Total No. of Questions :8]

SEAT No. :

P4029

[Total No. of Pages :7

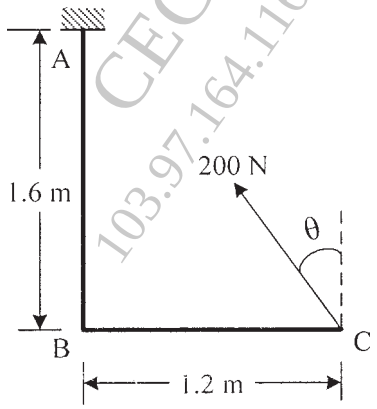
[5351] - 109
ENGINEERING
Engineering Mechanics
(2015 Pattern) (Semester - II)

Time : 2 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figure to the right indicates full marks.***
4) ***"Assume suitable data, if necessary and clearly state."***
5) ***Use of nonprogrammable electronic pocket calculator is allowed.***

Q1) a) The lever ABC fixed at A shown in Figure is subjected to a 200 N force at C at $\theta = 30^0$. Find the moment of this force about A. Also find the value of θ for which the moment about A is Zero. **[6]**

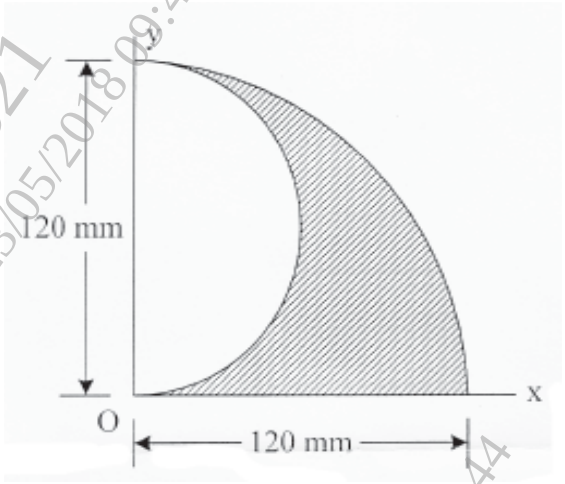


b) The motion of particle is defined by, $x = t^3-6t^2+9t+5$, where x expressed in meter and t in seconds. Determine the time at which velocity becomes Zero. Also determine velocity and acceleration at t = 5s. **[6]**

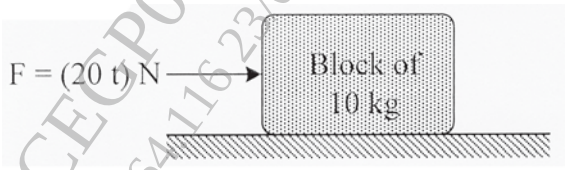
OR

P.T.O.

Q2) a) Locate the centroid of the plane area as shown in Figure with respect to origin O. **[6]**

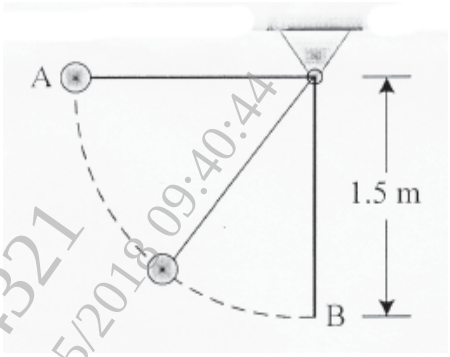


b) The 10kg block is subjected to the force shown in Figure determine its velocity when t = 2s if v = 0 when t = 0. **[6]**



