Q1  :  (20%)  
Determine the components of the support reactions. Neglect the weight and thickness of the bar.

NOTE:
A – Pin (Hinge)
B – Roller

Solution:
Q2 (20%):

Calculate the force in each member of the trusses shown. State whether each member is in (Tension) or (Compression).

B – Roller
C – Pin (Hinge)

Solution:
**Q3 (20%)**: 

For the beam and loading condition shown in figure:

a) Determine the shear and moment as a function of \(x\), where \(0 \leq x \leq 9\) m and \(9 \leq x \leq 11\) m, and then find;

b) Shear force and bending moment at point (C) located (6 m) to the right of point (A).

c) Draw shear and moment diagrams.

**Solution:**
Q4 (20%):

Two forces in (3D):

\[ F_1 = 20 \mathbf{i} - 15 \mathbf{j} + 7 \mathbf{k} \]

\[ F_2 \] has a magnitude of (30 N) and its coordinate directional angles are:

\[ \alpha = 40.9^\circ \quad \beta = 65^\circ \quad \gamma = 120^\circ \]

Find the resultant \( F_R \) of the two forces (magnitude and the three angles).

Solution:
Q5 (20\%):  
The unstretched length of spring $AB$ is (3 m). If the block is held in the equilibrium position shown, determine:  
The mass of the block at (D).

Solution :