FACULTY OF ENGINEERING	Project				Job Ref.	
UNIVERSITY OF RUHUNA	Sheet no./rev.					
Learning Tool for					1	
Reinforced Concrete	Calc.by	Date	Chk'd by	Date	App'd by	Date
Design						

FLEXURAL REINFORCEMENT CALCULATION (BS8110:PART1:1997)

(RECTANGULAR BEAM)

$$K = \frac{M}{bd^2 f_{cu}}$$

$$K'=0.167$$

 \star If $K \leq K'$, compression reinforcement is not required; hence singly reinforced.

$$Z = d \left\{ 0.5 + \sqrt{0.25 - \frac{K}{1.134}} \right\}$$
$$A_S = \frac{M}{0.87 f_y Z}$$

• If K > K', compression reinforcement is required;

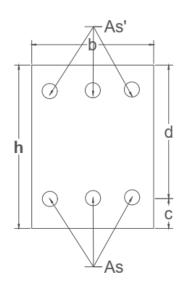
$$Z = d \left\{ 0.5 + \sqrt{0.25 - \frac{K}{1.134}} \right\}$$

But not greater than 0.95d

$$A'_{S} = \frac{(K - K')f_{ck}bd^{2}}{0.87f_{yk}(d - d')}$$

$$\frac{100A'_{S}}{A_{C}} > 0.2$$

$$A_S = {\left({{K_{bal}}f_{ck}bd^2} \middle/ {0.87f_{yk}}{Z_{bal}} \right)} + {A'}_S$$



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$K \leq K'$					
$Z = d \left\{ 0.5 + \sqrt{\right.}\right.$,				
$A_S = M / 0.87 f_y$	Z =				

Check for the minimum reinforcement

 $\overline{A_{S,prov}}$ has to be greater than 0.26 $\frac{f_{ctm}}{f_{vk}}b_td$ but not less than $0.0013b_t d$.

$$0.26 \frac{f_{ctm}}{f_{yk}} b_t d = 0.0013 b_t d =$$

Check for maximum reinforcement

$$\frac{100A_S}{A_C}$$
 < 4; hence ok.

$$Z = d \left\{ 0.5 + \sqrt{0.25 - \frac{K}{1.134}} \right\} =$$

$$A'_{S} = \frac{(K - K')f_{ck}bd^{2}}{0.87f_{yk}(d - d')} = \frac{100A'_{S}}{A_{C}} > 0.2$$

$$A_{S} = {K_{bal}f_{ck}bd^{2}/0.87f_{vk}Z_{bal}} + A'_{S} =$$

Check for the minimum reinforcement

 $\overline{A_{S,prov}}$ has to be greater than 0.26 $\frac{f_{ctm}}{f_{vk}}b_td$ but not less than $0.0013b_t d.$

$$0.26 \frac{f_{ctm}}{f_{yk}} b_t d = 0.0013 b_t d =$$

$\frac{\text{Check for maximum reinforcement}}{100A_S/_{A_C} < 4 \text{ ; hence ok.}}$

$$\frac{100A_S}{A_C}$$
 < 4; hence ok