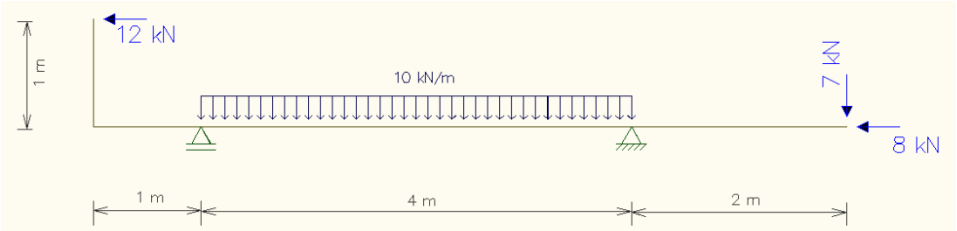
Escola Politécnica da Universidade de São Paulo - Departamento de Engenharia de Estruturas e Geotécnica

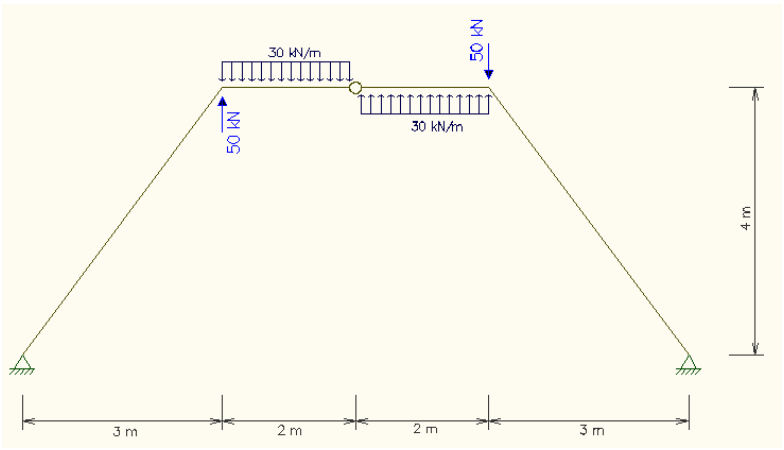
PEF - 2307 - Resistência dos Materiais - 1ª. Prova (12/09/2011) – Prova B

Nome: _____ Nº USP: _____

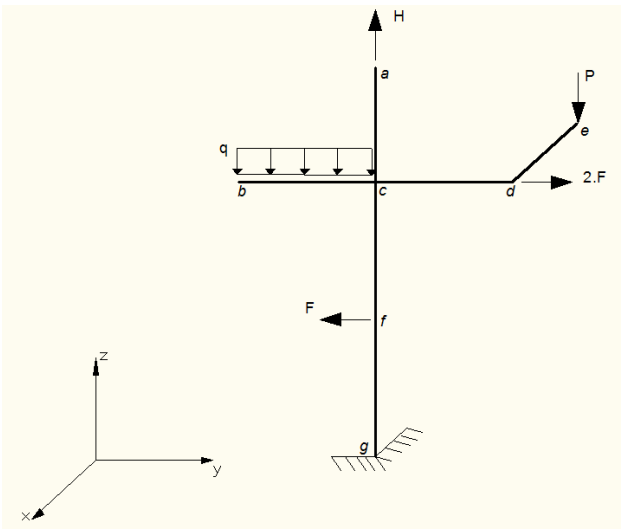
1) **(3 ptos)** Determinar os esforços solicitantes (M,V e N) na estrutura esquematizada a seguir, sob a ações das cargas indicadas. Indique explicitamente os valores e os pontos de momentos extremos.



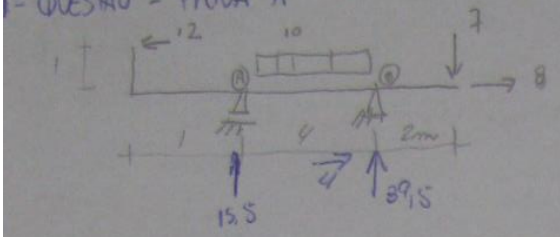
2) **(4 ptos)** Determinar os esforços solicitantes (M,V e N) no pórtico, sob a ações das cargas indicadas. Indique explicitamente os valores e os pontos de momentos extremos.



