H.W 1 (11)

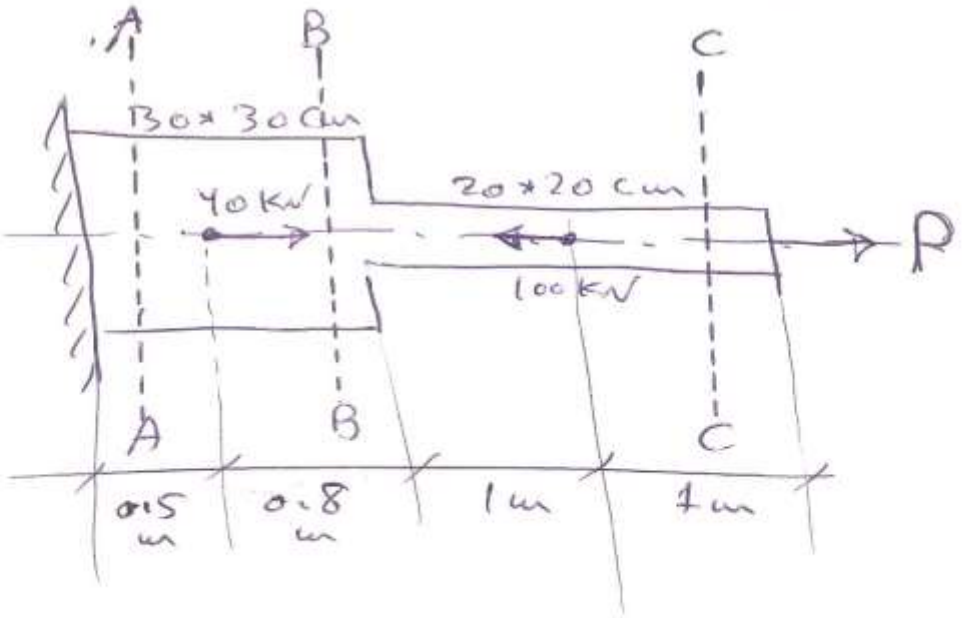
Find The Stresses at

Section A-A

Section B-B

Section C-C

for the beam shown in the Figure



P for first student = 200 KN

P for each student =

P Previous + 10 KN

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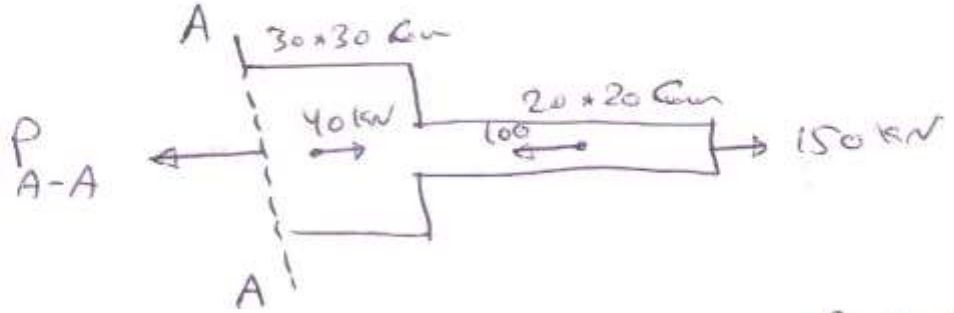
(12)

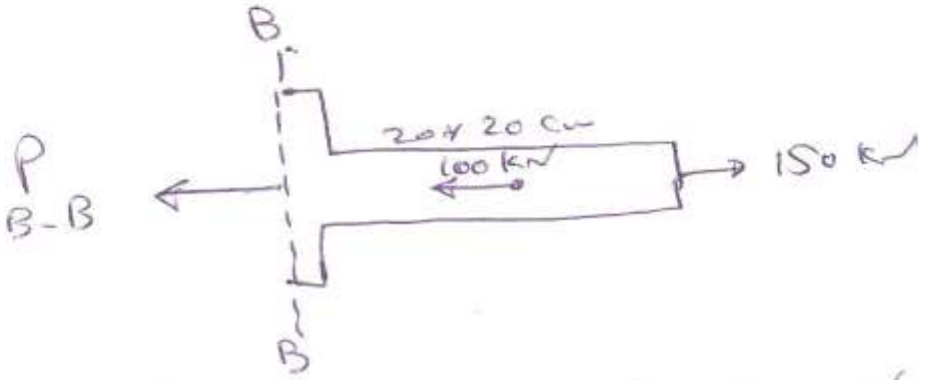
Solution H.W1 if P = 150 kN



$$\pm \rightarrow \quad \sum F_x = 0 \Rightarrow -P_{A-A} + 40 - 100 + 150 = 0 \Rightarrow P_{AA} = 90\ kN$$

$$\sigma_{A-A} = + \frac{P_{A-A}}{Area} = \frac{90 \times 10^3}{300 \times 300} = 1 \frac{N}{mm^2} = 1\ MPa$$

