Answer the following questions:
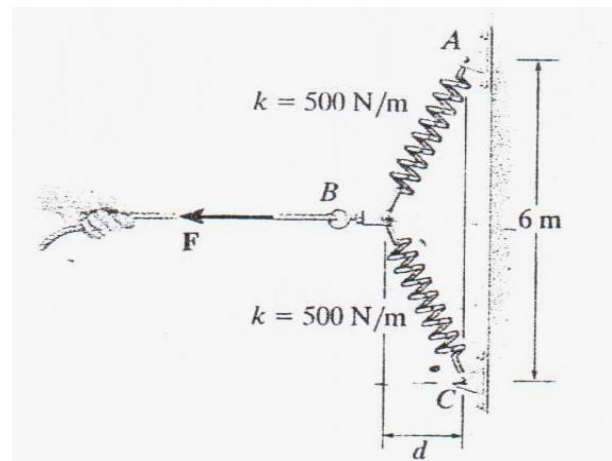
Question one: (10 marks)

If $\theta = 60^{\circ}$ and $F = 20$ kN, determine the magnitude of the resultant force and its direction measured clockwise from positive x-axis.
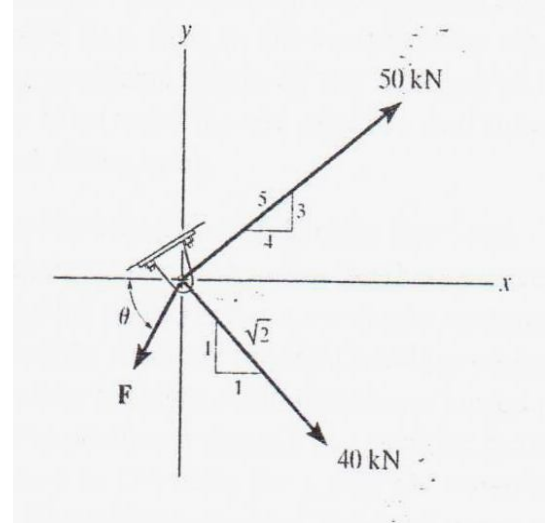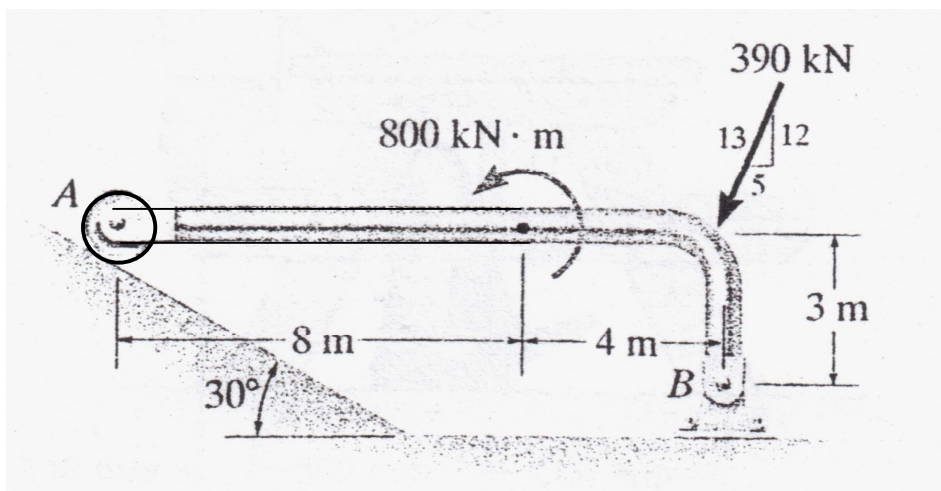

Question Two: (10 marks)

The springs AB and BC have a stiffness of 500 N/m and an unstretched length of 3 m. Determine the horizontal force F applied to the cord which is attached to the small pulley B so that the displacement of the pulley from the wall is d = 1.5 m.
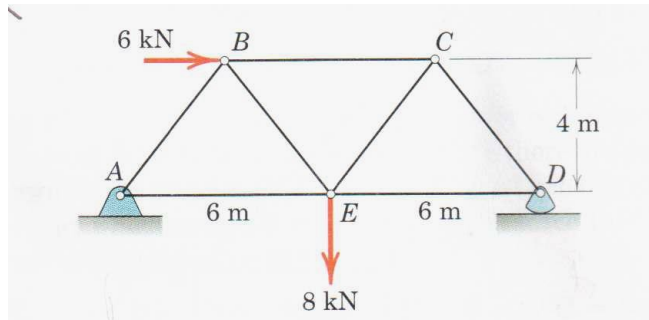

Question Three: (10 marks)

Determine the reactions at roller A and pin B.

Question Four: (10 marks)

Calculate the force in each member of the loaded truss. Specify weather the members are in tension or in compression.

Question Five: (10 marks)

Determine the force that the small roller C exerts on beam AB. Also, what are the horizontal and vertical components of reaction at pin A? Neglect the weight of the frame and roller.
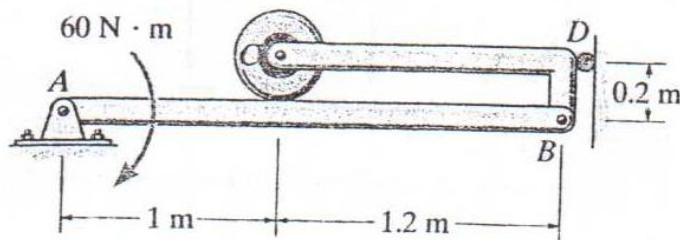
Question Six: (10 marks)

Determine the value of the mass m_o so that the 100-kg block will start moving up the inclined plane. The coefficient of static friction for the contact surfaces is 0.3.