

Department of Applied Mechanics  
S V NATIONAL INSTITUTE OF TECHNOLOGY, SURAT  
MID SEMESTER EXAM – MARCH 2012  
B.Tech. – I (Div – F – G – H – I – J) – 2<sup>nd</sup> Semester  
ENGINEERING MECHANICS

Marks: 30

14/03/2012

Time: 9.00 to 10.00 am

**Q1 Attempt any two :**

- [A] Determine the magnitude and direction of resultant of five forces acting at a point as shown in Figure-1. [05]
- [B] Two cylinders P and Q rest in a channel as shown in Figure-2. The cylinder P has diameter of 100 mm and weight 200 N, whereas the cylinder Q has diameter of 180 mm and weight 500N. If the bottom width of the box is 180 mm, with one side vertical and the other inclined at  $60^\circ$ , determine the reactions at all the four points of contact assuming them smooth. [05]

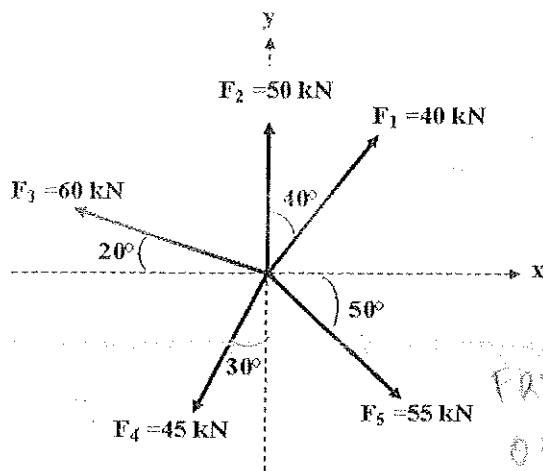


Figure-1

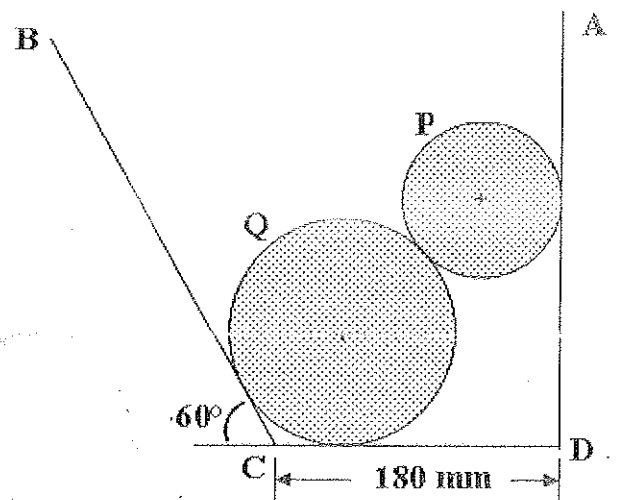


Figure-2

- [C] Replace the force acting on the rod by an equivalent single resultant force and couple system acting at point A as shown in Figure-3. [05]

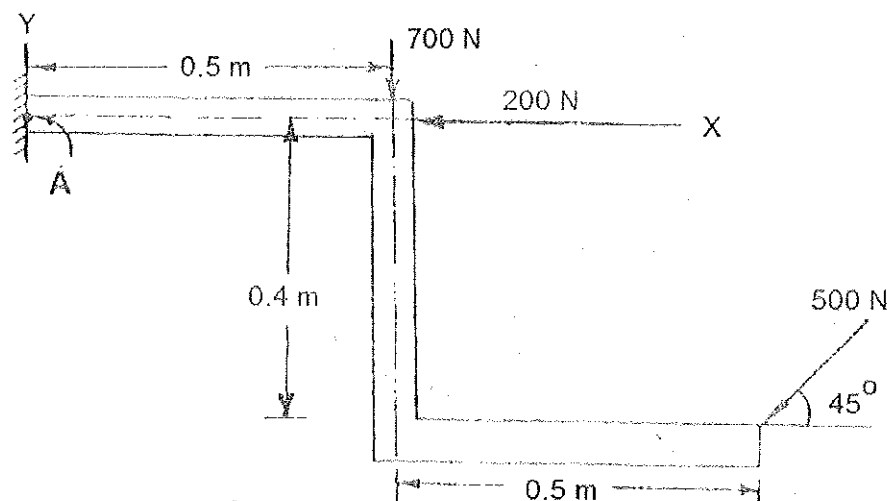


Figure-3

*M = 844.97 Nm*  
*FR = 100.11 N, theta = 68.28 degrees*

- ★
- Q2** A Load of 500 N is to be held in equilibrium by means of two strings CA and CB and by a force P (along Z axis) as shown in Figure-4. Determine tensions in strings and magnitude of P. [10]  
(Point A & B lie in X-Y plane)