(Tension ↑; 10 × 10 Cm = 100 mm; 1 kN = 1000 N)

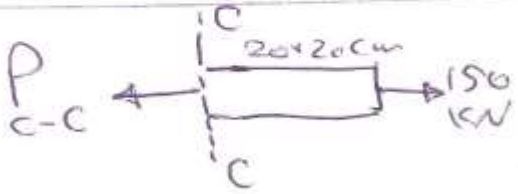


$$\pm \rightarrow \quad \sum F_x = 0 \Rightarrow -P_{B-B} - 100 + 150 = 0 \Rightarrow P_{B-B} = 50\ kN$$

$$\sigma_{B-B} = \frac{P_{B-B}}{300 \times 300} = \frac{50 \times 10^3}{300 \times 300} = 0.55\ MPa$$

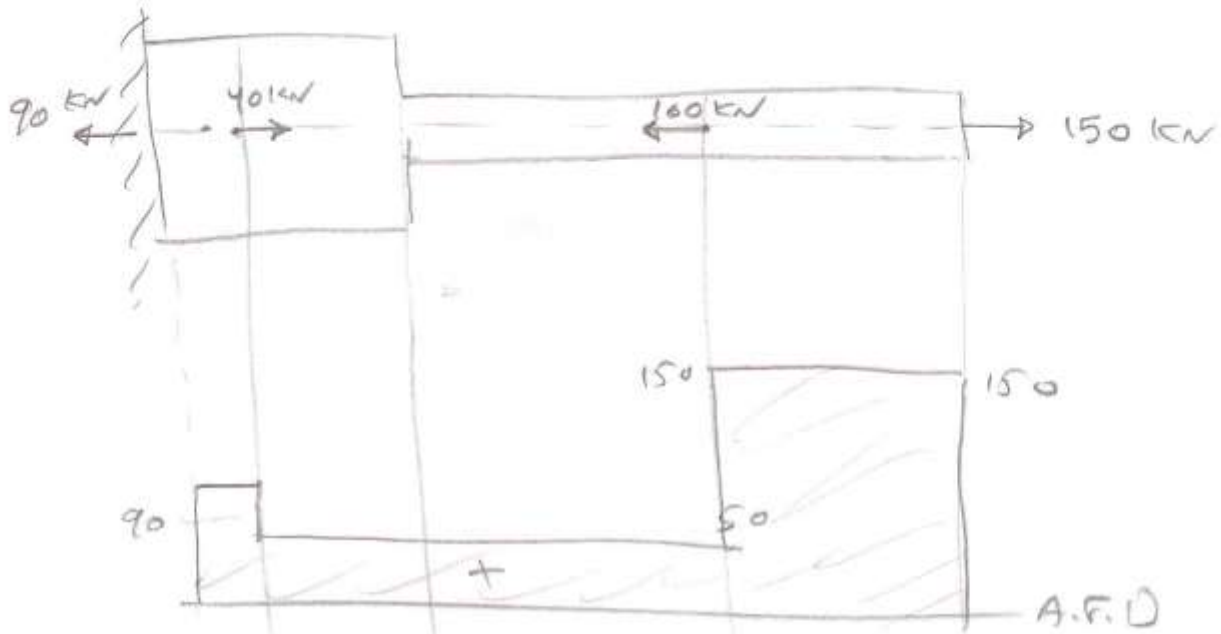
$$+ \rightarrow \quad \sum F_x = 0 \Rightarrow -P_{C-C} + 150 = 0$$

$$\therefore P_{C-C} = 150\ kN$$

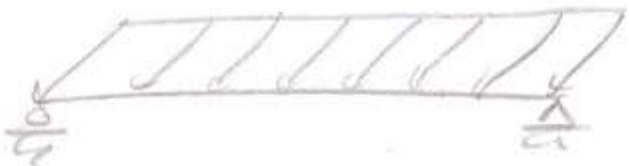


$$\sigma_{C-C} = \frac{150 \times 10^3}{200 \times 200} = 3.75\ N/mm^2 = 3.75\ MPa$$

