National Exams May 2016

04-BS-15, Engineering Graphics and Design Process

3-Hours Duration

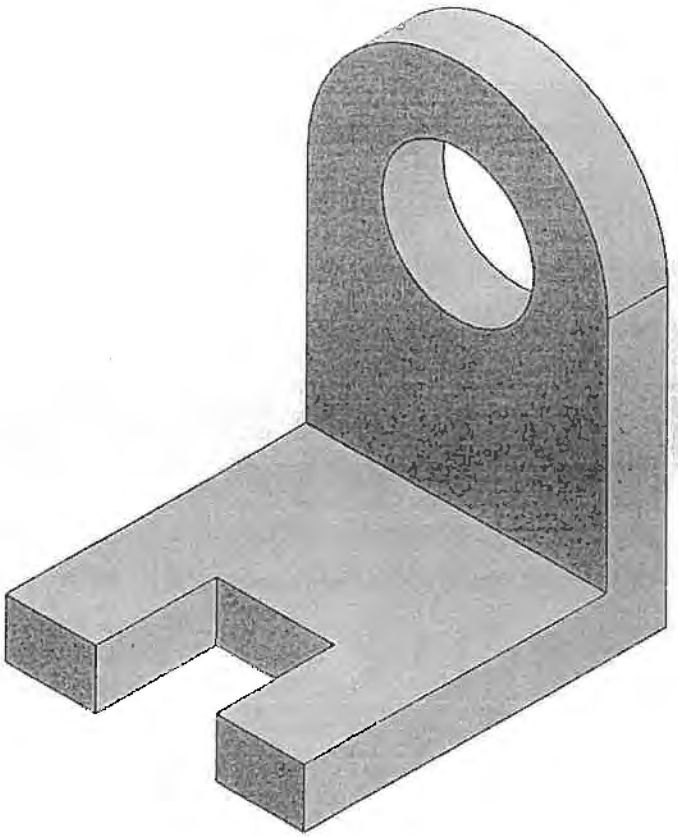
NOTES

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. Three (3) multi-part 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.

QUESTION 1

For the part shown below,

a) Sketch an appropriate set of orthographic views, using third-angle projection. (10 marks)
b) Describe and sketch two different sequences of feature-based solid modelling operations that could be used to create this geometry using CAD software. (10 marks)

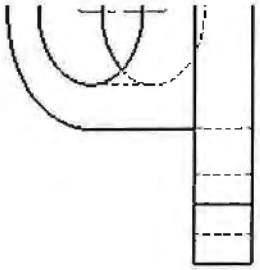


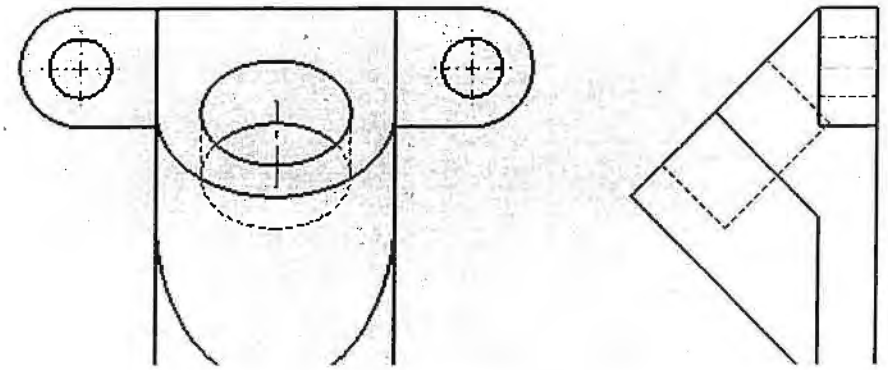
QUESTION 2

For the multiview drawing below,

a) Sketch an appropriate section view. (10 marks)
b) Sketch an appropriate auxiliary view. (10 marks)
c) Sketch an isometric view. (10 marks)
d) Fully dimension the drawing using professional standards. (10 marks)

You may either re-sketch the required drawing views in the exam booklet, or add sketches and dimensions to the views on the next page of this exam paper.

