

# **MEC106 Project Assignment (Final) 2020-2021 Semester Two**

## **Orthographic Drawing (Multiview Drawing) for Engineering Solids &**

### **Isometric Sketching from Orthographic Views**

#### **Assessment Weighting**

This assessment counts for 100% of the final mark of the module.

#### **Aims**

This project firstly aims to provide students the knowledge and skill set for orthographic drawing (multiview drawing). If the object is correctly positioned relative to the projection planes, the dimensions of features will be represented in true size in one or more of the views. Multiview drawing provide the most accurate description of 3D objects and structures for engineering, manufacturing and construction requirements. Last but not least, this project aims to provide students the knowledge and skill set for isometric sketch. An isometric sketch is a type of parallel projection that represents all 3D in a single image. Though there are a number of ways of orienting an object to represent all 3D, isometric pictorials have a standard orientation that make them particularly easy to sketch.

#### **Learning Outcomes**

On completion of this assignment you should be able to:

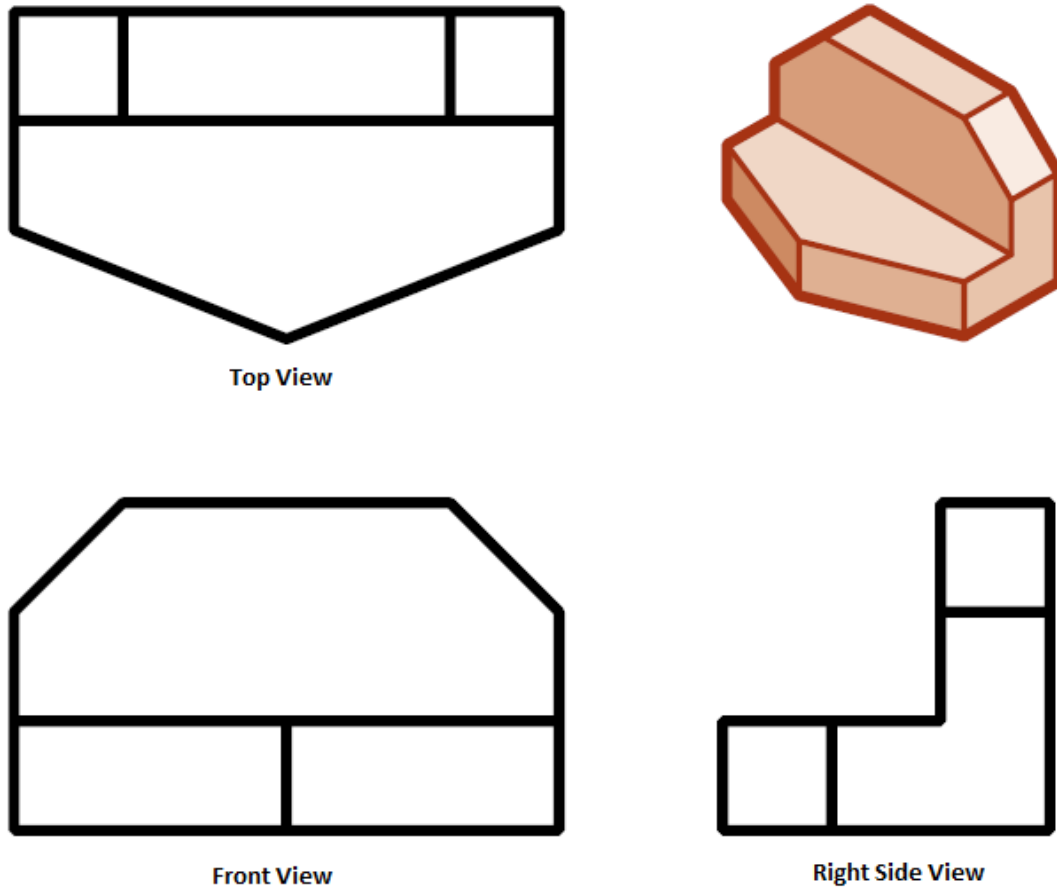
1. Be able to demonstrate a clear understanding of the standards in engineering drawing;
2. Be able to apply orthographic projection to view and analyze engineering solids;
3. Be able to propose the isometric representation of engineering components;
4. Be able to apply spatial-visual thought, spatial imagination, exploration and innovation;
5. Be able to master the knowledge of Computer Aided Drafting applications;
6. Be able to produce an engineering style report.

