بسم الله الرحمن الرحيم

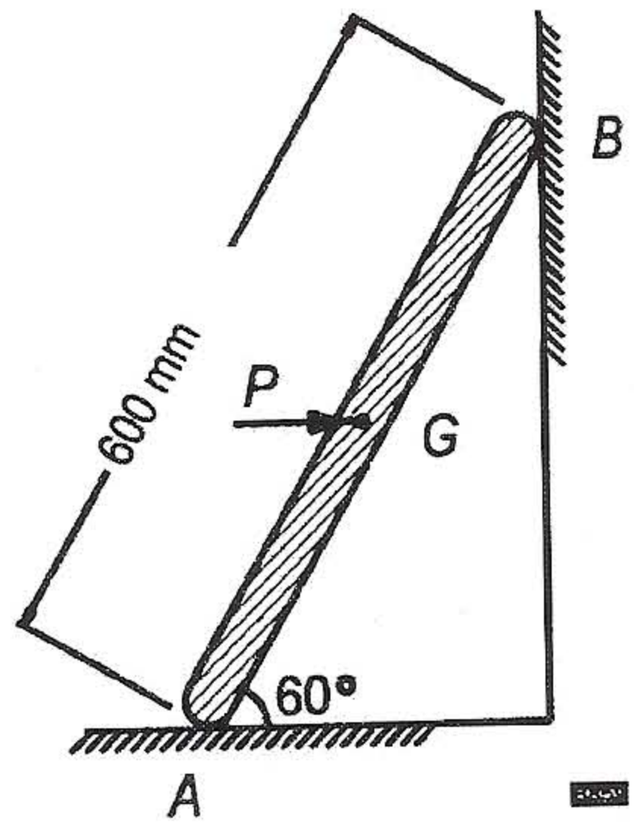
KING ABDULAZIZ UNIVERSITY - COLLEGE OF ENGINEERING

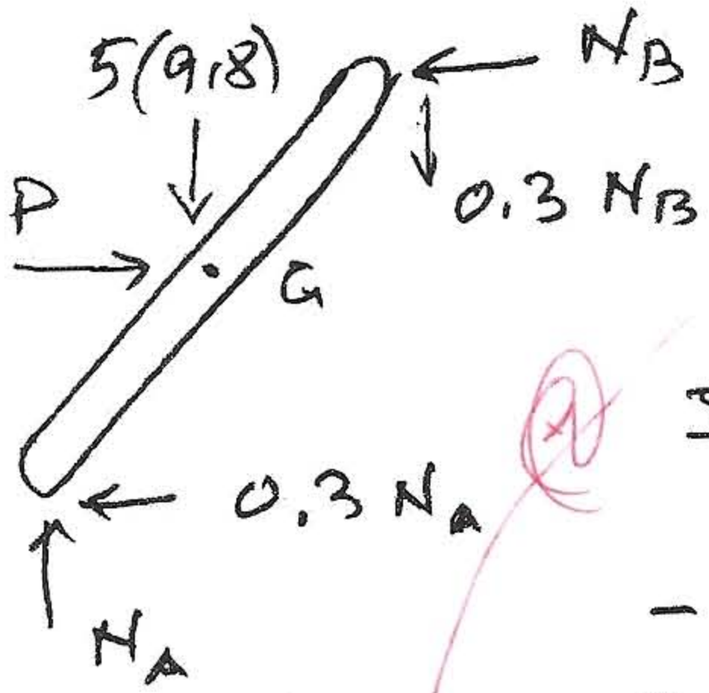
25 / 12 /1429(Fall 2008) **MENG 262 DYNAMICS** Quiz # 6B

Duration: 60 minutes

Name **Comp No.**

The 5-kg rod AB is at rest at the position shown. The coefficient of friction at both ends is 0.3. Find the magnitude of force P which, if suddenly applied, will give the rod a tw acceleration of 10 rad/s^2. Find also the corresponding reactions at A and B.





$\bar{\alpha}_{AB} = 10\bar{k}$

$\Sigma \bar{F} = m\bar{a}_G$

$-0.3N_A\bar{i} + N_A\bar{j} - 5(9.8)\bar{j} + P\bar{i}$

$-N_B\bar{i} - 0.3N_B\bar{j} = 5\bar{a}_G$ ---(1)

where $\bar{a}_B = \bar{a}_A + \bar{\alpha}_{AB} \times \bar{r}_{AB}$

$a_B\bar{j} = a_A\bar{i} + 10\bar{k} \times 0.6(\cos 60\bar{i} + \sin 60\bar{j})$

$\bar{i}$ll $0 = a_A - 6\sin 60 \rightarrow a_A = 5.2$ m/s^2

$\bar{j}$ll $a_B = 6\cos 60$

$\bar{a}_G = \bar{a}_A + \bar{\alpha}_{AG} \times \bar{r}_{AG} = 5.2\bar{i} + 10\bar{k} \times [0.3\cos 60\bar{i} + 0.3\sin 60\bar{j}]$

Subst in (1)

$-0.3N_A + P - N_B = 5[5.2 - 3\sin 60] = 13$ ---(2)

$N_A - 5(9.8) - 0.3N_B = 5[3\cos 60] = 7.5$ ---(3)

$\Sigma \bar{M}_G = I_G\bar{\alpha}$

$[-0.6\cos 60\bar{i} - 0.6\sin 60\bar{j}] \times [N_A\bar{j} - 0.3N_A\bar{i}] +$