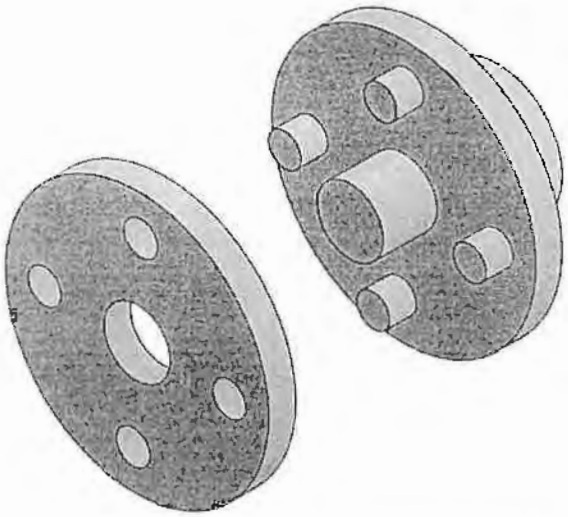




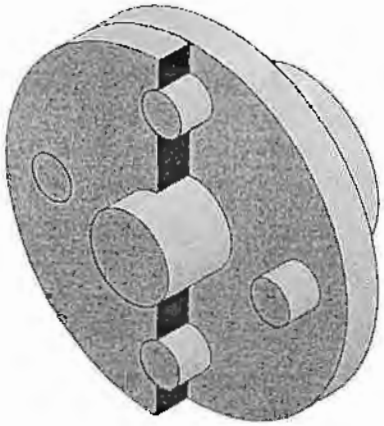
QUESTION 3

Consider a proposed design to connect a wheel and hub, shown below. The proposed design fastens the wheel to the hub using an M50 nut on the threaded end of the large central pin. The four smaller locating pins on the hub slide into corresponding holes on the wheel. In the CAD model below, only the details of the connection are shown.

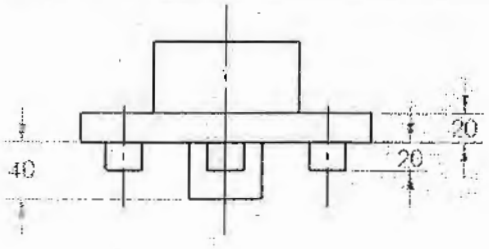
a) List and describe key functional requirements for the connection method. (10 marks)
b) Evaluate the proposed design, identifying potential problems and issues. (15 marks)
c) Suggest at least two design improvements to address the issues identified in part b). (15 marks)

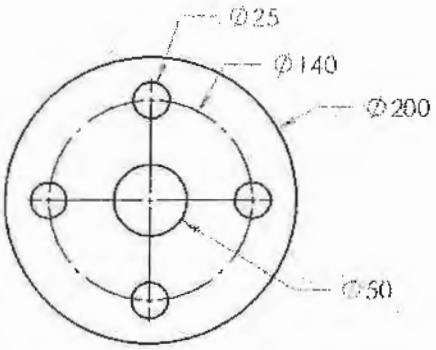


Exploded View

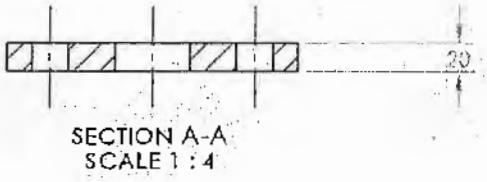


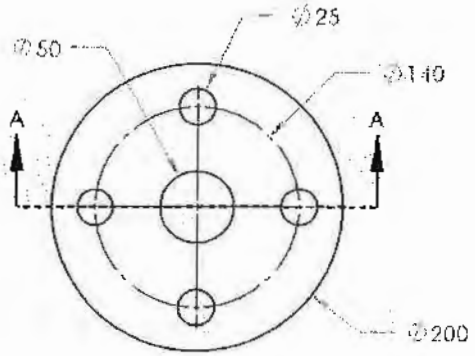
Section View





Part 1 – Hub





Part 2 - Wheel