#### **Design Instruction**

**The risk to lose full or partial points or marks would be effective, if students do not follow the instructions and the given grading information.**

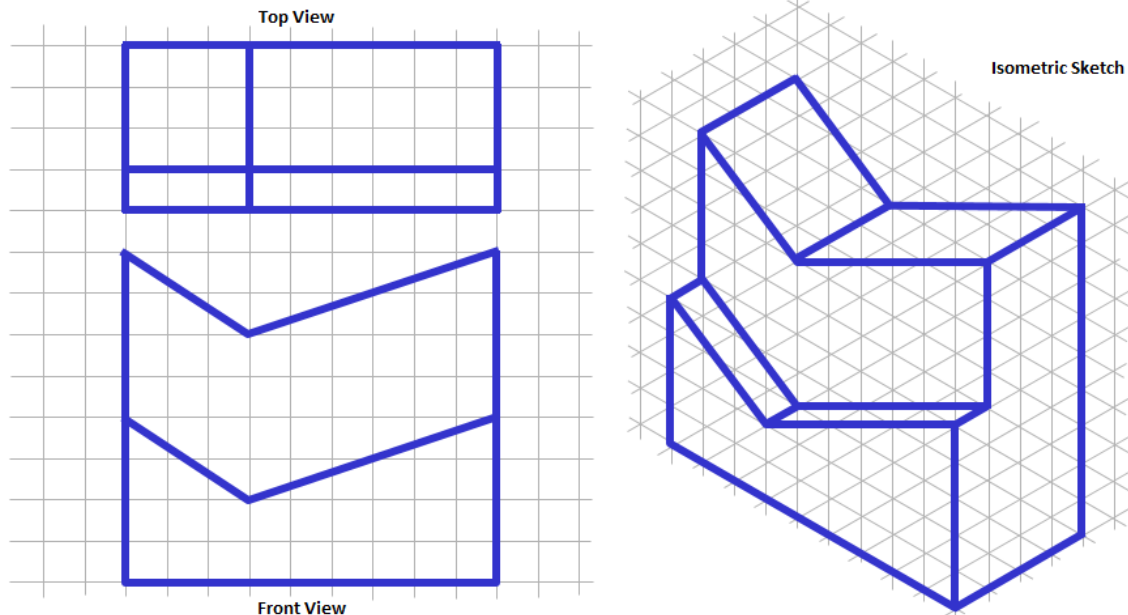
Orthographic drawing (multiview drawing) is a set of related images that are created by viewing the object from a different direction. Multiview drawing employ multiview projection techniques. In multiview drawing, generally three views of an object are drawn (front view, right side view and top view introduced in the assignment), and the features and dimensions (not required in the assignment) in each view accurately represent those of the object. Each view is a 2-D flat image. The views are defined

according to the positions of the planes of projection with respect to the object. A multiview drawing example is given as follow in **Figure 1**:



**Figure 1**

‘Iso’ means ‘equal’ and ‘metric projection’ means ‘a projection to a reduced measure’. An isometric projection is one type of pictorial projection in which the three dimensions of a solid are not only shown in one view, but also their dimension can be scaled from this drawing. It is seen that all the edges and faces of the rectangular prism are equally inclined to the plane of all the edges and faces of the cube are equally inclined to the plane of projection. Hence the rectangular faces are seen as similar and equal rhombuses. An isometric sketch example from multiview is given as follow in **Figure 2**:



**Figure 2**

In the assignment, for orthographic drawing (multiview drawing) for engineering solids, two generic geometry objects are given in **Figure 3** and **4**. Please provide the multiview drawing for each view (front view, right side view and top view in the assignment).

