## CEN 202 spring 2012- exam 2

## Problem 3:

The spring is stretched a distance d= 30 mm when the mechanism is in the

position shown

1- calculate the force  $P_{min}$  required to initiate rotation about the hinge axis **BC**, and determine the corresponding magnitude of the bearing forces which are perpendicular to **BC**. Hint : Look at what happens to the mechanism at **D**, when the force  $P_{min}$  is applied

2- What is the normal reaction force at **D** if  $P = P_{min}/2$ 

N.B: points A, B, C and D are located in the x-y plane and k=900 N/m

## PROBLEM 3: (30 points)

The spring of stiffness k = 900 N/m is stretched a distance  $\delta = 30$  mm when the mechanism is in the position shown.

 Calculate the force P<sub>min</sub> required to initiate rotation about the hinge axis BC, and determine the corresponding magnitudes of the bearing forces which are perpendicular to BC. Hint: Look at what happens to the mechanism at D, when the force P<sub>min</sub> is applied.

2. What is the normal reaction force at **D** if  $P = P_{\min}/2$ .







Problem 2 :

Calculate the magnitude of the forces supported by the pin at **C** and the guided roller at **B** (which can move without any friction along line **aa'**) under the action of force F = 2000 N applied to the bracket



problem 4 :

a- Determine the reaction at **<u>pin support B</u>** and **<u>roller support E</u>** of the beam shown

b- Draw the diagrams of the shear force  ${\bf V}$  , and moment  ${\bf M}$  for the beam

(30 points) PROBLEM 4; a. Determine the reactions at pin support B and roller support E of the beam shown. b. Draw the diagrams of the shear force V, and moment M for the beam. Show all details of calculation leading to drawing of the V and M diagrams, as well as all particular points 36 kN 3 m 18 kN/m 72.LN 24 kN.m 18 kN 3 3 m 48 kN.m 3 m 6 m 3 m ANESE BY NATUR OUD BY CHOICE