3) **(3 ptos)** Determinar os esforços solicitantes (M,V, T e N) no pórtico tridimensional. As forças são paralelas aos eixos do sistema xyz, conforme indicado.
Dados: As coordenadas dos pontos são, em metros: a(0;0;30), b(0;-12;24), c(0;0;24), d(0;12;24), e(-10;12;24), f(0;0;12) e g(0;0;0). H = P = 180 kN; F = 120 kN; q = 12 kN/m



1ª QUESTÃO - PROVA A



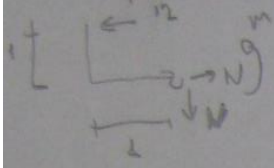
$\Sigma M_A = 0 \rightarrow 4B + 12 = 15 \cdot 6 + 10 \cdot 4 \cdot 2$

$B = 39,5\,KN$

$\Sigma F_y = 0 \rightarrow A = 15,5\,KN$

$\Sigma F_x = 0 \rightarrow B_x = 4\,KN\ (\rightarrow)$

Corte Esq:

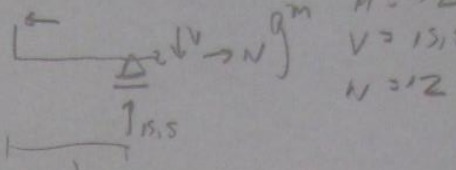


$M = -12$

$V = 0$

$N = 12$

· corte Direita A:

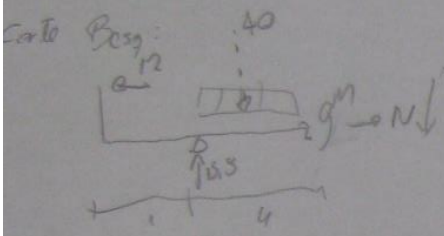


$M = -12$

$V = 15,5$

$N = 12$

Corte Esq:

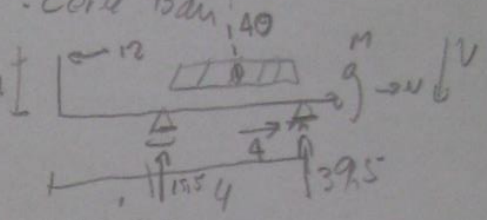


$M = -30$

$V = -24,5$

$N = 12$

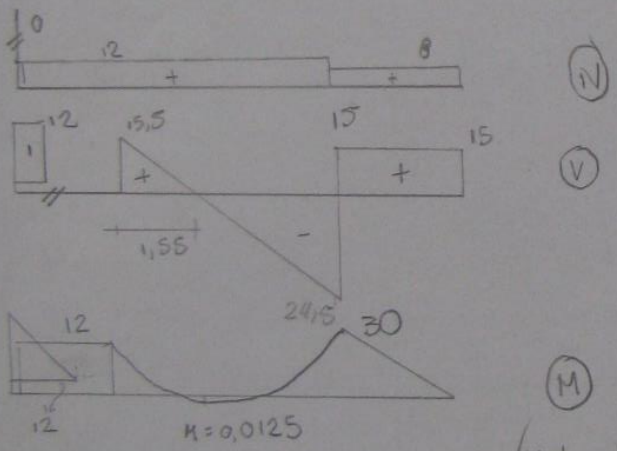
· Corte Dir:



$M = -30$

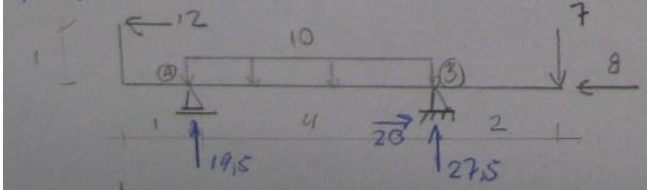
$N = 8$

$V = -24,5$



(KN, m)

1ª QUESTÃO - PROVA B

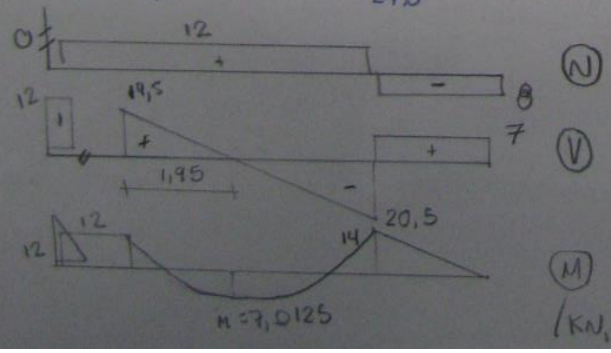


$\Sigma M_A = 0 \rightarrow 4B + 12 \cdot 1 = 7 \cdot 6 + 40 \cdot 2$

$B = 27,5\,KN$

$\Sigma F_y = 0 \rightarrow A = 19,5\,KN$

$\Sigma F_x = 0 \rightarrow B_x = 20\,KN\ (\rightarrow)$



(KN, m)

