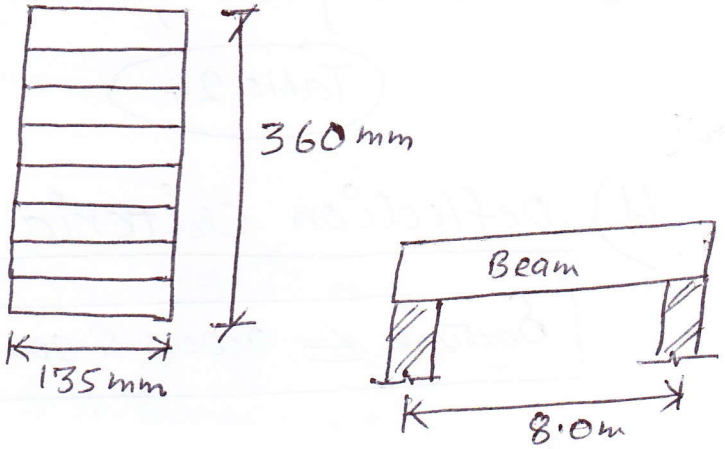
Example 1: The glulam timber beam shown below comprises 8/45 mm finished laminations (machined from 50 mm thick timber) each of which is C24 grade timber. It is intended to use the beam internally in a building which is continually heated. Assuming an 8.0m simply supported span, determine the maximum long-term safe load (including self weight) the beam can carry considering the following criteria:

a) Bending
b) Shear and
c) Deflection



Solution:

i a) **Grade Stresses (Table 8):**

$\sigma_{m,g,\parallel} = 7.5\ N/mm^2$

$\tau_{g,\parallel} = 0.71\ N/mm^2$

ii b) **Section properties**

Area, $A = 135 * 360 = 48.6 \times 10^3\ mm^2$

M.I, $I_{xx} = \frac{135 * 360^3}{12} = 524.9 \times 10^6\ mm^4$

$Z_{xx} = \frac{135 * 360^2}{6} = 2.92 * 10^6\ mm^3$

iii) **Consider bending criteria**

Maximum applied bending moment $= \frac{wl^2}{8} = \frac{w \cdot 8^2}{8} = \underline{8w\ kNm}$

w = total uniformly distributed load including self weight of beam

$\sigma_{m,a,\parallel} = \frac{8w * 10^6}{2.92 \times 10^6} = 2.74w\ N/mm^2$