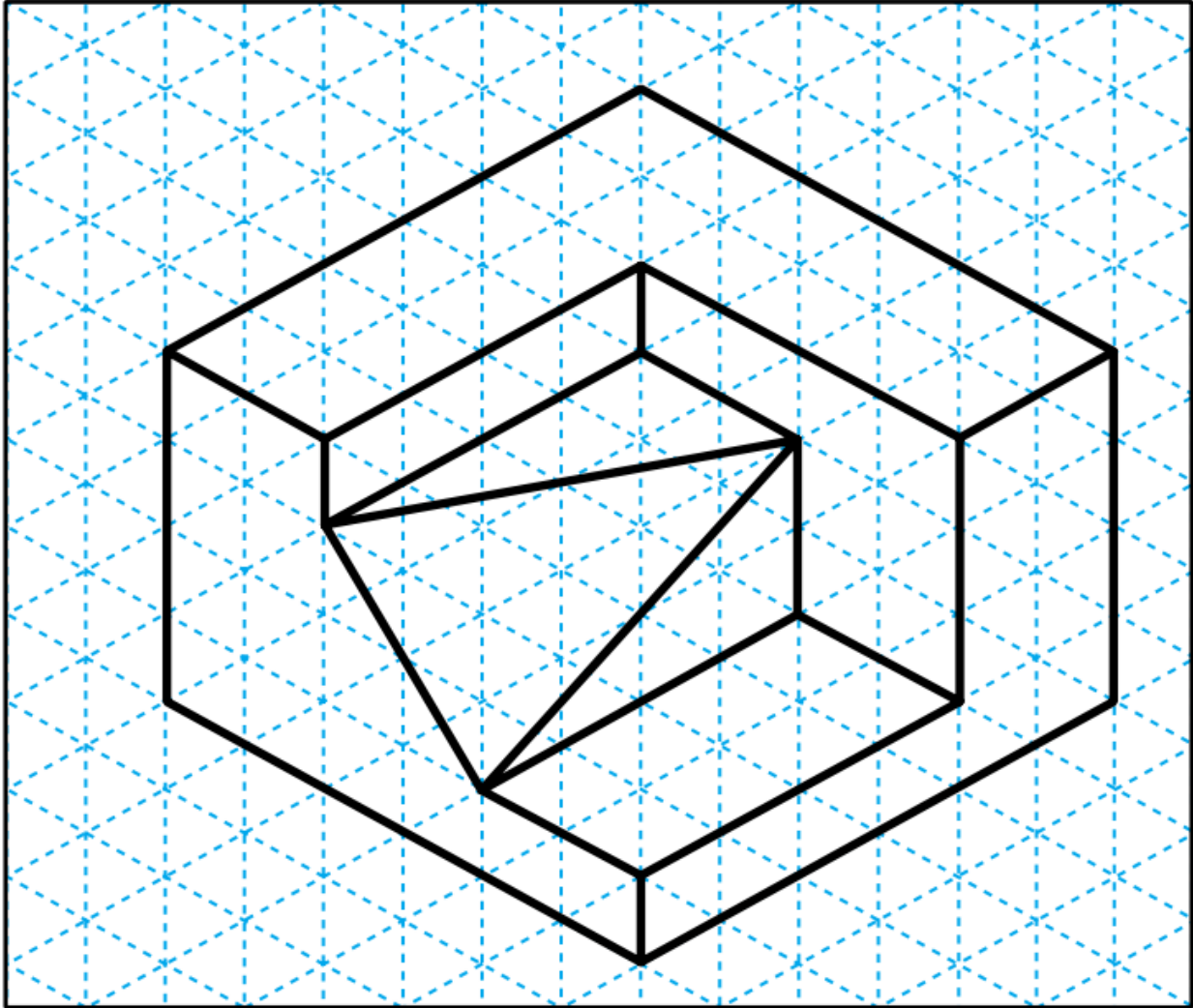


Figure 3

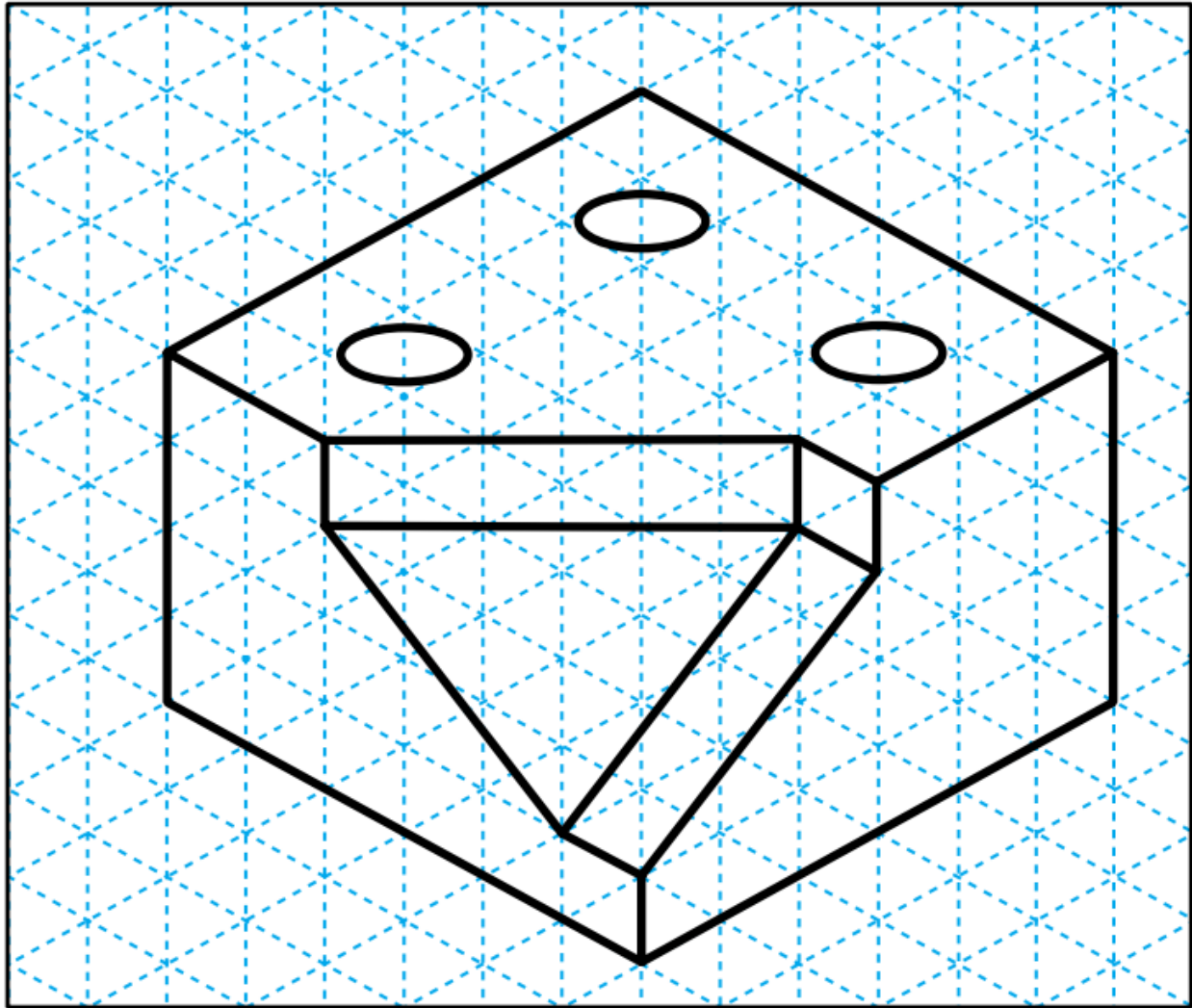


Figure 4

In the assignment, for isometric sketching from orthographic views, another two orthographic views/multiviews of objects are given in **Figure 5** and **6**. Please provide the related isometric sketch (in isometric axes/grids) and the missed view.

