uOttawa

L'Université canadienne
Canada's university

GNG-1105 (Engineering Mechanics)

FINAL EXAM

27th APRIL,2010.

Time allowed: 3:00 hrs

Student Name: **Student #**

TOTAL MARKS: 100

Please Read the Instructions:

1. Attempt all **Five** questions. (There's a choice for Question No. 5 ***ONLY***).
2. Write your **NAME** and **STUDENT NO**. on **Question paper** and **Answer booklet**.
3. **Return** Question sheet with Answer book.
4. Please write cleanly and make **FREE BODY DIAGRAMS (F.B.D)** where required. Separate points for F.B.D.
5. ONLY NON-PROGRAMMABLE CALCULATORS ALLOWED.

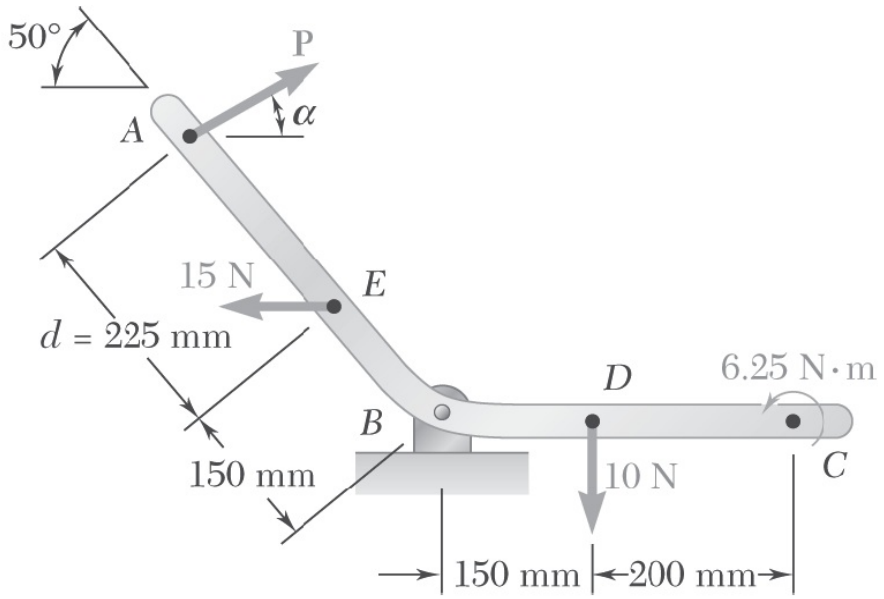
Q1:

Three forces and a couple act on crank ***ABC*** *(as shown)*. For ***P = 25 N*** and $\alpha = 40^0$

a) Determine the resultant of the given system of forces**.**

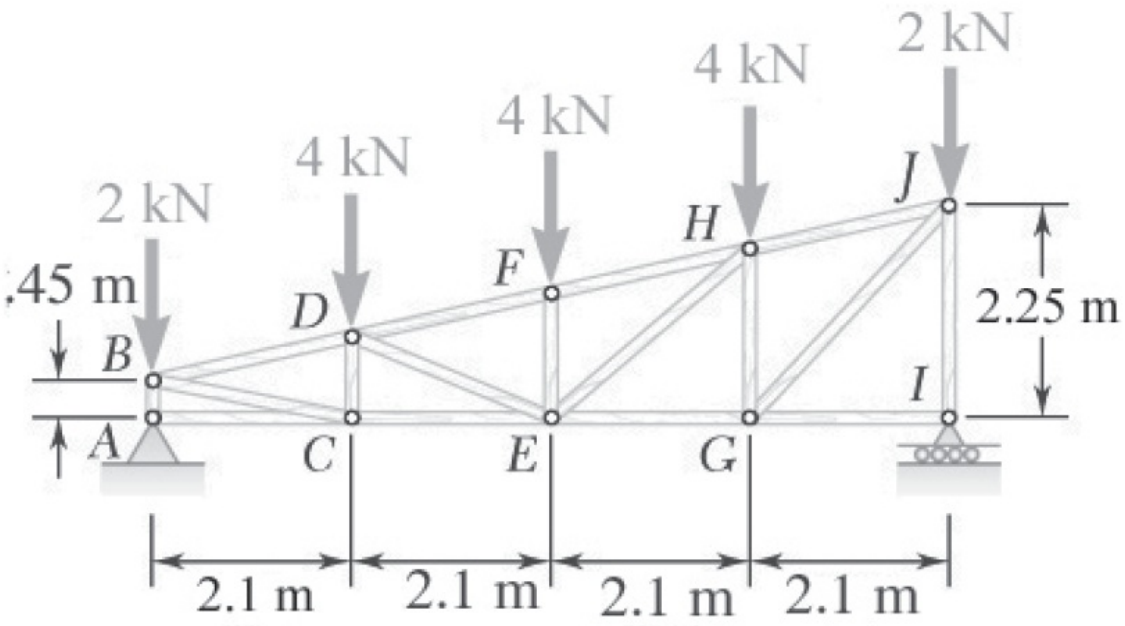
b) Locate the point where the line of action of the resultant intersects a line drawn through points ***B*** and ***C***.

