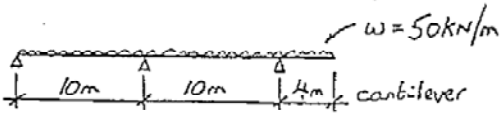
Instructions

- Please complete the 15 questions in approximately 30 minutes
- Pace yourself so as to finish as many of the questions in your range of experience as possible
- Use only paper, pencil/pen and a calculator
- Do not use any references

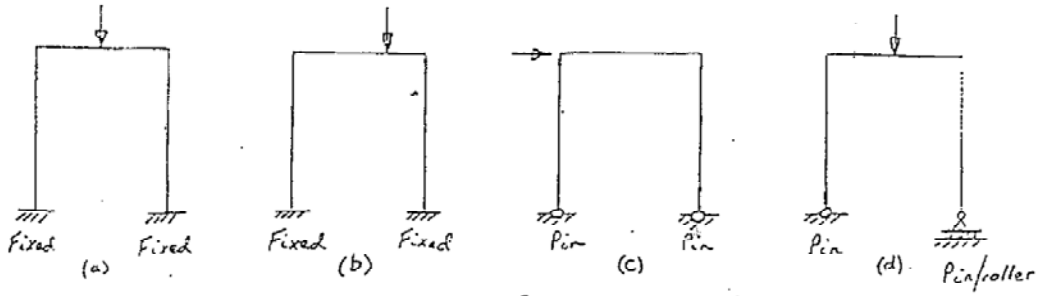
Question 1 For the following continuous, constant interia, beam:



Sketch the bending moment diagram and estimate support values in kNm:

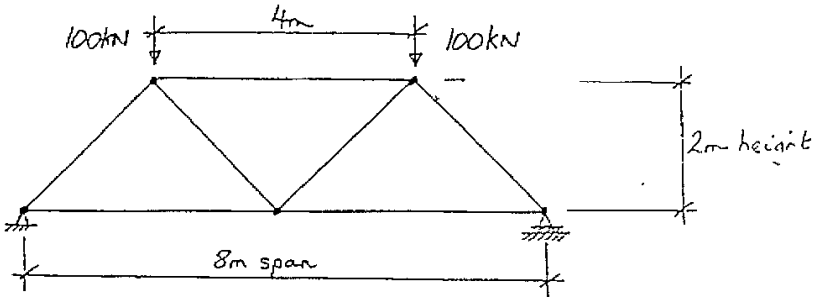
Sketch the shear force diagram and estimate support values of shear in kN:

Question 2 Sketch the bending moment diagrams on the following portal frames:

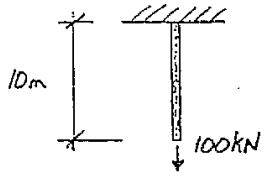


Which way does frame (b) sway? L or R

Question 3 Calculate the axial loads (in kN) in the following pin - jointed truss, showing them as tension or compression :



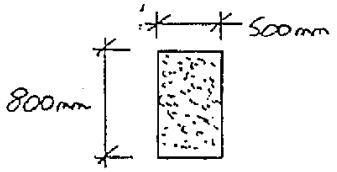
Question 4 Calculate the tip extension of the following tie rod:



$EA = 200,000$ kN

Tip extension = ...mm

Question 5 Estimate the required reinforment area for the following concrete section under an ultimate moment of 800 kNm:



Concrete, $f_{cu} = 40 N/mm^2$

Reinforcement, $f_y = 460 N/mm^2$

Steel area, As = ... mm^2

Suggest a suitable number and size of reinforcing bars :

No. of bars = ... No.

Bar diameter = ... mm