## AE307

## 2024-2025 SPRING

## **DESIGN PROJECT**

A 10mm thick AISI 1040 hot-rolled steel bar, has to be connected to a AISI 1020 hot-rolled steel column shown in Figure 1. You are asked to <u>design</u> a suitable connection (1 non-permanent connection (like bolt and nut) and 1 permanent connection (like welding)) under these conditions and restrictions:

- You are allowed to use maximum 5 bolts.
- The bolt threads do not extend into the joint.
- You <u>must</u> use <u>eccentric</u> type loading for the bolt layouts and welding patterns (Examples shown in Figure 2 and Figure 3).
- The electrode for welding is E7010.
- The available bolt size range is: M12-M16.
- The external load F is 14kN.



Figure 1: Dimensions and loading of members



Figure 2: Bolt connection examples



Figure 3: Weld connection example

- Design and analyze your connections, <u>find the important parameters</u> like resultant loads on bolts and points, stresses on bolts and welds, and factors of safeties for connections.
- Since this is a design project (not a problem solving) you are free to choose and use un-defined properties (like distance between the bolts etc.) within the restrictions by clearly indicating on your report.
- Write a hand written report including your design strategy, parameters, and solutions.
- Write a conclusion paragraph commenting your results.