c) Locate the point where the line of action of the resultant intersects a line drawn through points ***A*** and ***B***. **(25 Points)**



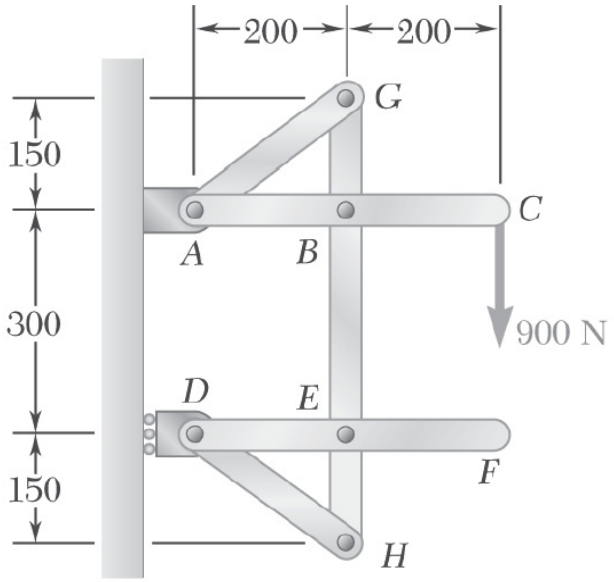
Q2:

A pitched flat roof truss is loaded as shown in the figure below. Determine the forces in members ***CE***, ***DE***, and ***DF***. **(20 points)**



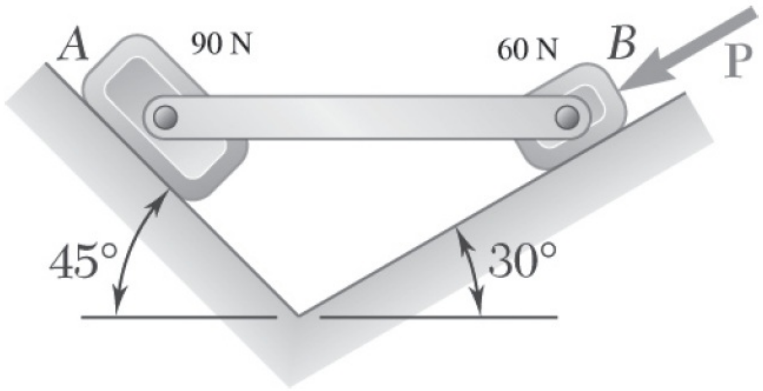
Q3:

For the frame and loading shown below, determine the components of all forces acting on member ***GBEH***. (**note**: all dimensions in mm) **(20 points)**



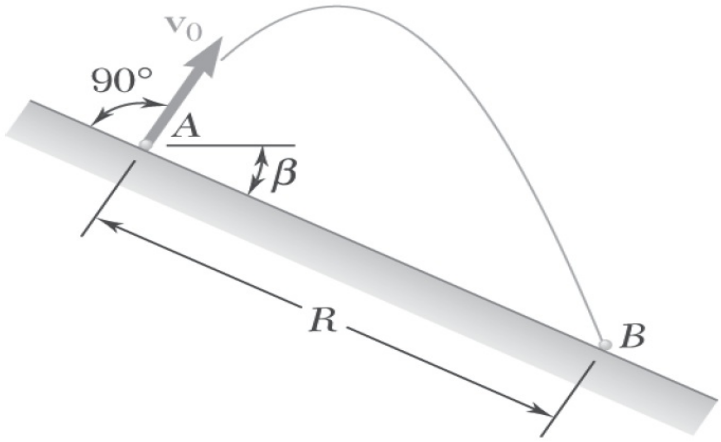
Q4:

The **90**-N block ***A*** and the **60**-N block ***B*** are connected to the slender rod of negligible weight as shown below. The coefficient of static friction is **0.40** between all surfaces of contact. Knowing that for the position shown the rod is horizontal, determine the range of values of ***P*** for which equilibrium is maintained. **(20 points)**



Q5:

A ball is projected from point ***A*** with a velocity $\mathbf{V_o}$ which is perpendicular to the incline shown below. Knowing that the ball strikes the incline at ***B***, determine the initial velocity $\mathbf{V_o}$ in terms of range ***R*** and β. **(15 points)**



OR

Q5:

Two block shown below start from rest. Mass of ***Block A*** is **100**- kg and ***Block B*** is **300**- kg. The horizontal plane and the pulley are frictionless, and the pulley is assumed to be of negligible mass. Determine the **acceleration** of each block and **tension** in each cord.

(15 points)