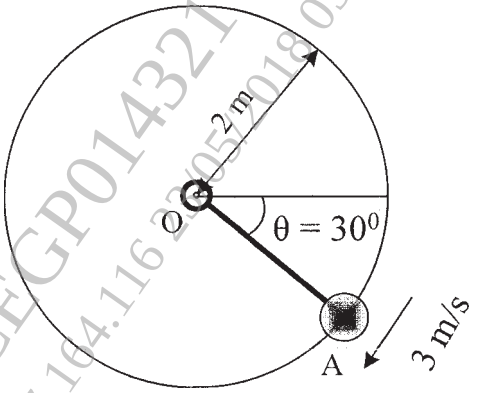
Q3) a) A motorist is traveling on a curved section of highway of radius 762m at the speed of 96 kmph. The motorist suddenly applies the brakes, causing the automobile to slow down at a constant rate. Knowing that after 8s the speed has been reduced to 72 kmph, determine the acceleration of the automobile immediately after the brakes have been applied. **[6]**

b) The 2kg pendulum bob is released from rest when it is at A as shown in Figure. Determine the speed of the bob when it passes through its lowest position B. **[6]**

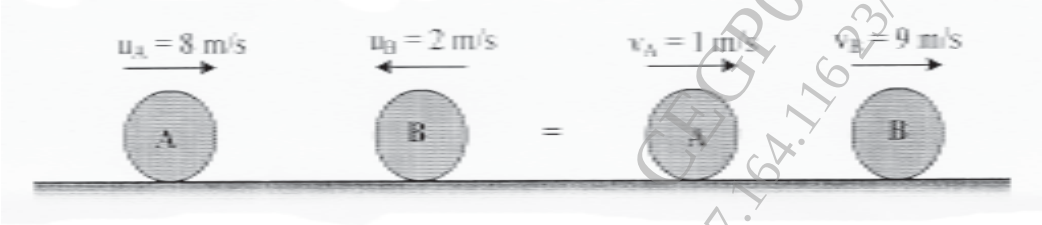


OR

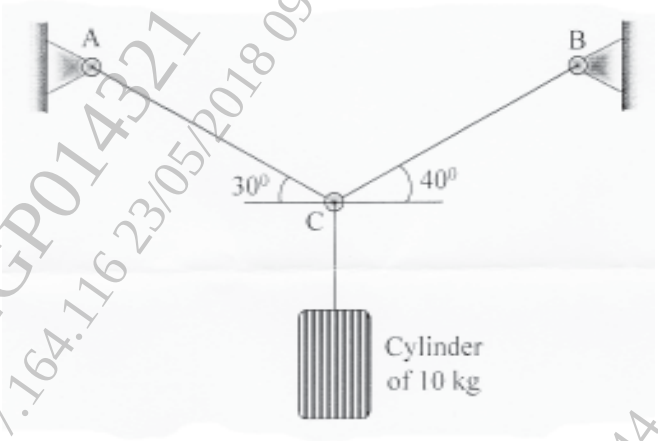
Q4) a) If the 10kg ball has a velocity of 3 m/s when it is at the position A as shown in Figure along the vertical path, determine the tension in the cord and the tangential component of acceleration of ball at this position. **[6]**



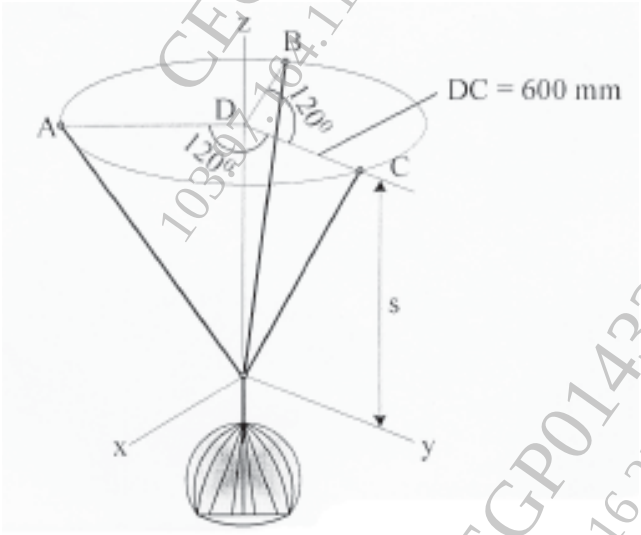
b) Determine the coefficient of restitution e between two identical balls A and B. The velocities of balls A and B before and after impact are shown in Figure. **[6]**



