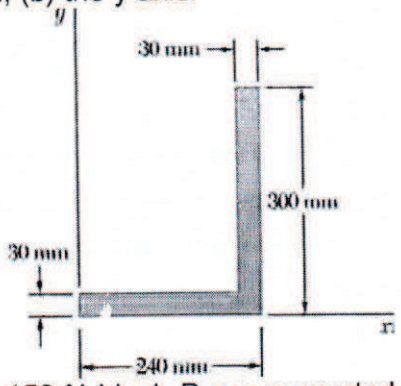
DEPARTMENT OF MECHANICAL ENGINEERING, IIT PATNA

ME102 **Engineering Mechanics** **Mid-Semester Examination**

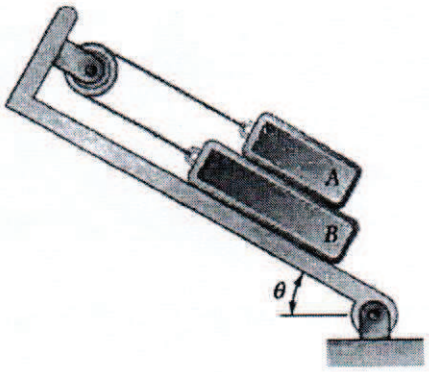
Instructions:

1. This is a closed book closed notes examination. Students are allowed to bring pen, pencil, geometry box and a calculator ONLY. Sharing of calculators is not allowed.
2. Carefully read the problems and in case of any missing data or confusion, please make suitable assumptions and solve the problem.
3. Draw clear FBD as appropriate.
4. All answers should be boxed and units should be mentioned.
5. All parts of a problem should be solved at one location together.

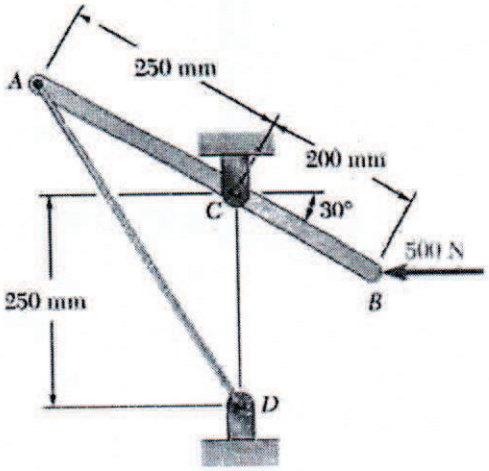
1. Determine the volume and the surface area of the solid obtained by rotating the area below about (a) the line x = 240 mm, (b) the y axis. **6**



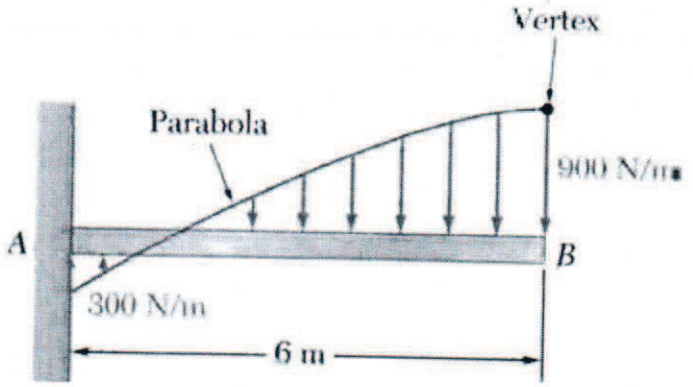
2. The 100-N block A and the 150-N block B are supported by an incline that is held in the position shown. Knowing that the coefficient of static friction is 0.15 between all surfaces of contact, determine the value of θ for which motion is impending. **8**



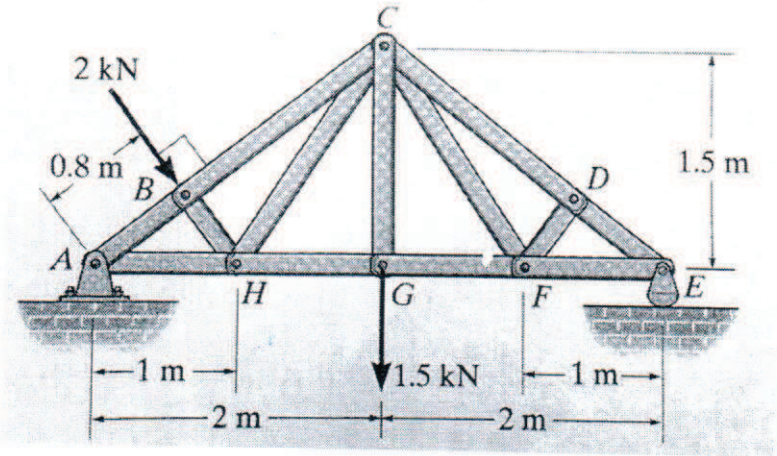
3. A lever AB is hinged at C and attached to a control cable at A. If the lever is subjected to a 500-N horizontal force at B, determine (a) the tension in the cable, (b) the reaction at C. **8**



4. Determine the reactions at the beam supports for the given loading. **8**



5. Determine the force in members, CD, GF, and CG of the truss and state if the members are in tension or compression. Also indicate if there are any zero-force members. **10**



6. Determine the internal forces and moment at point A and B. **10**