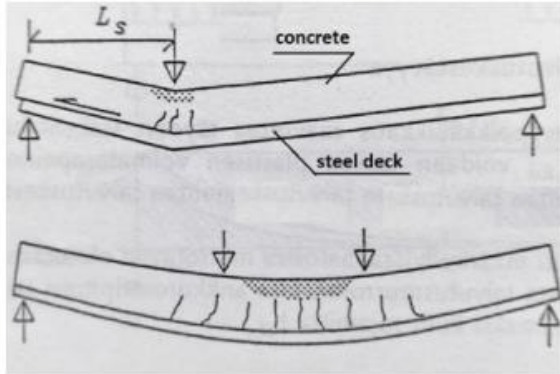


Question 1

Flag question Marked out of 6.00 Not yet answered

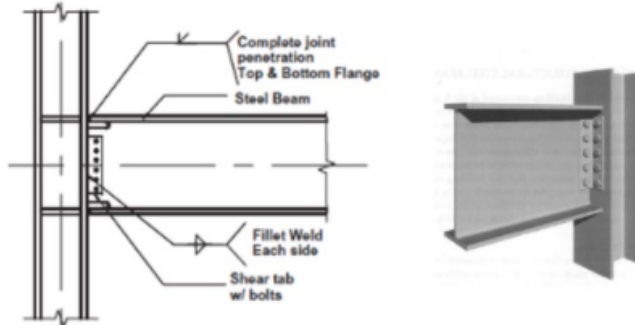
- a). Two single-span composite slabs are respectively loaded as shown in the figure. Please identify the corresponding failure modes and explain the reasons.
- b). What is the m-k method in EN 1994-1-1 for determining the strength of the composite slab shown in the figure?



Question 2

Flag question Marked out of 6.00 Not yet answered

- a). What are the components in a beam-to-column joint shown in the figure when the moment – rotation properties of the joint are characterized according to EN 1993-1-8?
- b). Describe the procedure for checking the strength of the joint in (a).

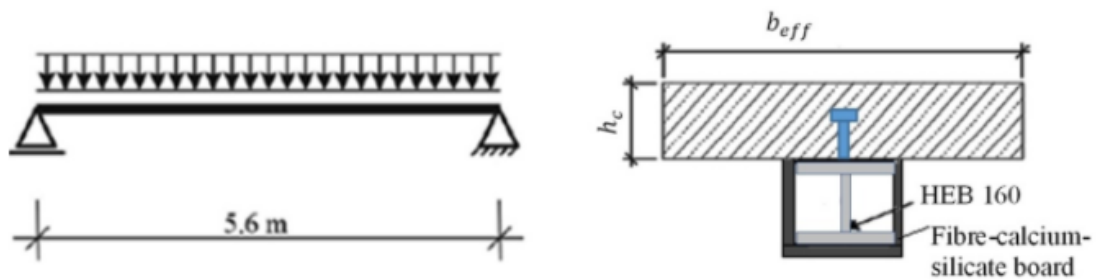


Question 3

Flag question Marked out of 6.00 Not yet answered

The composite beam shown in the figure is simply supported and uniformly loaded. The composite beam is composed of a steel beam with profile HEB 160 (S355) and a concrete slab with a height of 160 mm (C25/30, $f_{ck}=25\text{N/mm}^2$, $E_{cm}=30500\text{N/mm}^2$). The steel beam is protected with 15 mm thick fiber-calcium-silicate board (thermal conductivity: $\lambda_p = 0.15\text{ W/(mK)}$, specific heat: $c_p = 1200\text{ J/(kgK)}$, Density: $\rho_p = 600\text{ kg/m}^3$).

- Determine the temperature distribution across the steel profile if the beam is exposed to the standard fire for 60 min.
- How high is the temperature of the shear stud and the temperature of the concrete close to the shear stud?
- At elevated temperatures, it is assumed that the numbers of shear connectors are strong enough to provide full shear connections between steel profile and concrete. Determine the load the composite beam can carry if the beam is rated as R60?



Question 4

Flag question Marked out of 6.00 Not yet answered

According to EN 1994-1-1, determine the resistance of a concrete-filled circular composite column in compression. The dimension of the composite column is shown in the figure. The grade of concrete is C35/45 ($f_{ck}=35\text{N/mm}^2$, $E_{cm}=33500\text{N/mm}^2$) and the grade of steel is S355. Partial safety factors: structural steel 1.10 and concrete 1.5. The effect of long-term loading on the effective elastic flexural stiffness is not considered in this case.

