

National Exams December 2019

04-BS-15, Engineering Graphics and Design Process

3-Hours Duration

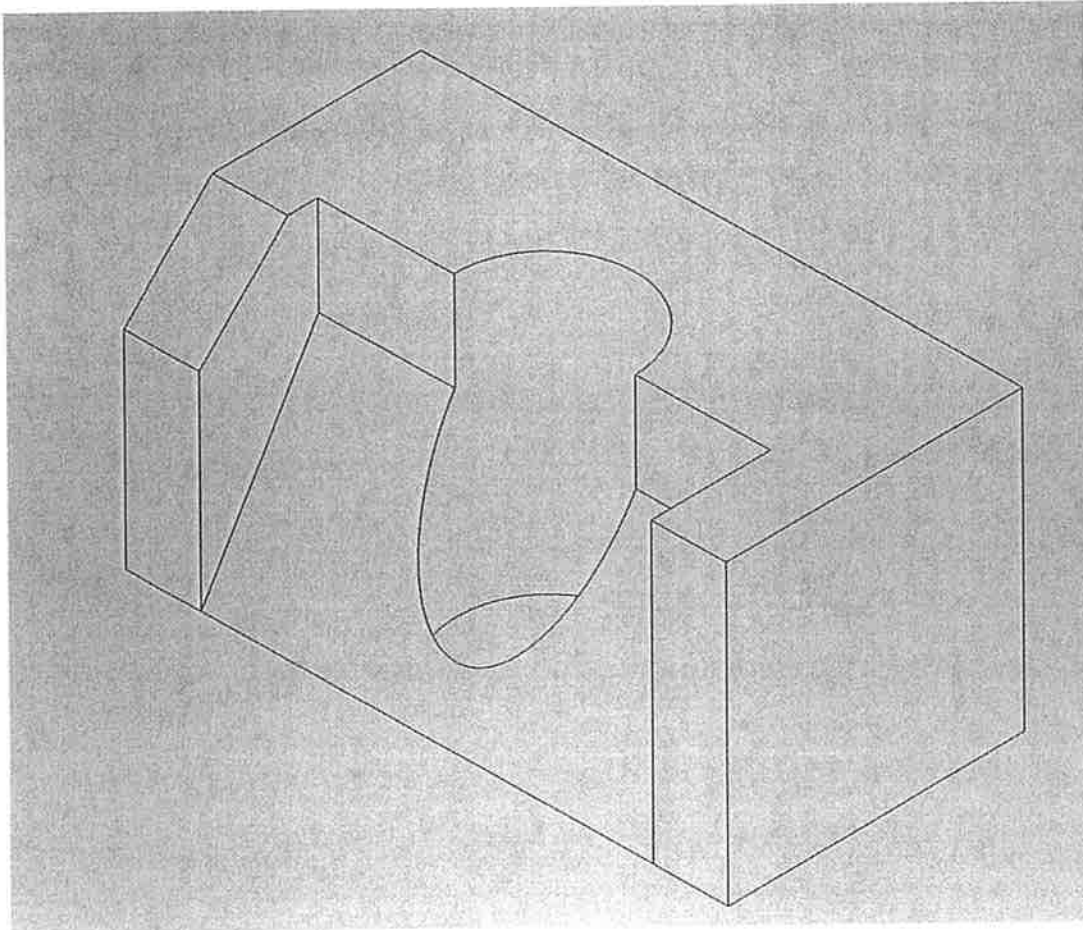
NOTES

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. No calculator is permitted.
3. Six (6) questions constitute a complete exam paper. Clearly label the answers in the answer book.
4. All sketches must be made freehand and must be easy to read and neat. Straightedges may not be used.
5. The exam is out of 100 marks.

