

## National Exams May 2012

### 04-BS-15, Engineering Graphics & Design Process

3 hours duration

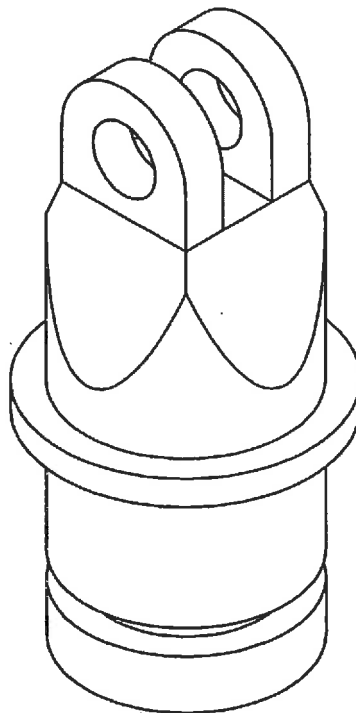
#### NOTES

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**

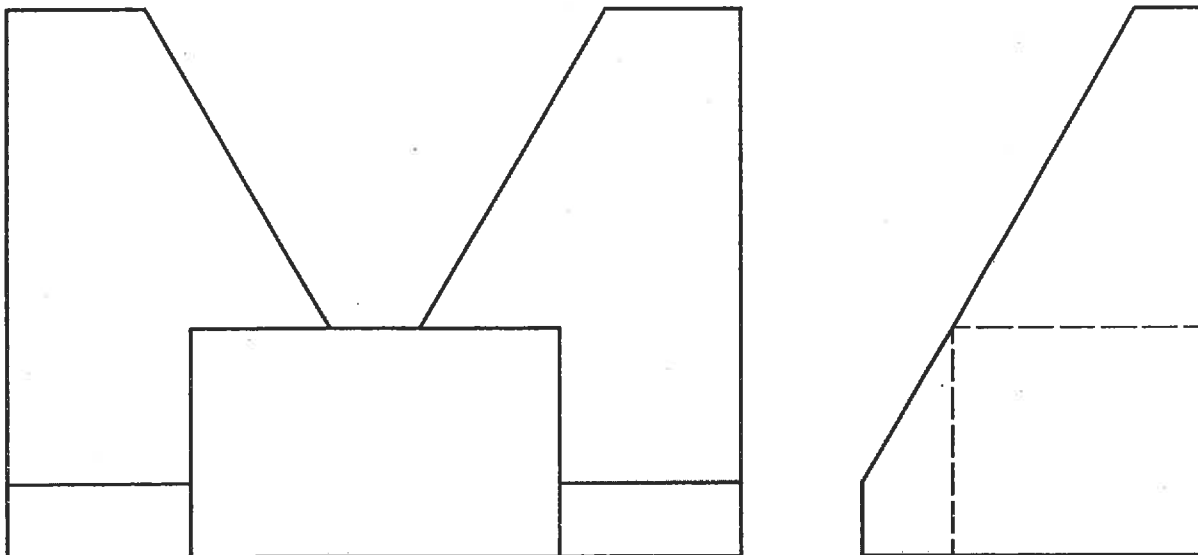
1. Shown below is an isometric pictorial of a single component. Sketch or draw an orthographic projection of the component. Select and position principal, section, and auxiliary views as necessary. Use common Canadian (CSA/ANSI) conventions and practises. Do not dimension. All holes are through.

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



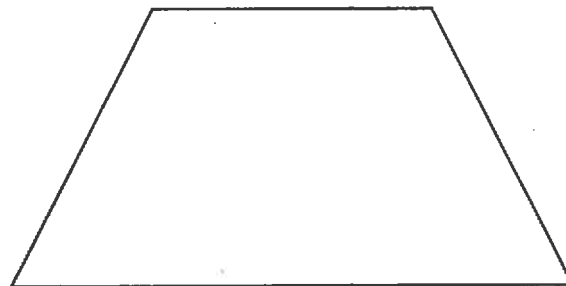
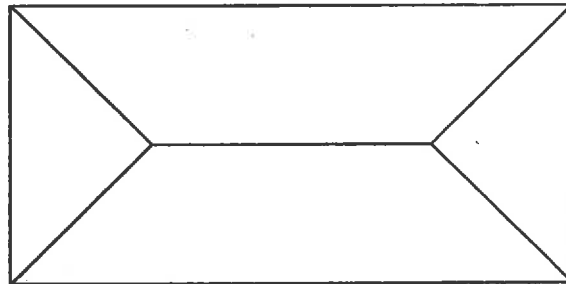
2. Sketch an isometric pictorial of the following orthographic projection. Sketch. Do not draw. Do not use a straight edge.

