



NATIONAL INSTITUTE OF TECHNOLOGY CALICUT
ZZ1001 ENGINEERING MECHANICS
Interim Test - I - Monsoon Semester 2013

Name: UMAIRA V P
Roll No: B130873CE

Time: 1hr

Max Marks: 15

1. Find the torque (i.e., moment of forces and couple moments) of the entire system shown in Fig.1 about axis A-A having direction cosines $l=0.63, m=0.72$ and $n=0.291$ and going through P. [5]

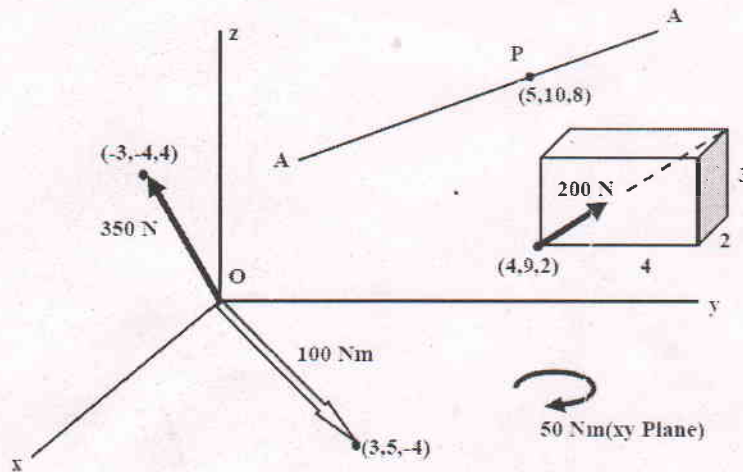


Figure 1.

2. Find the resultant of the systems of forces acting on the pipe assembly at A. The forces and couple are given in the Fig.2. [5]

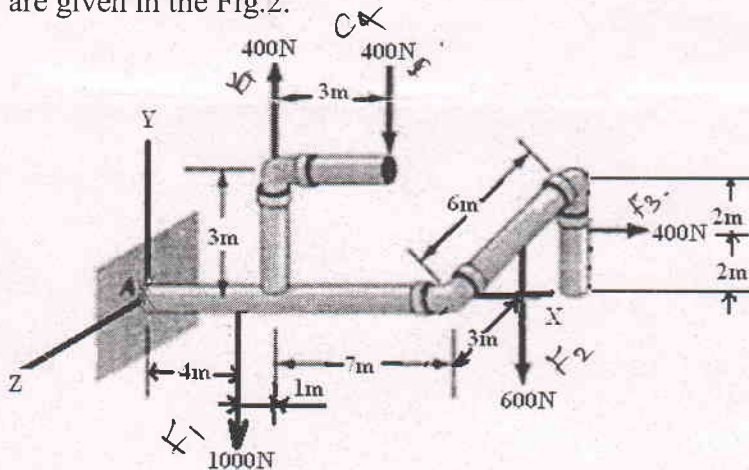


Figure 2.

3. Find the simplest resultant of the loads shown in Fig. 3. Give the intercept of the simplest resultant with the x - axis. [5]

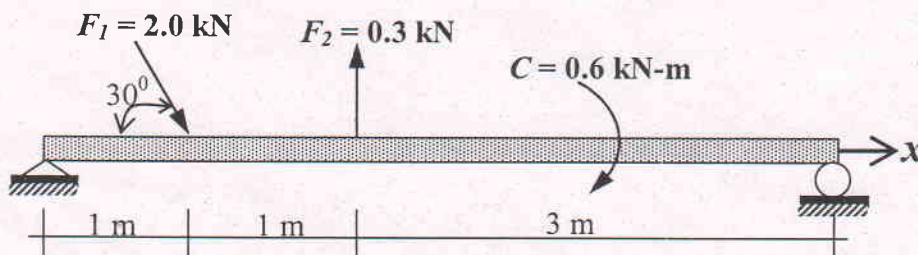


Figure 3.

Handwritten calculations for Figure 1:

$$(3i + 5j + 10k) \times (3i - 5j + 10k)$$
$$= 3i \times 3i - 15i \times j + 30i \times k + 5j \times 3i - 15j \times j + 50j \times k + 10k \times 3i - 15k \times j + 10k \times 10k$$
$$= 0 - 15(-k) + 30(-j) + 5(3i) - 15(0) + 50(-i) + 10(0) - 15(-j) + 0 + 0$$
$$= 15k - 30j + 15i - 50i + 15j = -35i - 15j + 15k$$
$$= -7i - 3j + 3k$$
$$\sqrt{49 + 9 + 9} = \sqrt{67}$$
$$6.40^\circ$$

Handwritten calculation for Figure 3:

$$(x_i + y_j) \times (-1.73i - 0.7j) =$$