QUESTION 1 (40 MARKS)

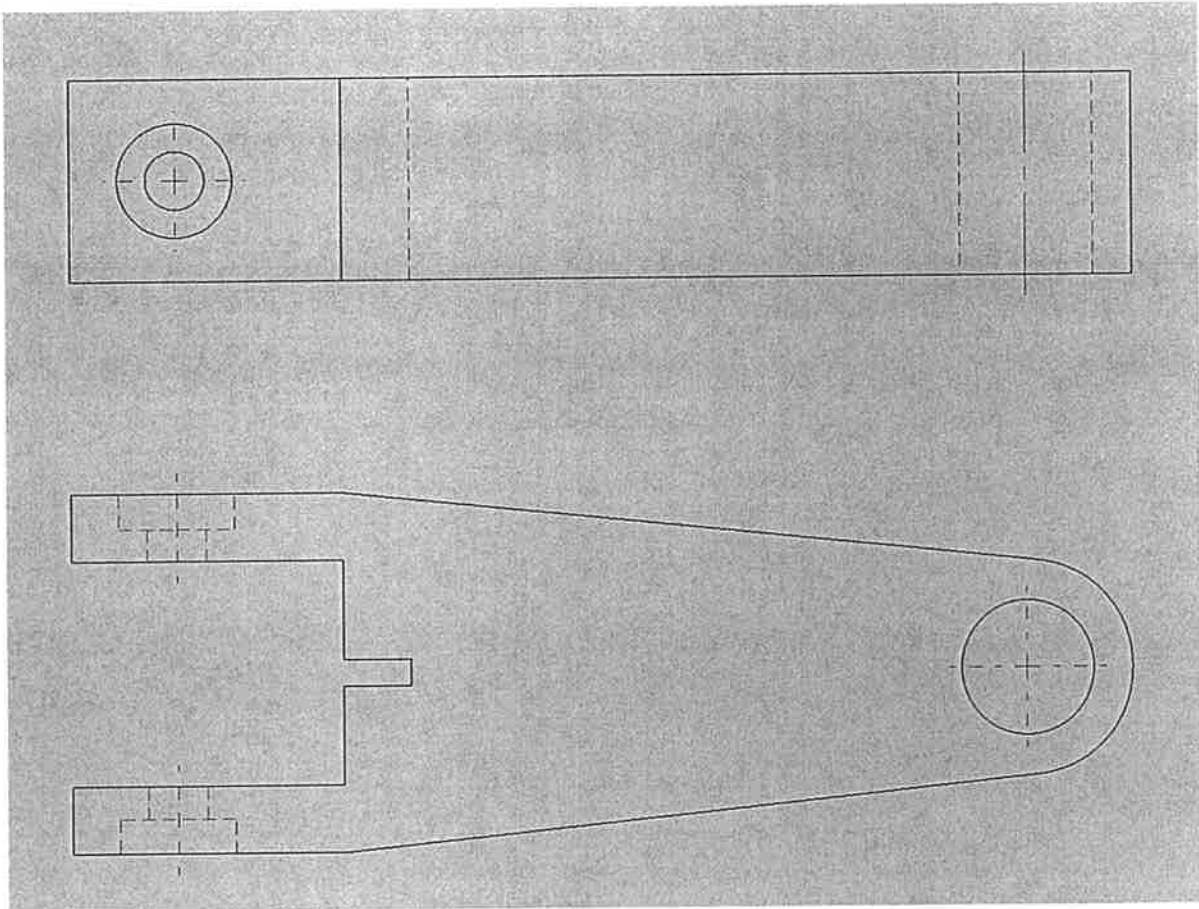
For the part shown below,

- Sketch an appropriate set of orthographic views, using third-angle projection. (10 marks)
- Fully dimension the sketch in part a) using professional standards. Use "xx" in place of numerical values in the dimensions. (10 marks)
- Describe and sketch an appropriate sequence of feature-based solid modelling operations that could be used to create this geometry using parametric, feature-based solid modelling CAD software. (20 marks)



