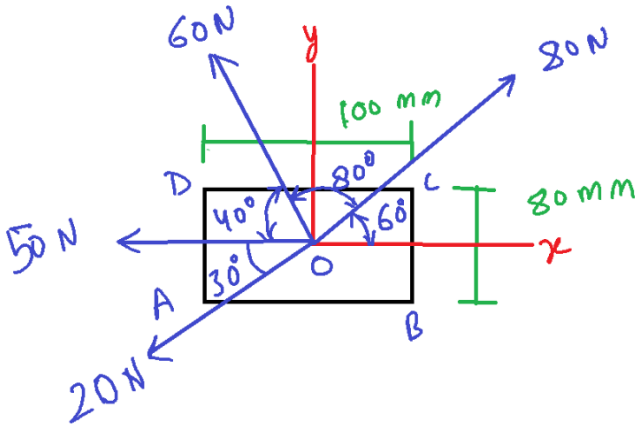
Mid Semester Examination, January 2021

Subject: Applied Mechanics **Subject Code: CE-101**

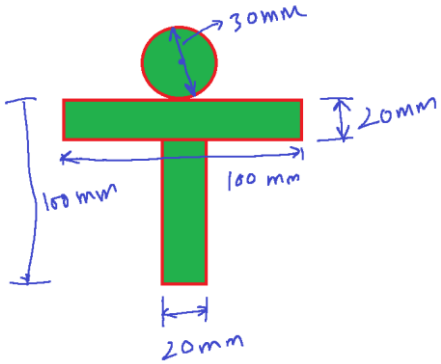
Maximum Marks: 30 **Time Duration 90 Minutes**

Q1. A rectangular body is acted upon four forces as shown in figure. Calculate the magnitude of the resultant force acting on the body and its direction with x-axis. Also calculate the equivalent force couple system at the corner B of the rectangle. Also draw the sketch.

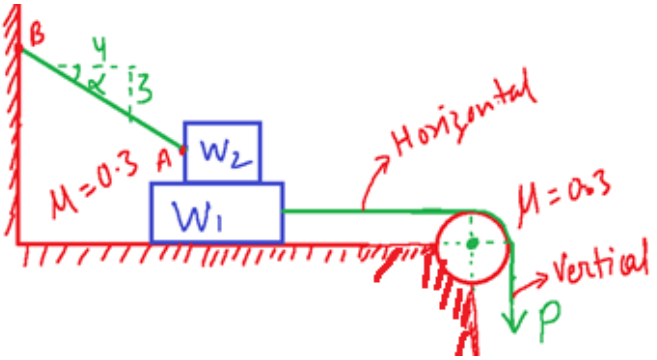
(6+2 = 8 Marks)



Q2. Calculate moment of inertia for the following symmetrical cross-section about the x and y axis passing through the centroid of the area.
(8 Marks)



Q3. A block of weight W1=200 N rests on a horizontal surface and supports on top of it another block of weight W2= 50 N. The block W2 attached with vertical wall by a string AB. Find the amount of vertical force P applied to the lower block necessary for impending slipping. The coefficient of friction for all contiguous surface is 0.3. **(10 Marks)**



Q4. Define the following terms:

(a) Angle of repose
(b) Parallel axis theorem
(c) Varignon theorem
(d) Mass and weight

(1 mark X 4 = 4 Marks)

Applied Mechanics (101) NIT Hamirpur

3rd Feb., 2022 Time 1:30 Hr

Marks (30)

Attempt any five

1. A man is centering the load hanging over a crane truck as shown in Fig.1. If the angle of the rope is 20^o then find a) tension in rope CB, b) and tension in cable AC.

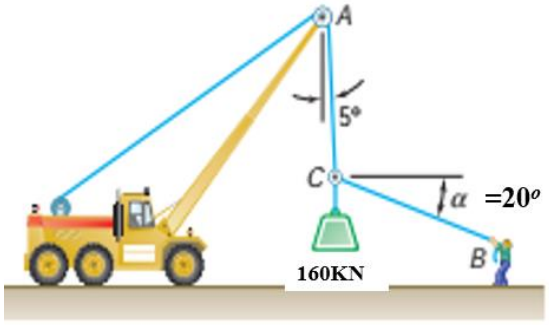


Fig.1 (6)

2. Determine the equivalent force couple system at A for the forces acting as shown in fig.2.

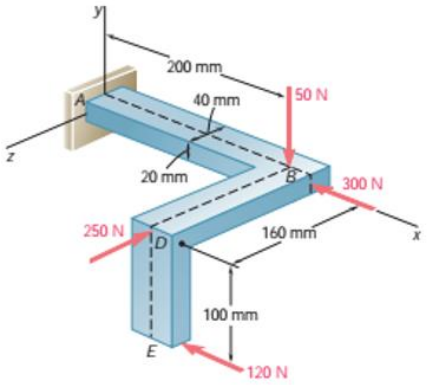


Fig.2 (6)

3. A 5^0 wedge is used to lift a machine of 1400 kN at *A (ref Fig.3)*. Knowing that the coefficient of static friction at all surfaces is 0.20, (*a*) determine the force **P** required to move the wedge, (*b*) indicate whether the machine base will move.

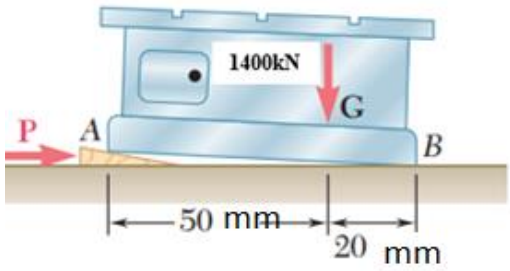


Fig.3 (6)

4. Determine the center of gravity of the L-section and moment of Inertia about centroid axes as shown in fig.4.

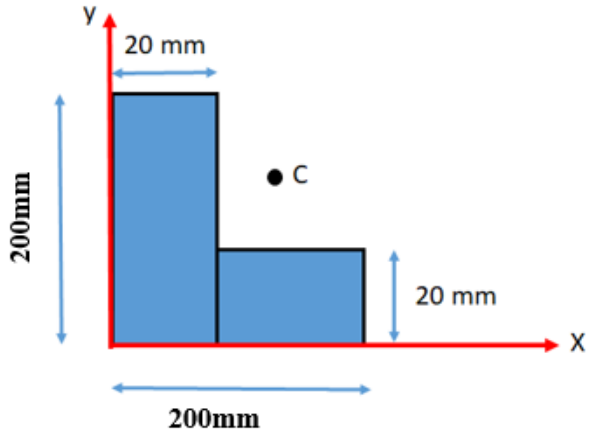


Fig.4 (6)

5. Using the method of virtual work, determine the reaction at supports A and B of the transversely loaded beam shown in fig.5.

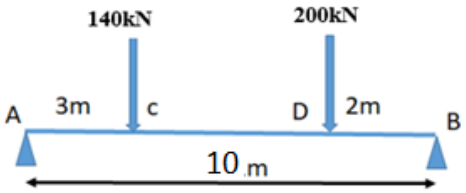


Fig.5 (6)

6. Locate the centroid of plate shown in Fig.6 and also find moment of inertia about axis passing through the centroid.

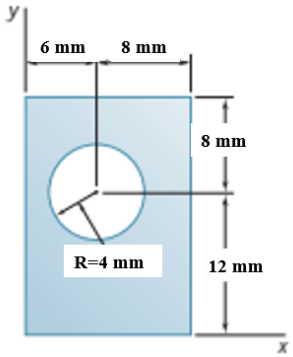


Fig.6 (6)