

# COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra)  
SHIVAJI NAGAR, PUNE - 411 005

## END Semester Examination

### (CE-101) Engineering Mechanics

Course: B. Tech.

Semester: Sem I

Year: 2014-2015

Max.Marks:60

Duration: 3 Hours Time:- 10am - 1 pm

Date:25.11.14

#### Instructions:

MIS No.

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1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper

Q.1 The rectangular platform is hinged at A and B and is supported by a cable (Figure 1) that passes over a frictionless hook at E. Knowing that the tension in the cable is 1349 N, determine the moment about each of the coordinate axes of the force exerted by the cable at C. [08]

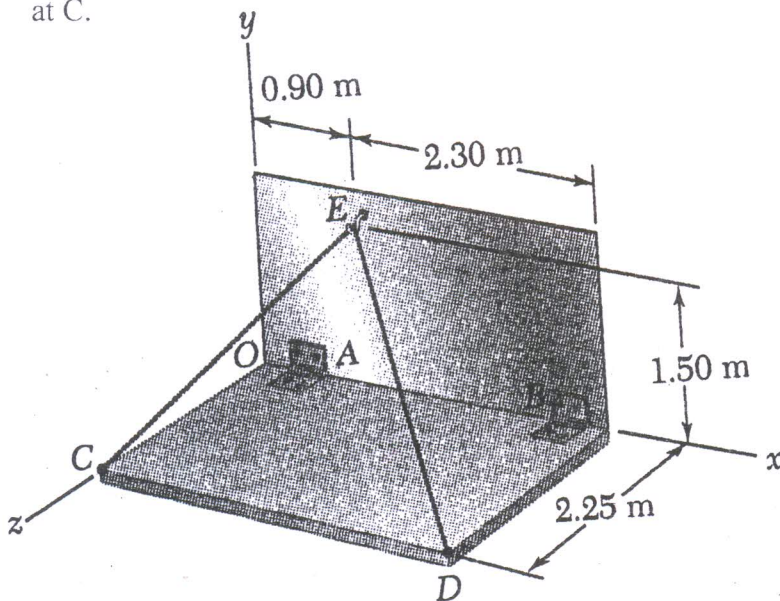


Figure 1

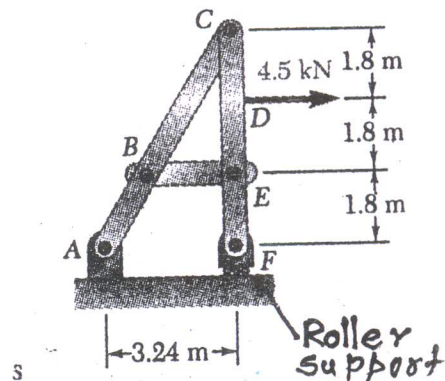


Figure 2

Q.2 For the frame and loading shown (Figure 2), determine the components of all forces on member ABC and reactions at A and C. [08]

- Q.3 A  $10^\circ$  wedge is forced under an 80 kg cylinder as shown (Figure 3). Knowing that the coefficient of static friction between all surfaces of contact is 0.25. determine the force  $P$  for which motion of the wedge is impending. [08]

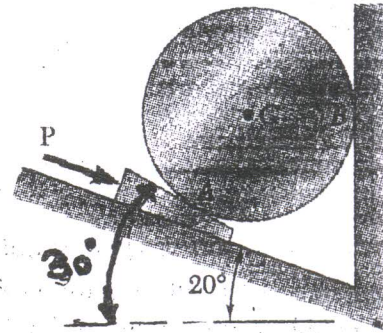


Figure 3

- Q.4 Find the reactions at the hinge support A, and roller supports B and C for the beam ABC [08] loaded as shown (Figure 4), using principle of virtual work.

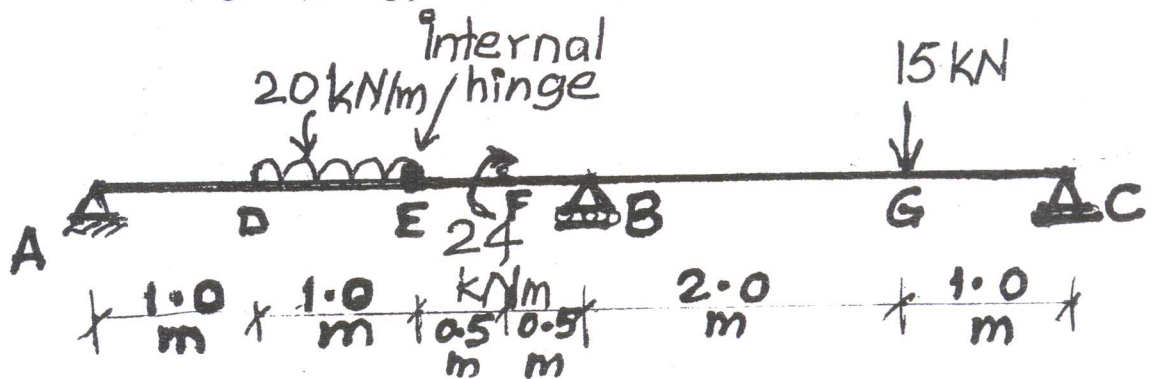


Figure 4

- Q.5 Boxes are transported by a conveyor belt with a velocity  $v_0$  to a fixed incline at A where they slide (Figure 5). and eventually fall off at B. Knowing that  $\mu_k = 0.40$ , determine the velocity of the conveyor belt if the boxes leave the incline at B with a velocity of 2 m/s. [08]

