

**UNIVERSITY COLLEGE LONDON**

University of London

**EXAMINATION FOR INTERNAL STUDENTS**

For The Following Qualification:–

*B.Sc.*

**ES217A: Structural Form and Function A**

**COURSE CODE : ENVS217A**

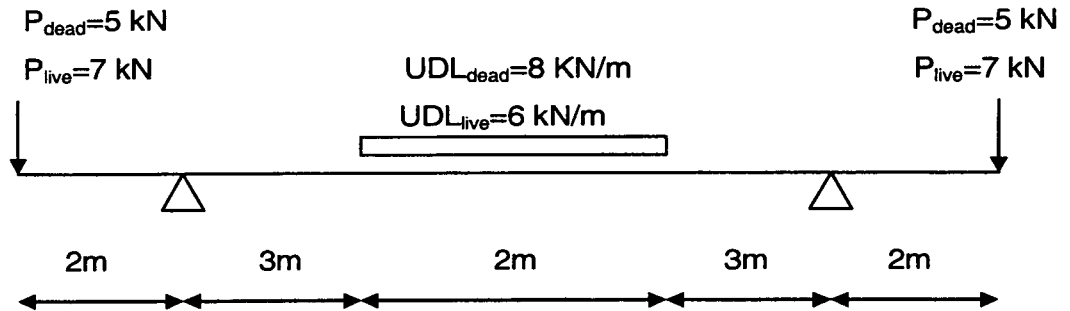
**UNIT VALUE : 0.50**

**DATE : 16-MAY-06**

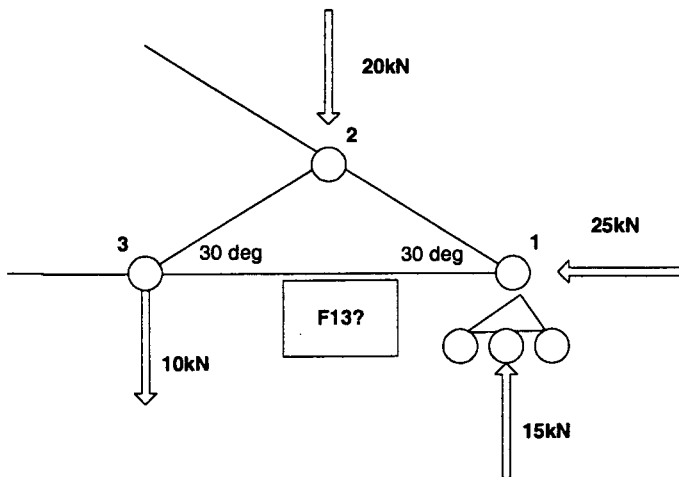
**TIME : 10.00**

**TIME ALLOWED : 3 Hours**

- Assuming the tensile force = 5000 kN, design a UC element in tension (select size from given tables and justify) assuming that the maximum design tensile strength of steel is 275 N/mm<sup>2</sup> and calculate the elongation (increase of length) of the element. Young's modulus = 2.05 E5 N/mm<sup>2</sup> and original length = 1.5m.
- Using diagrams provided sketch shear force and bending moment diagrams and calculate and locate maximum values using given formulas, for the cantilever shown below. Carry out the calculations for **design** (not characteristic) loading.



- Resolve the given below truss joint for the unknown force in member linking joints 2 and 3 – F<sub>23</sub>? (Calculate value of the force and state if tensile or compressive). (6.5 marks)
  - Comment on what assumptions are made in truss design and what are the implications of these assumptions. Explain determinate and indeterminate trusses. (6 marks)



4. Please explain the need for bracing, shear walls or structural cores in buildings. How does concept of braced and un-braced frames link to the first part of this question?
5. a. Describe bolted and welded connections (7.5 marks)  
b. Explain torsion and sketch some examples of torsion (5 marks)
6. Describe composite floors, commenting on the following: (i) deck types; (ii) slab span and depths; (iii) concrete type and grade; (iv) the construction and composite loading; (v) forms of shear connection.
7. Describe all three modes of failure of retaining walls and state briefly what should be done to prevent them.
8. Describe displacement and replacement piles and their methods of construction as well as justification for using in cohesive and cohesionless soils. Use sketches.
9. a. Describe the implications on the stress distribution underside the foundations in cases when eccentric loading is applied from the structure. (7.5)  
b. Explain the statement "rotating a timber beam (200x50 mm) by 90 deg. influences its capacity to withstand bending". Use sketches if needed. (5)
10. Describe the design procedure for checking the vertical capacity and the lateral capacity of solid masonry walls.
11. What is the purpose of modification factors in timber design? Please list the most important ones and comment on their values. Explain how they are used.
12. Explain principles of steel design (conservative approach). Explain significance and use of relevant section properties related to the process.

END OF PAPER