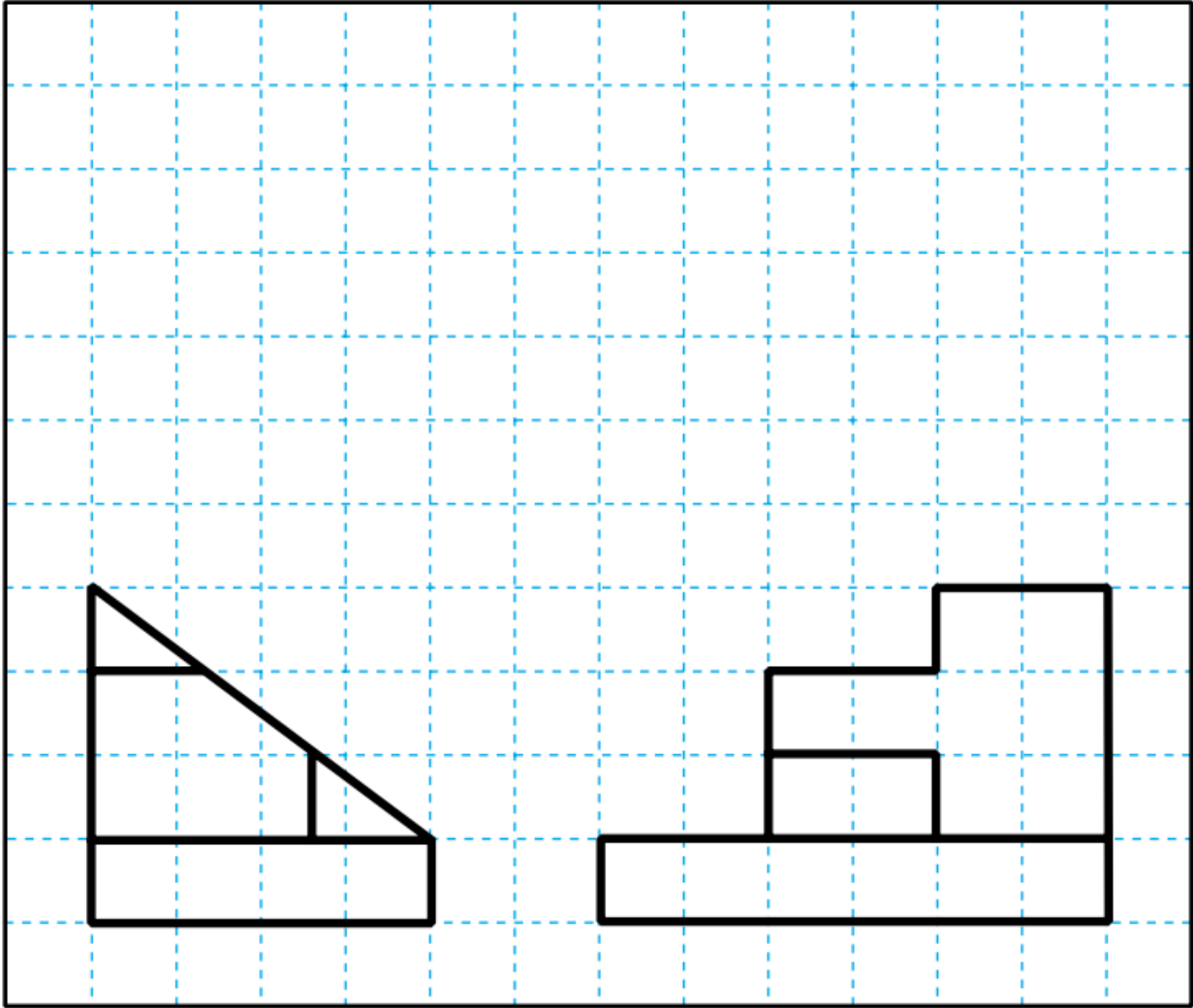


Figure 5

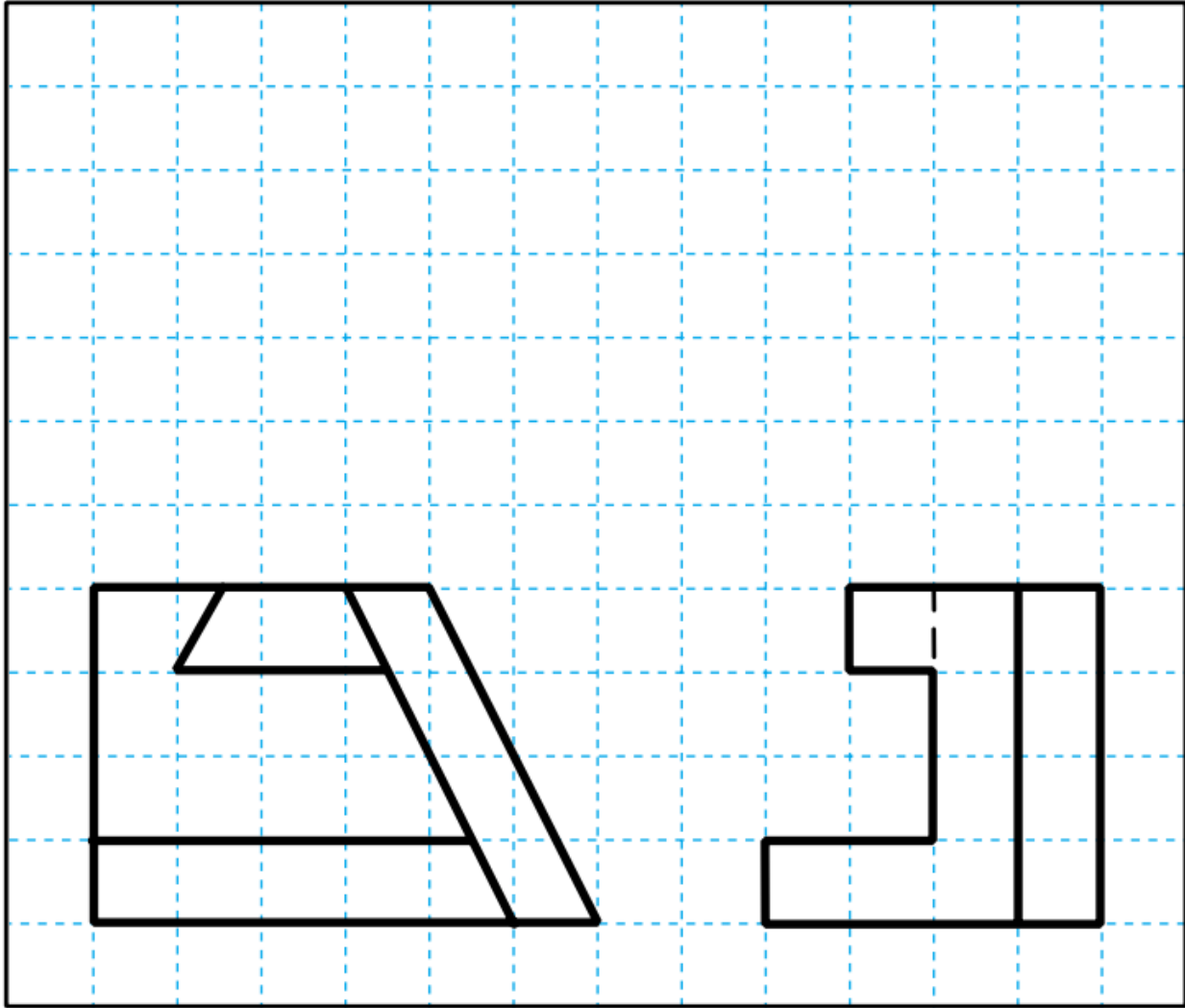


Figure 6

**Grading Information for Design (60%):**

Please scan, or photo your completed design and put/integrate them in report. (clearly presented)