Q5) a) Determine the tension developed in wires CA and CB required for equilibrium of the 10kg cylinder as shown in Figure. **[6]**

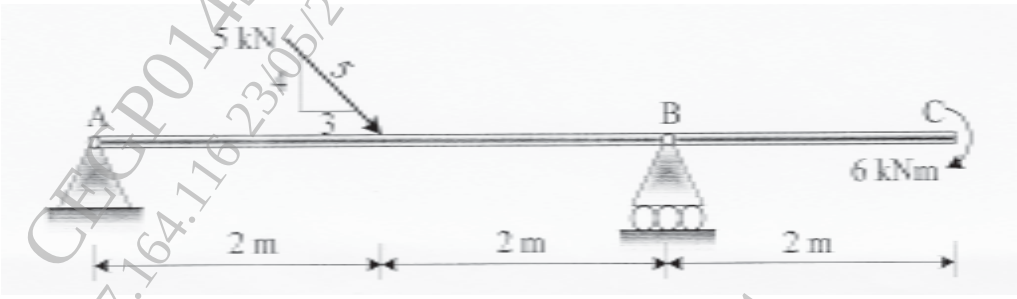


b) The 10kg lamp shown in Figure is suspended from three equal length cords. Determine its smallest vertical distance s from the ceiling if the force developed in any cord is not allowed to exceed 50N. **[7]**

