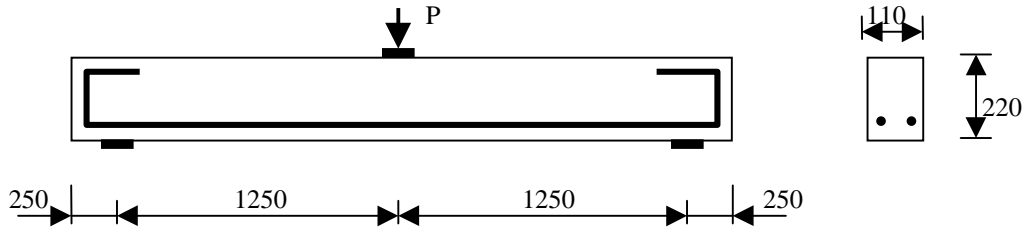
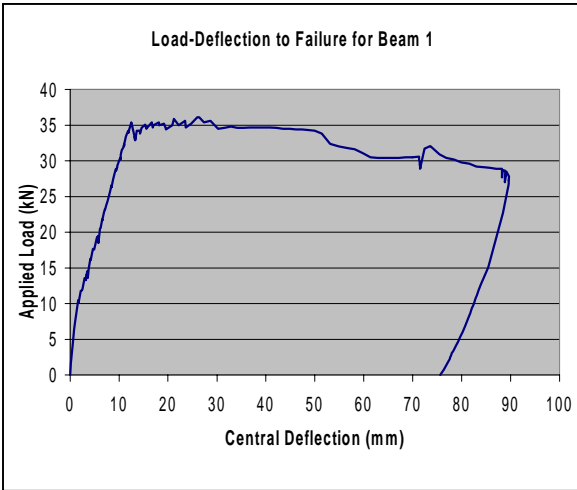


Beam design and dimensions



Concrete cube strength $f_{cu} = 51.0 \text{ N/mm}^2$, tensile strength $f_t = 5.49 \text{ N/mm}^2$. Bottom reinforcement is 2 T12 bars. Cover is 25mm. Young's Modulus $E_s = 200,000 \text{ N/mm}^2$ for the steel and $E_c = 30,000 \text{ N/mm}^2$ for the concrete.



Cracking behaviour

at 15kN:

at 20kN:

at 25kN:

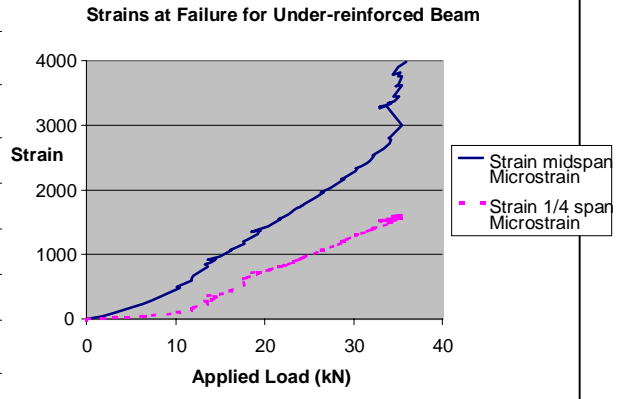
at 30kN:

at failure:

Comment briefly on the behaviour of the beam through the elastic range, during progressive cracking, up to peak load and post-peak behaviour. Comment on whether you think this behaviour was to be expected, and why.

Estimate the cracking load of the specimen from the load-deflection plot. By using a transformed section approach, calculate the predicted cracking load and compare with the actual result. Ignore self-weight. Comment on your result. [Hint: Look at page 91 of your Structures 2 notes]

Comment on the strain in the steel bars through the elastic and cracked ranges, and leading up to failure.



By using relevant clauses from the appropriate code-of-practice, predict the design strength of this beam. Comment on the accuracy and safety of the code-of-practice in this case. Show all calculations below and ignore self-weight.