ويمكن معرفة ذلك عند طريق رسم A.F.D



ملاحظة: دائماً يكون رسم الـ A.F.D على شكل قطوع مستقيمة الا في حالة واحدة هي عندما يكون لدينا Axial distributed load فيكون على شكل قطع مكافئ كما في هذه الحالة:



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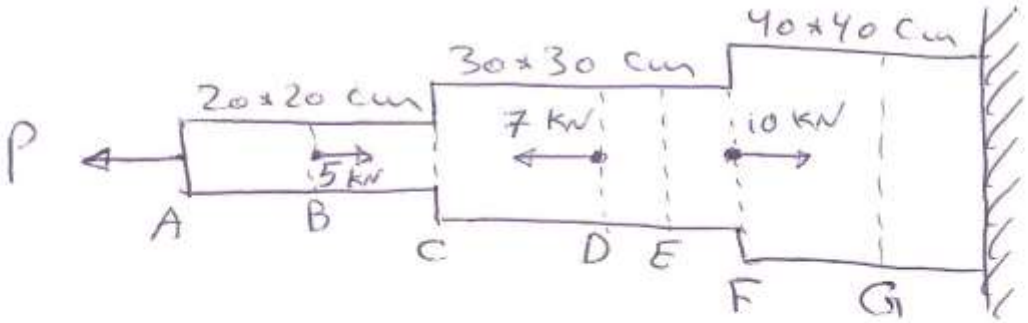
(14)

H.W 3 For the ~~Beam~~ Cantilever Beam shown in the Figure :-

(1) Draw Axial diagram

(2) Find the Normal stresses at A, B, C, D, E, F, G



P for 1st student = 10 KN

P for each student =

$P_{previous} + 1$ KN

Q2: For the rod of variable cross sectional area and different materials as shown in Fig.2. Find the maximum safe force (P).

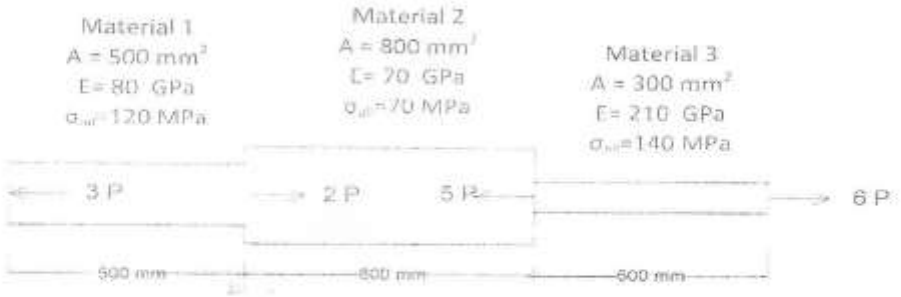


Fig.2

Solution

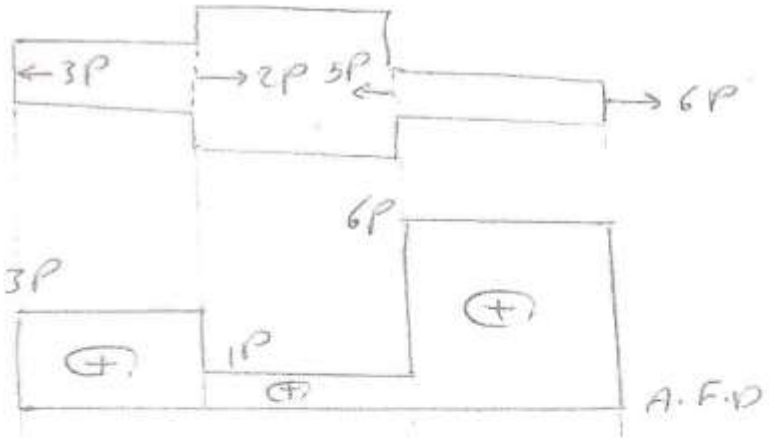
Mat. 1

$$\sigma_{all} = \frac{3P}{A_1}$$

$$P = \frac{\sigma_{all}(A_1)}{3}$$

$$P = \frac{120(500)}{3}$$

$$\boxed{P = 20000\ N}$$



Mat. 2

$$\sigma_{all} = \frac{P}{A}$$

$$\boxed{P = 70 * 800 = 56000\ N}$$

Mat. 3

$$\sigma_{all} = \frac{6P}{A}$$

$$\boxed{P = \frac{140 * 300}{6} = 7000\ N}$$

$$\boxed{P = 7000\ N}$$