



*A Centre of Excellence*

**TECHNICAL UNIVERSITY OF MOMBASA (TUM)**

**UNIVERSITY REGULAR EXAMINATIONS FOR:**

**BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING**

**TCV 4316: STRUCTURAL STEEL DESIGN**

**END OF SEMESTER EXAMINATION**

**SERIES: JANUARY 2025**

**TIME: 2 HOURS**

**Instructions to Candidates:**

1. You should have answer booklet for this examination.
  2. This paper contains **FOUR** questions
  3. Answer question **ONE** any **TWO** questions.
  4. Marks for each question are indicated in the parenthesis.
  5. Examination duration is **2 Hours**
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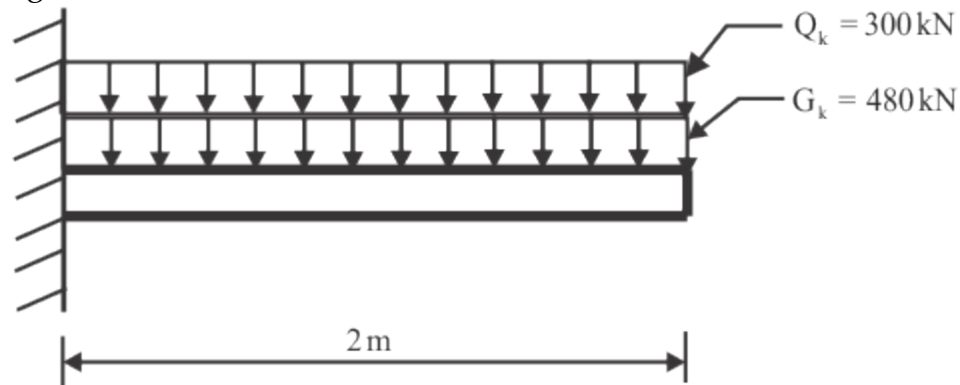
**TCV 4316: STRUCTURAL STEEL DESIGN**

**Question One [20 marks]**

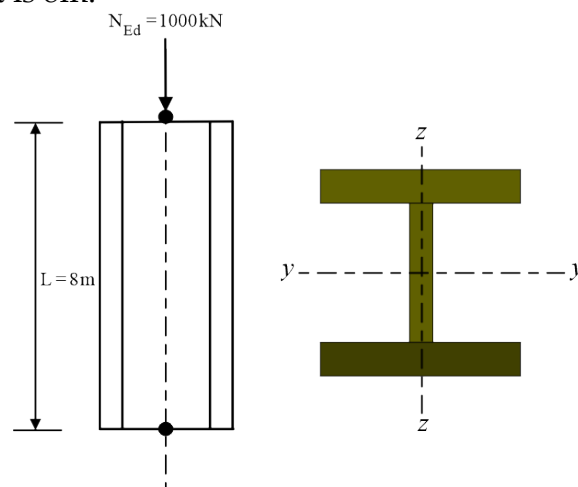
- Briefly explain advantages of using structural steel as a construction material. [12 marks]
- Durability is a service limit state. Outline the durability factors considered at the design stage. [2 marks]
- Briefly describe the four classes of steel sections. [6 marks]

**Question Two [20 marks]**

- A cantilever beam is needed to resist the loading shown (figure Q2). Select a suitable UB section in S 275 steel to satisfy bending and shear criteria only assuming full lateral restraint.

**Figure Q2****Question Three [20 marks]**

Check the suitability of the 305×305×158 kg/m UC (figure Q3) section in S275 steel to resist a design axial compression force of 1000 kN. Assume the column is pinned at both ends and that its height is 8 m.

**Figure Q3**

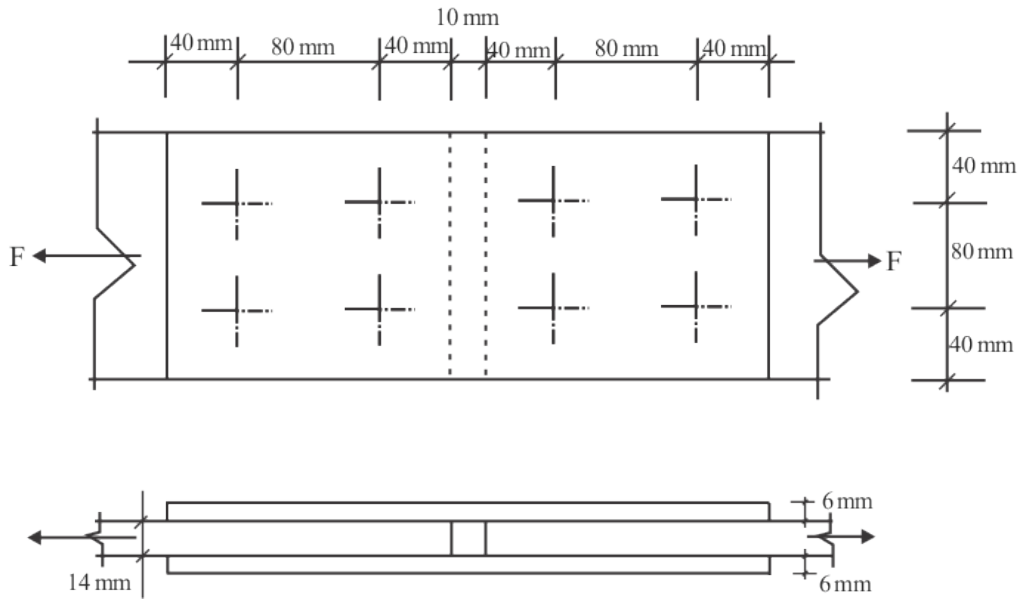
**Question Four [20 marks]**

Calculate the design resistance of the connection detail shown in figure Q4. The cover plates are made of S275 steel and connected with either

a) non-preloaded bolts of diameter 22 mm and class 4.6 [14 marks]

b) Prestressed bolts of diameter 16 mm and class 8.8 [6 marks]

Assume that in both cases, the shear plane passes through the unthreaded portions of the bolts.



**Figure Q4**