Q.4 Set. (C) **[7 Marks]**

A cantilever beam contains a through-thickness crack. The beam is loaded by a system of forces as shown in the figure. Determine at what value of P failure may be expected. Numerical data: crack length (2a) = 0.06m, beam thickness t = 0.03m, plate width b =0.09m, d=0.06m, l=3.2m, yield strength σ_y =600MPa, and fracture toughness K_{Ic} =50 MPa $m^{1/2}$. The geometrical factor can be taken as 1.12 for fracture toughness calculation. Also, check if the given system plate thickness and crack size satisfy the condition for plain strain fracture toughness test.


P
d
d
P
t
b
2 a
l