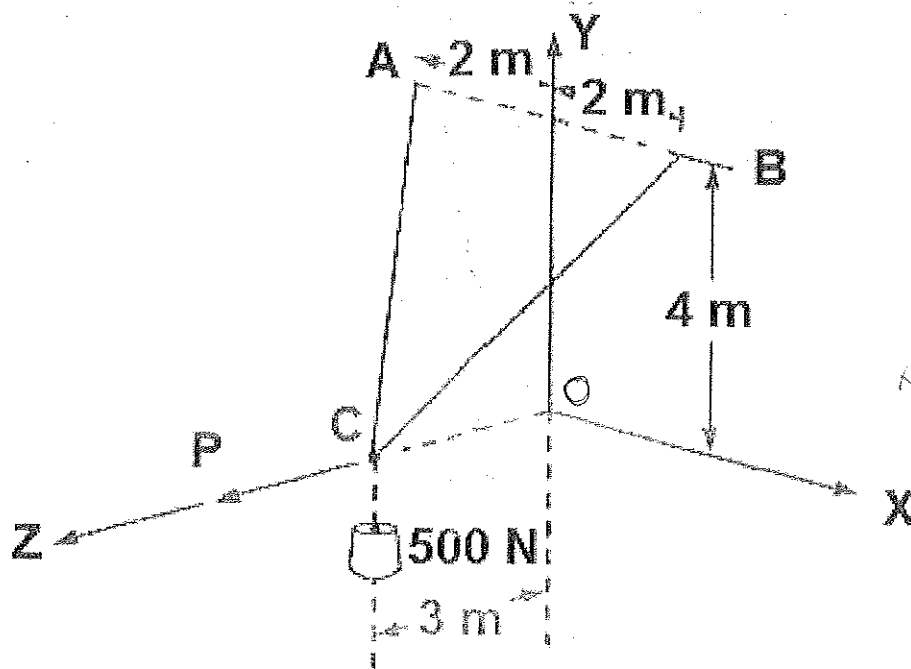


Figure-4

- Q3** Determine the centroid of the shaded area  $[X_C, Y_C]$  and moment of inertia about x-axis only. [10]  
[Figure-5]

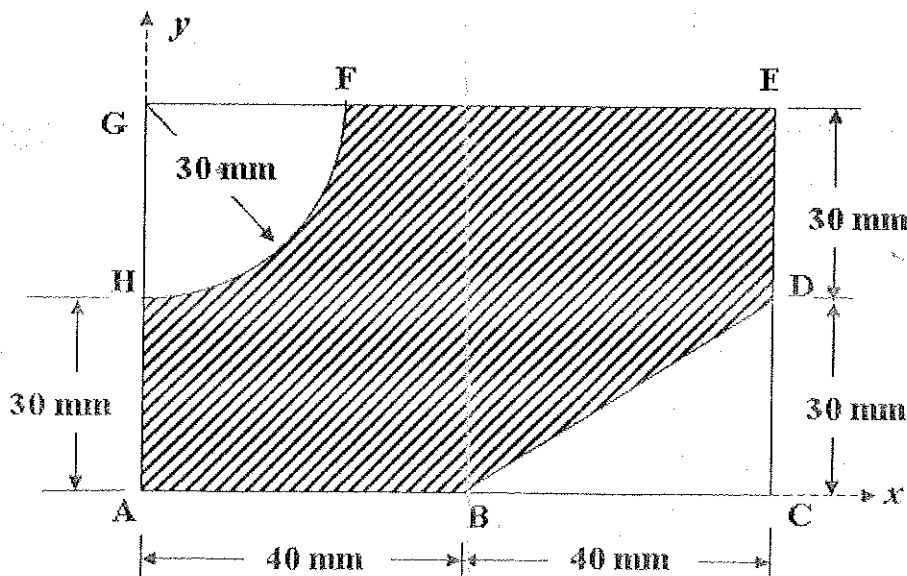


Figure-5

\*\*\*\*\*Best of Luck\*\*\*\*\*