1. Drawing Papers and tools (5%):  
The multiview drawing and isometric sketch shall be drawn on the simple A4 size papers. Simple engineering drawing tools (pencil, eraser, ruler, etc.) shall be satisfied with the drawing requirement.
2. Design Layout (5%):  
Please draw the front view, top view and right-side view on the left part of the A4 size drawing paper with grid. Please design the isometric sketch on the right part of the paper. Please make full use of the A4 size drawing paper with proper scale.
3. Designs in Multiview Drawing and Isometric Sketch (20%):

**Multiview Drawing:** the expected drawings shall match each line to the given generic geometry objects' feature in the multiview drawing (front view, right side view and top view). Each multiview name (front view, right side view and top view) shall be listed under each drawing.

**Isometric Sketch:** the final isometric sketch shall match each line from the given object feature in the given multiview drawing (front view, right side view and top view).

4. Width, Height and Depth (20%):

There are specified relations of width, height and depth between front view, right side view, top view and the isometric sketch. It is strongly encouraged to draw the isometric sketch in the isometric axes/grids (given in **Figure 3, 4, 5 and 6**). Please make the dimension of width, height and depth consistent in the designs.

5. Line Convention (10%):

Please follow the line drawing convention of visible line, hidden line, center line and construction line. Detailed instruction can be found on the lecturer notes.

### **Grading Information for Report (40%)**

A formal report should be given to accompany the design. The report will be graded against the requirements set out below:

1. Report Format (5%):

Cover page, contents, abstract, introduction, main body and conclusion.

2. Abstract & Conclusion (5%):

Abstract shall be read and understood independently of the rest of the report. Conclusion should be in consistent with earlier sections.

3. Introduction (5%):

Please present the benefit of multiview drawing, as well as a briefing comparison of multiview drawing, pictorial drawing and perspective drawing in the part. Please list the benefit of isometric sketch, as well as a briefing comparison of isometric sketch and oblique sketch in this part.

4. Main Body (15%):

a. Orthographic drawing steps for the two given object shall be provided in the part. Problem solving step will be also encouraged to list in the main body. (5%)

b. Isometric sketch steps for the object shall be provided in the part. Problem solving step will be also encouraged to list in the main body. (5%)

c. Discuss about the Computer Aided Drafting (CAD) application/software in the part. For example: What is CAD? What can CAD help for drafting? What are the dominant CAD application/software brands in professional field? (5%)

5. CAD Modeling/Design (10%)

Please provide the isometric sketch in **Figure 5 and 6** (in isometric axes/grids) **in report** using AutoCAD, or 3Ds Max, or Maya, or SolidWorks, et al. Apart from necessary isometric sketch regular angle, various angles capture (up to 5) would be expected within the report.

### **Delivery**



1. A formal report (pdf format) to accompany the design.

Note: please make sure you attach the University assignment cover sheet to your report and make sure that your name and student ID are clearly written on the engineering drawing papers.

### **Academic Misconduct**

Students should be aware that when submitting assessed work that the work is their own and that it fully acknowledges the work and opinions of others. For further clarification students should read the latest version of the XJTLU Code of Conduct. These can be found on the university web pages.

### **Assignment Submission and Deadline**

The project starts on **May 5<sup>th</sup> 2021 Wednesday in Week 10**. Please submit your completed report (pdf format) directly on **LMO** no later than:

**6pm Wednesday 2<sup>nd</sup> June 2021 (Week 14)**

Late submission shall follow university policy available on the university website. 5% of the total marks available for the assessment shall be deducted from the assessment mark for each working day after the submission date, up to a maximum of five working days.