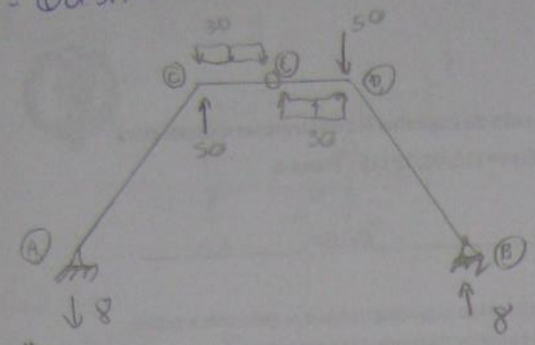
REAÇÕES: V_A, V_B, H_B : 0,6 (cada)

DIAGRAMAS:

MF = 1,0 ; V = 0,8 ; N = 0,6

sendo cada trecho (2 5 90)

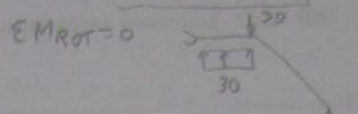
2º QUESTÃO



$\Sigma MA = 0 \quad B \cdot 10 + 60 \cdot 6 - 60 \cdot 4 + 50 \cdot 3 - 50 \cdot 7 = 0$

$B = 8\,KN$

$A = -8\,KN$



$\Sigma M_{ROT} = 0 \quad AB_H \cdot 15 = 60 \cdot 11,5$

$B_H = 0$

$A_H = 0$

1)

$M_A = 0$

$0,6\,N_A + 0,8\,V_A = 0 \quad (\Sigma F_x = 0)$

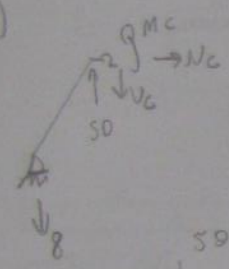
$N_A = -1,33\,V_A$

$\Sigma F_y = 0 \rightarrow 0,8\,N_A = V_A \cdot 0,6 + 8$

$V_A = -4,8\,KN$

$N_A = 6,4\,KN$

2)

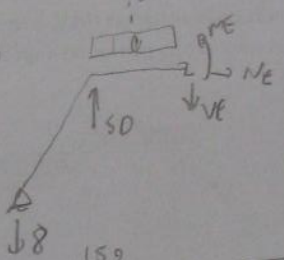


$N_C = 0$

$V_C = 42\,KN$

$M_C = -24$

3)

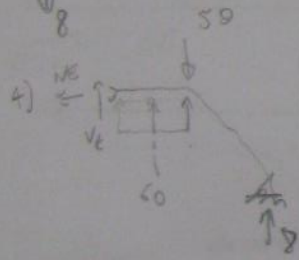


$M_E = 0$

$N_E = 0$

$V_E = -18\,KN$

4)

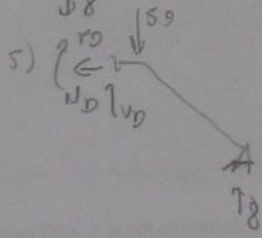


$M_E = 0$

$N_E = 0$

$V_E = -18$

5)

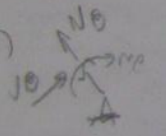


$N_D = 0$

$V_D = 42$

$M_D = 24$

6)



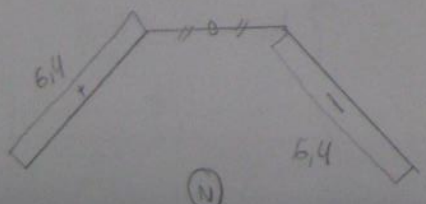
$M_B = 0$

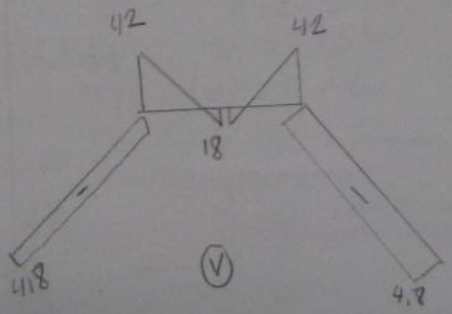
$\Sigma F_x = 0 \rightarrow 0,6 \cdot N_B = 0,8\,V_B \rightarrow N_B = 1,33 \cdot V_B$

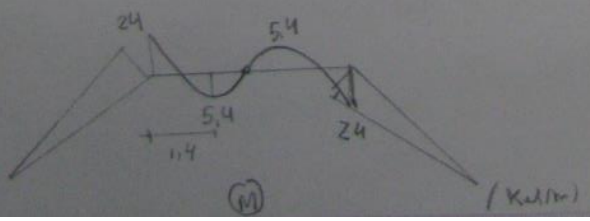
$\Sigma F_y = 0 \rightarrow 0,8 \cdot N_B + 0,8 \cdot V_B + 8 = 0$