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



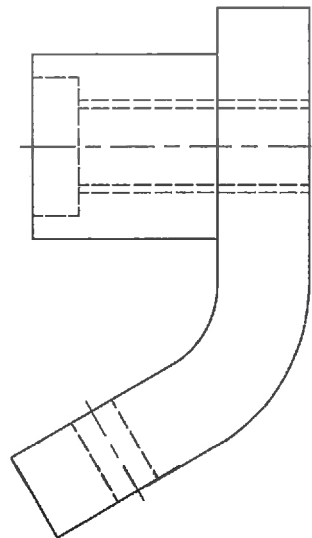
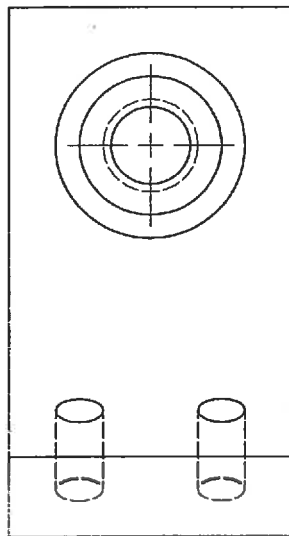
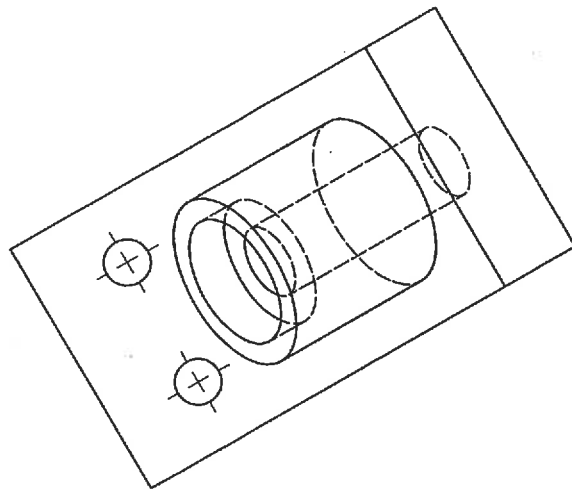
3. Draw two oblique faces of the following component in true shape. Show all work. Clearly label auxiliary views. Complete the answer in the space provided below.

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



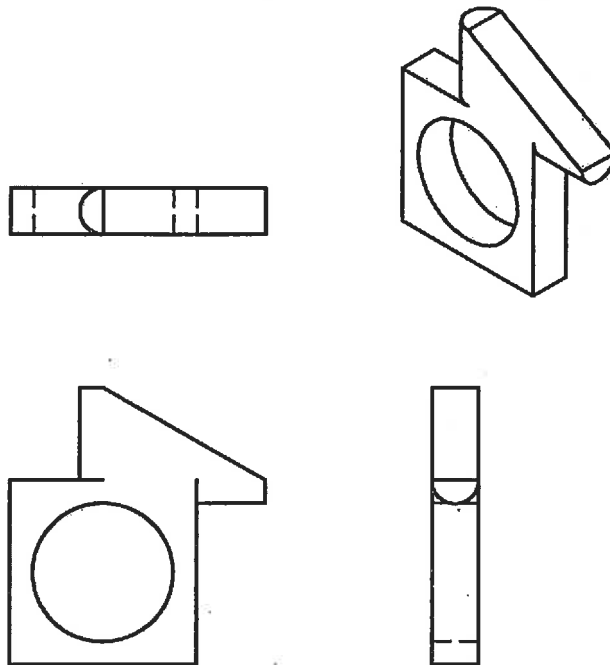
4. Dimension the following orthogonal projection using Canadian conventions (CSA/ANSI) in inches. The component is drawn in full scale. Complete the answer on the drawing provided.

| Criterion                | Grade  |
|--------------------------|--|
| Drawing                  | 10: dimensioned figure                                   |
| Dimensioning             | -1 per unnecessary dimension<br>-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).

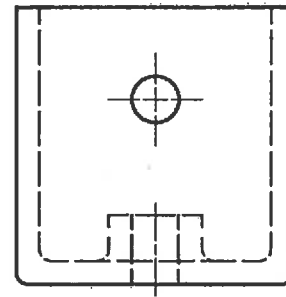
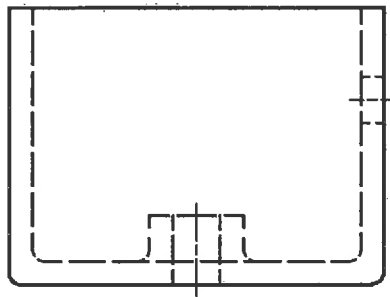
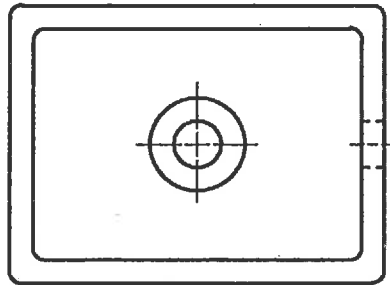
| Criterion           | Grade   |
|---------------------|---|
| Overall correctness | 10: flawless description of steps to reproduce object<br>8: minor errors<br>4: object could not be reproduced |





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

| Criterion                  | Grade   |
|----------------------------|---|
| Selection of section view  | 3: Correct<br>2/1: Wrong type of section view<br>0: Inappropriate   |
| Adherence to conventions   | 3: Flawless<br>2: Minor omissions<br>1/0: Incorrect application of conventions                                |
| Correctness of projections | 4: Flawless<br>3: Minor errors<br>2: One or more significant omissions<br>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.
- Constructive Solid Geometry (CSG)
  - Boundary Representation (B-Rep)
  - Constraint-Based Modelling

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

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

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

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

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