

TEST 2 (2.4.12/2015 - sem 1)

Q1

DL = $1.35(15) + 1.5(10) = 35.25 \text{ kN/m}$
 P. load = $1.35(40) + 1.5(20) = 84 \text{ kN}$

Q2

Main beam
 Span A-B (M = 320 kNm)
 $d = 600 - 30 - 10 \cdot 20\% = 550 \text{ mm}$
 $M_f = 0.587 \cdot 80 \cdot 900 \cdot 150 \left(\frac{550 - 150}{2} \right) \cdot 10^{-6} = 1041 \text{ kNm}$
 $\therefore M < M_f \therefore$ Neutral axis in the flange
 $k = \frac{320 \cdot 8 \cdot 10^6}{(30 \cdot 900 \cdot 550^3)} = 0.026 < 0.167$

$\lambda = 0.9764 > 0.95d$
 \therefore Use $0.95d$
 $A_s = \frac{320 \cdot 8 \cdot 10^6}{0.97 \cdot 520 \cdot 0.95 \cdot 550} = 945 \text{ mm}^2$
 \therefore Use 2H25 ($A_s = 982 \text{ mm}^2$)

$A_{smin} = 0.26 \left(\frac{2.7}{50} \right) b d = 306 \text{ mm}^2$

$A_{emax} = 0.04 (250 \cdot 600) = 6000 \text{ mm}^2$

at Support B (M = 320 kNm)

$K = \frac{320 \cdot 10^6}{(30 \cdot 270 \cdot 550^3)} = 0.141 < 0.167 \therefore$ no computer bar

$Z = d \cdot 55 \cdot d < 0.95d$

$A_s = \frac{320 \cdot 1 \cdot 10^6}{(0.87 \cdot 520 \cdot 0.25 \cdot 550)} = 1566 \text{ mm}^2$
 \therefore Use 4H25 ($A_s = 1964 \text{ mm}^2$)

$A_{smin} = 30 \text{ mm}^2$
 $A_{emax} = 6000 \text{ mm}^2$

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