UNIVERSITY OF WOLVERHAMPTON

Faculty of Science and Engineering
Civil Engineering

ASSESSMENT BRIEF

Module Title:	**Principles of Design**			
Module Code:	**4CV003**			
Component Number:	**2 of 2**	**Part Number:**	**2 of 2**	
Weighting of this Part:	25%	Individual Assignment		

Part 2: Design Report

Learning outcomes to be assessed
LO1: SCIENCE AND MATHEMATICS
ISM1, Knowledge and understanding & of the scientific principles underpinning civil engineering and their evolution.

LO2: DESIGN
ID2: Define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.
ID4 Apply problem-solving skills, technical knowledge and understanding to create or adapt design solutions that are fit for purpose including operation, maintenance, reliability etc.

LO4: ENGINEERING PRACTICE
IEP2: Understanding of and ability to use relevant materials, equipment, tools, processes, or products
IEP5: Ability to use appropriate codes of practice and industry standards

Marking Criteria: As stated in the core of the assessment brief

Latest date for submission	3/5/2018

Thursday 3 May 2018 (before 23.59))

Assignments submitted after the deadline and without an authorised extension of time will be marked 0.

Objectives: This task is intended to encourage you (1) To implement your structural analysis knowledge so as to design of a steel structure according to Eurocode 3 (2) To undertake the structural verifications associated with ULS and SLS design and (3) Identify structural issues and propose solutions that ensure the safety of the structure.

1. Submission deadline and report format

This is an individual assignment and therefore, students are asked to submit **one individual report** showing the detailed calculations that involve the loading and analysis of the steel beams for the floor of a 3 storey building.

The submission deadline is Thursday the 3rd of May (Uni week 36).
Single .pdf or doc.x format file submission via **CANVAS only**. Students are responsible for ensuring that their submissions are neat, readable and with adequate format. **No hard copies**.

Report format:

- Minimum font size is 11Pt Arial in single spacing with at least 2cm margin.
- Justify text
- Use A4 sheets.
- Employ reported speech/write in the third person.
- Neat, lucid and grammatically correct presentation is required.
- Hand sketches are allowed but they must be clear and neat.
- Any image taken from the internet must be referred accordingly using Harvard referencing system.
- All calculations must be stated. Usage of Excel is highly recommended to carry out the calculations and present the diagrams but all steps must be clearly stated in the report.
- All equations used must be stated and referenced. E.g.

BS EN 1991-1-4 Clause 5.3 (2)	**1.2 Live loading: Wind action** $F_w = c_s c_d \cdot c_f \cdot q_p(z_e) \cdot A_{ref}$

- Students are asked to highlight the final answer.
- Any assumption made must be clearly stated. E.g

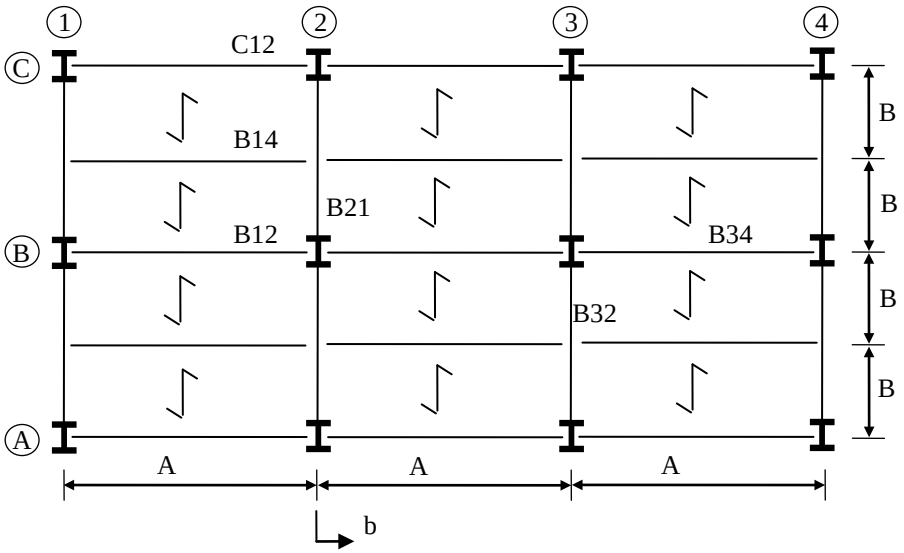
BS EN 1991-1-1	Assumed reinforced concrete unit weight 25 kN/m^3

Report Structure:

- Cover
- Abstract: State the purpose and main conclusions (max. 150 words)
- Table of contents
- Introduction: Students are expected to write a brief introduction describing the development and supporting material used (Eurocodes, Excel, AutoCAD, etc.) to carry out the calculations and produce the report (max. 300 words).
- Calculations
  In this section students must include the development of their calculations. Include drawings or sketches as well as formulae used. Provide references/statements to any external sources used by using Harvard referencing system.
- Summary: State your relevant intermediate calculations and findings.
- Conclusions: present your conclusions regarding the selected profile (state why you selected such profile size and orientation), the cross-sectional and member verifications (if they are OK or not) as well as your recommendations (and why) to ensure that the safety of the structure (max. 300 words).
- References (documents used supporting your statements, e.g. Eurocodes, theory from literature, etc).

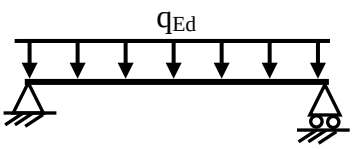
2. Design of steel beams

The figure below shows the column grid and the plan layout of the primary and secondary steel beams for the floor of a 3 storey building to be constructed in the city of Wolverhampton. All beams may be assumed to be simply-supported at their ends.

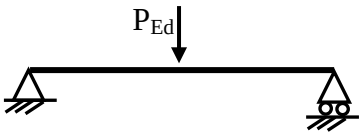


Column grid and plan layout

Assuming that the beams B34 (sencondary beam) and B32 (primary beam) are subjected to the following **<u>design</u>** loads:



B34 – UDL



B32 – Point load at midspan

For both beams you are required to:

- Q1. Size an UKB that satisfies a deflection limit of δ<Span/300.
- Q2. Assuming that the beams are laterally restarined at the supports, verify the cross-sectional resistance allowing for interaction if required.
- Q3. Assuming that the beams are unrestrained, verify the lateral torsional buckling resistance.
- Q4. Discuss the results and propose changes to ensure that the selected profile in Q1 is adequate when the beams are unrestrained.

NOTE 1: refer to CANVAS to find your allocated A, B, q_{Ed}, P_{Ed} and steel grade.
NOTE 2: ignore the self-weight of the steel beams.

3. Marking criteria:

Based on 25% weighting of Part 1 of Component 2:

- Overall quality and critical reasoning: grammar, references and overall presentation (5%)
- Q1. Sizing (3.75%)
- Q2. Cross-section verification (3.75%)
- Q3. Member verification (3.75%)
- Q4. Discussion (3.75%)
- Accuracy of the calculations and units (5%).

Refer to CANVAS to see rubric.
Feedback will be given based on the CANVAS rubric.