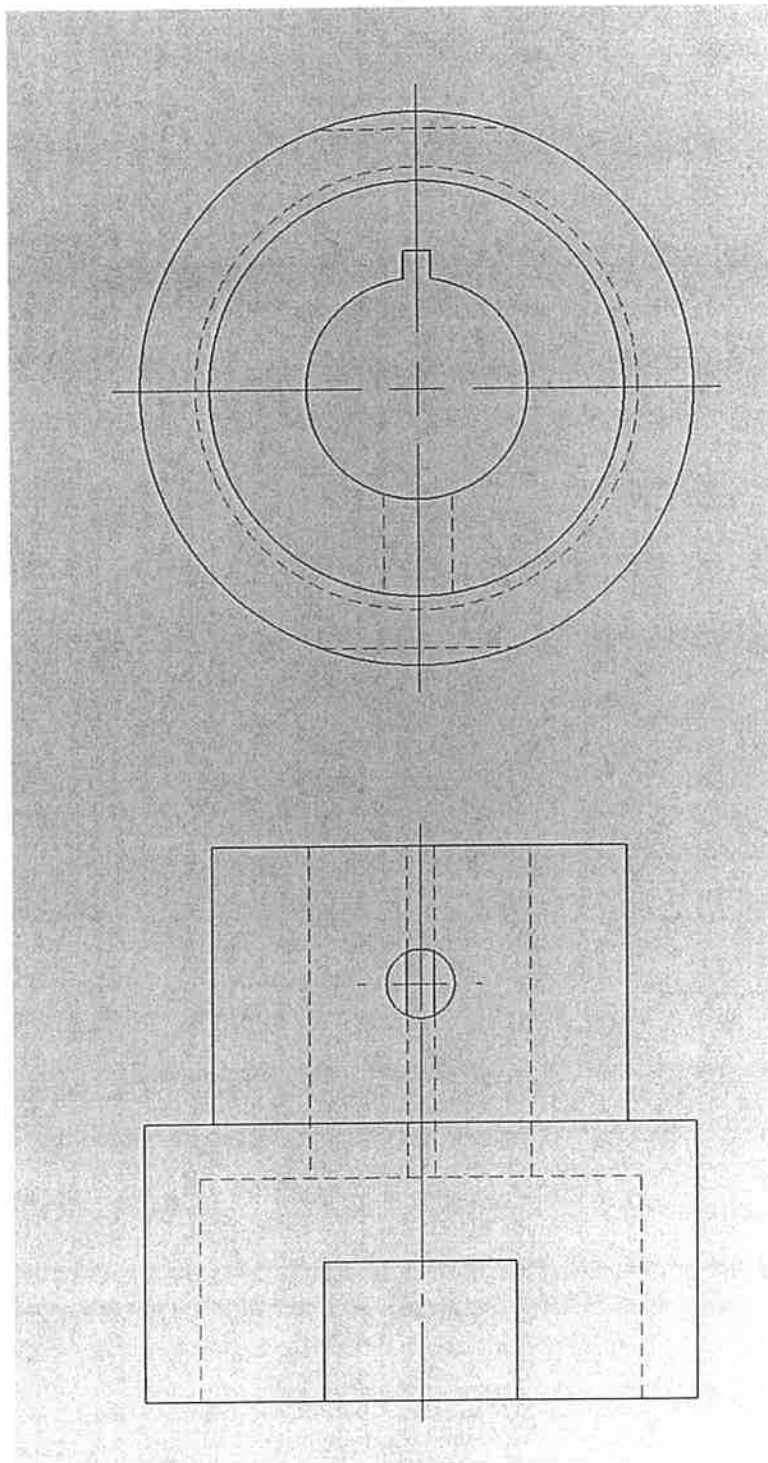
QUESTION 2 (10 MARKS)

The multiview drawing below uses 3rd-angle projection. Sketch an isometric view.



QUESTION 3 (10 MARKS)

Sketch an appropriate section view for the part shown below.

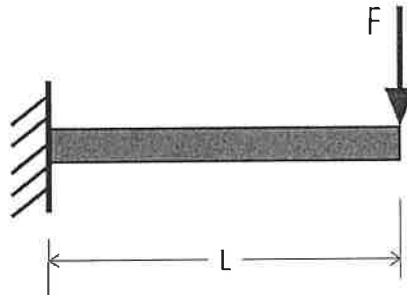


QUESTION 4 (10 MARKS)

Describe the different types of fits for holes and shafts, and discuss the applications of the different fits.

QUESTION 5 (20 MARKS)

A design concept being evaluated includes a cantilever beam with a point load F as shown in the figure below:



We wish to determine the deflection at the end of the beam due to the applied load. We use three different methods to find the deflection: a simple beam bending formula, a finite-element analysis (FEA) based on a CAD model, and testing of a physical prototype. All three methods produce slightly different results. Discuss the pros and cons of each method, and the accuracy of the results.

QUESTION 6 (10 MARKS)

For one of the following products, list several customer requirements (needs), and several corresponding product design specifications. Discuss how the needs and specifications are correlated.

- a) A hot water kettle.
- b) A desk lamp.
- c) A television.
- d) An external hard drive for a computer.