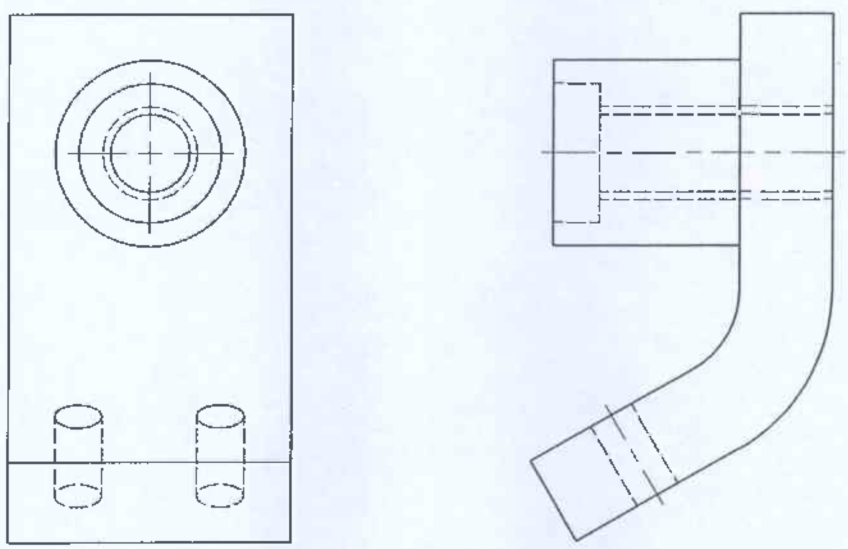
Criterion	Grade
Selection of views	2: Two correct auxiliary views 1: One correct auxiliary view
Adherence to conventions	3: Flawless 2: Minor omissions 1/0: Incorrect application of conventions
Correctness of projections	4: Flawless 3: Minor flaws 0: True shape not obtained



4. Dimension the following orthogonal projection using Canadian conventions (CSA/ANSI) in inches. The component is drawn in full scale. Complete the answer on the drawing provided.

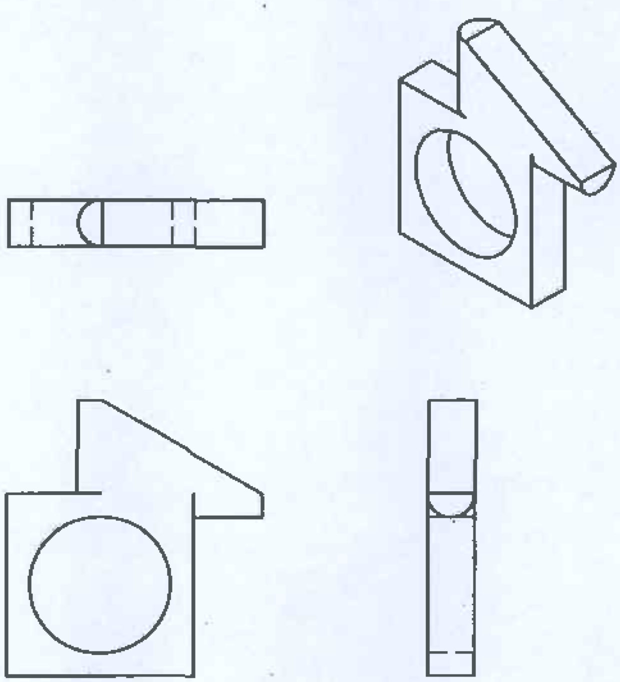
Criterion	**Grade**
Drawing	10: dimensioned figure
Dimensioning	-1 per unnecessary dimension -1 per missing dimension
Adherence to conventions	-1 per error





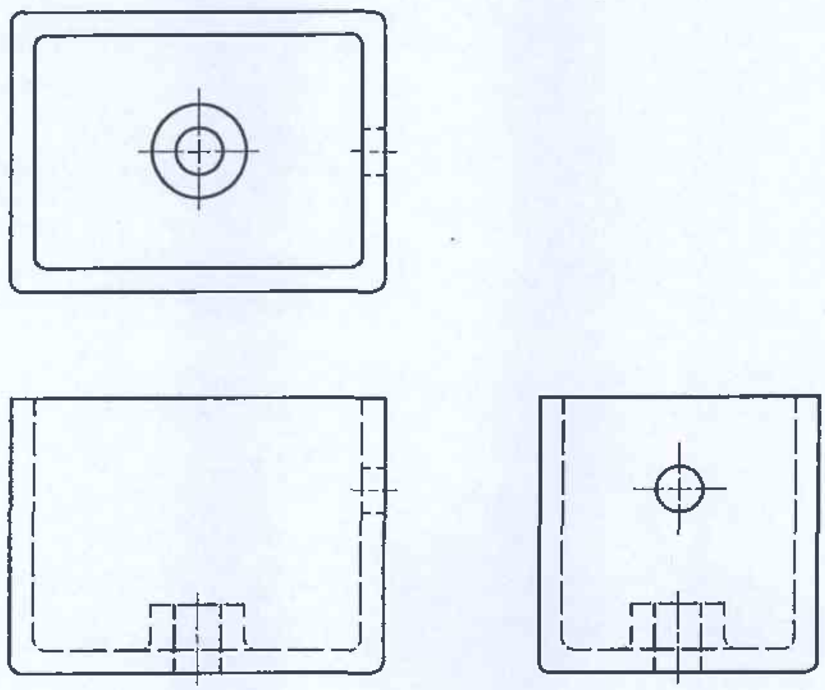
5. Sketch the steps that could be used to construct the following object using primitives (cubes, right rectilinear prisms, right triangular prisms, spheres, cones, tori, and *cylinders) using only* Boolean operations (union, difference, and intersection).

Criterion	**Grade**
Overall correctness	10: flawless description of steps to reproduce object 8: minor errors 4: object could not be reproduced



6. Sketch an appropriate section view for the following component.

Criterion	Grade
Selection of section view	3: Correct 2/1: Wrong type of section view 0: Inappropriate
Adherence to conventions	3: Flawless 2: Minor omissions 1/0: Incorrect application of conventions
Correctness of projections	4: Flawless 3: Minor errors 2: One or more significant omissions 1/0: Part could not be manufactured



7. For two of the three following terms write a paragraph explaining the term and provide an example.
   a. Constructive Solid Geometry (CSG)
   b. Boundary Representation (B-Rep)
   c. Constraint-Based Modelling

Criterion	Grade
Correct English	-½ per error
Explanation (×2)	3: clear and concise 2: minor flaws 1: difficult to understand
Example (×2)	2: clear and concise

8. Sketch an example of two of the three following section types.
   a. Broken-out
   b. Revolved
   c. Removed

Criterion	Grade
Identification (×2)	1: Correctly labelled sketch
Sketch (×2)	4: Simple and concise sketch following conventions 3: Minor errors 0: Not a section view

9. For two of the three following terms write a paragraph explaining the term and providing an example.
   a. Limit dimension
   b. Plus and minus dimension
   c. Functional dimension

Criterion	Grade
Correct English	-½ per error
Explanation (×2)	3: clear and concise 2: minor flaws 1: difficult to understand
Example (×2)	2: clear and concise

10. Define two of the three following terms. Provide an example of each.
    a. Concurrent engineering
    b. Collaborative engineering
    c. Product Life Cycle Management (PLM)

Criterion	**Grade**
Correct English	-½ per error
Explanation (×2)	3: clear and concise 2: minor flaws 1: difficult to understand
Example (×2)	2: clear and concise