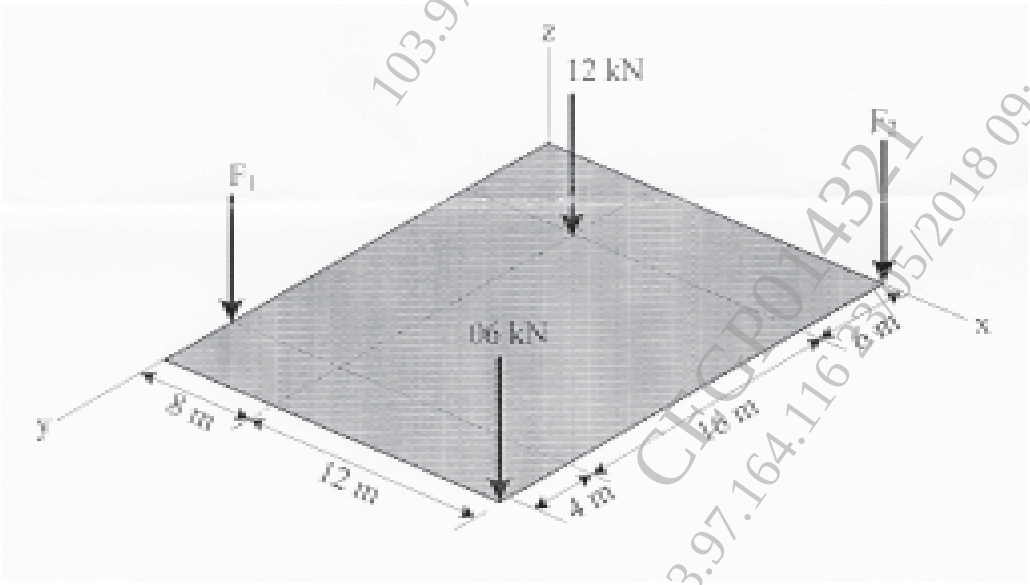


OR

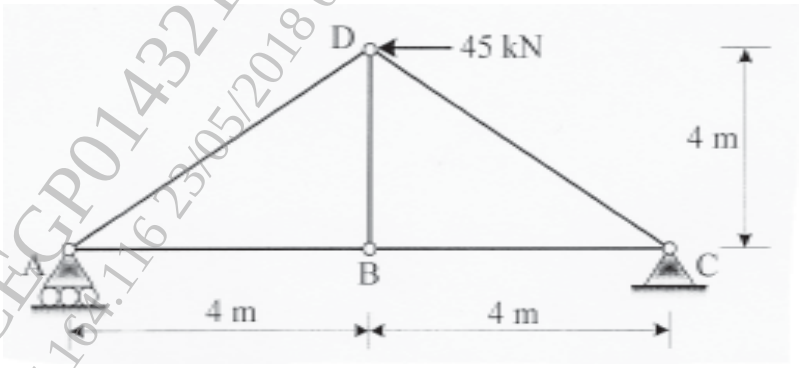
Q6) a) Determine the horizontal and vertical components of reaction at the supports for the beam as shown in Figure. **[7]**



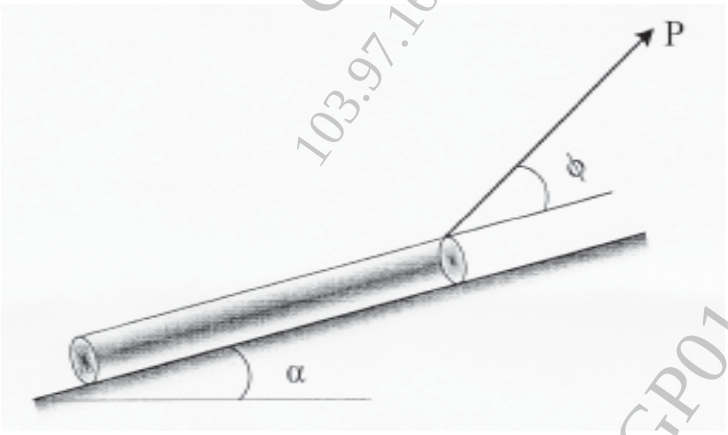
b) The building slab is subjected to four parallel column loading shown in Figure. Determine F1 and F2 if the resultant force acts through point (12m, 10m). **[6]**



Q7) a) Determine the forces in each member of the truss shown in Figure. State if the members are in tension or compression. **[6]**

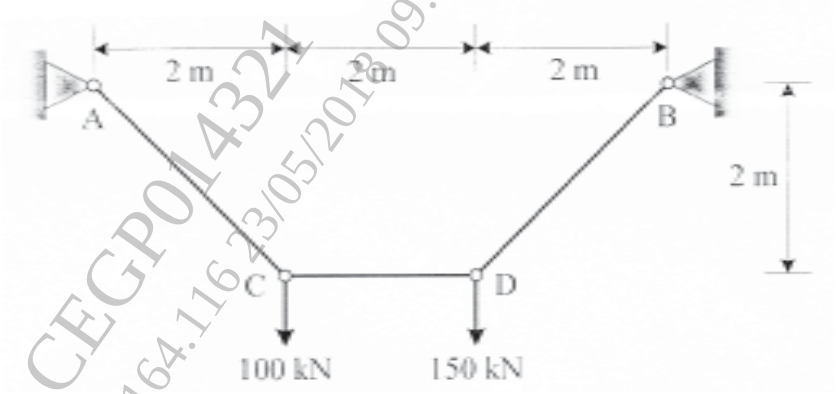


b) The pipe of weight W is to be pulled up the inclined plane of slope α using a force P shown in Figure. If P acts at an angle ϕ, show that for limiting condition $P = \sin(\alpha + \phi) / \cos(\phi - \theta)$ where θ is the angle of static friction $\theta = \tan^{-1} \mu_s$. **[7]**



OR

Q8) a) For the cable AB as shown in Figure, find the reaction at supports and tension in each segment. **[7]**



b) Determine the maximum horizontal force P that can be applied to the 12kg hoop without causing it to rotate as shown in Figure. The coefficient of static friction between the hoop and the surfaces at A and B is, $\mu_s = 0.2$ Take r = 300mm. **[6]**