$N_B = -4,8\,KN$

$V_B = -6,4\,KN$







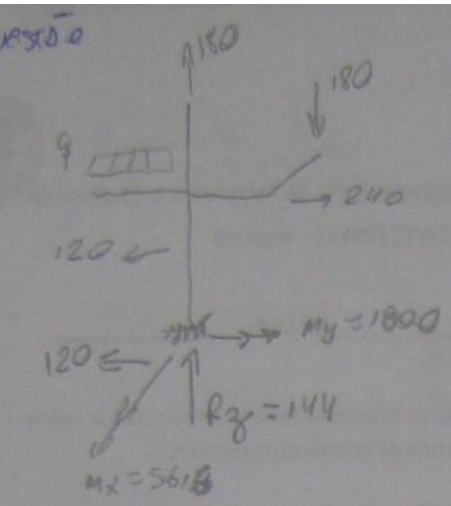
VALORES:

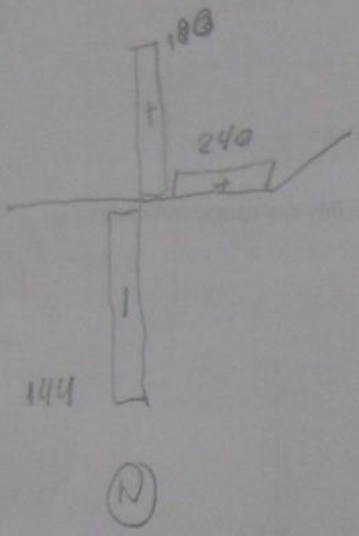
REAÇÕES: $R_V = 0,6$ e $R_H = 0,4$ TOTAL = 1

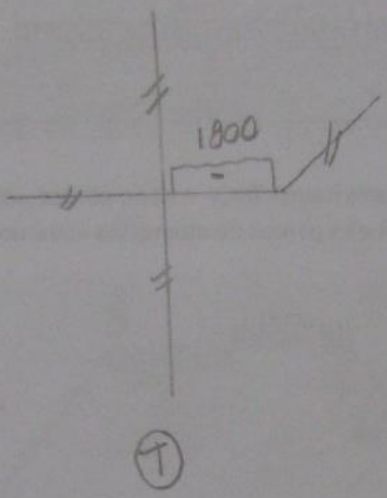
$DN = 0,75$

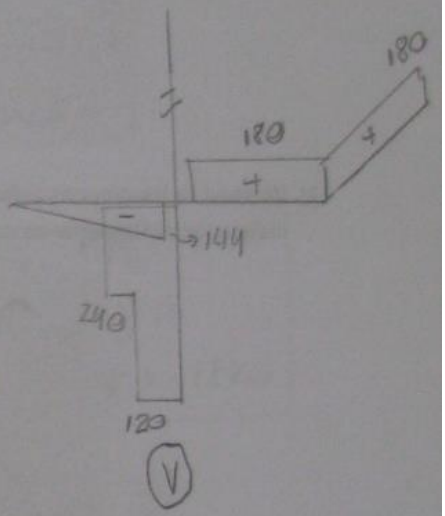
$DV = 0,75 \quad DM = 1,5$

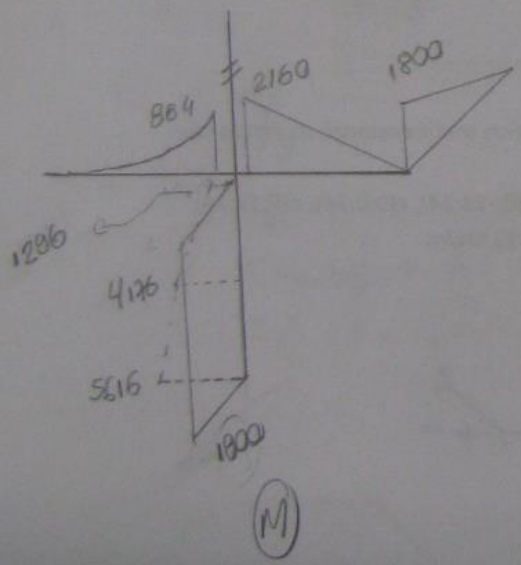
3ª Questão











(kN/m)

Valores

reações: total = 0,6 (0,15 cada)

DN = 0,4

DV = 0,75

Dt = 0,5

DM = 0,75