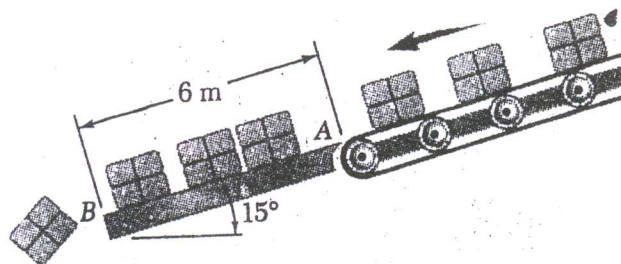


Figure 5

- Q.6 Knowing that at the instant shown (Figure 6), the angular velocity of rod AB is 15 rad/s clockwise: determine (a) the angular velocity of rod BD. (b) the velocity of the midpoint of rod BD.

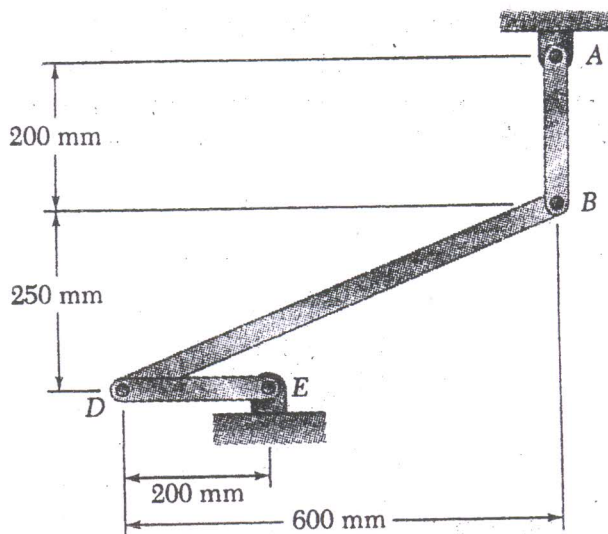


Figure 6

- Q.7 A pulley weighing 54.4 kg and having a radius of gyration of 20.3 cm is connected to two blocks as shown (Figure 7). Assuming no axle friction, determine the angular acceleration of the pulley and the accelerations of each block.

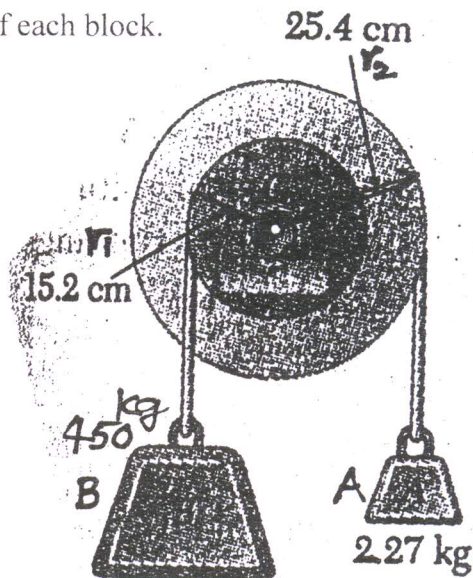


Figure 7

- Q.8 At an intersection (Figure 8), car A is travelling south with a velocity of 40 km/h when it is struck by car B travelling 300 north of east with a velocity of 48 km/h, determine the relative velocity of car B with respect to car A.

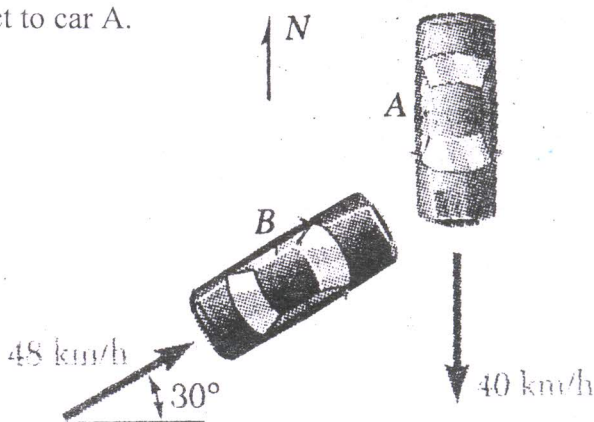


Figure 8