

**COLLEGE OF ENGINEERING PUNE**  
**End-Sem- 2013-2014 (I SEM)**  
**Engineering Mechanics (CE 101)**

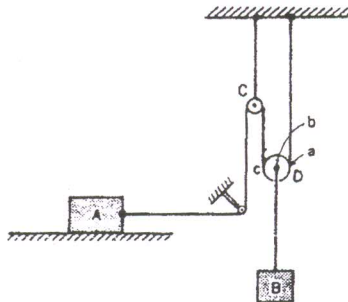
Programme : F. Y. B. Tech. (Electrical Group)  
 Duration : 180 minutes

Date:17-11-2013  
 Max. Marks: 60

Instructions :

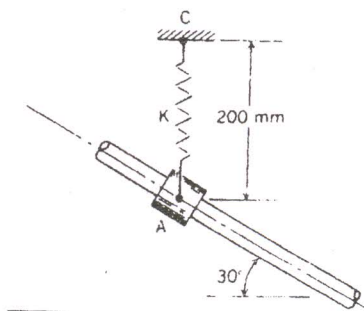
- 1) **Answer all questions.**
- 2) **Figures to the right indicate full marks.**
- 3) **Use of non-programmable calculator is allowed.**
- 4) **Assume suitable data if necessary**

- Q.1 Derive the expression for normal and tangential components of acceleration. (4)
- Q.2 Two bodies at A and B are shown having masses of 40 kg and 30 kg, respectively. The cables are inextensible. Neglecting the inertia of the cables and pulleys at C and D, what is the speed of block B, 1 sec after the system has been released from rest? The Coefficient of kinetic friction for the contact surface of body A is 0.3. (6)



**Fig. Prob. 2**

- Q.3 A collar A having a mass of 1 kg can slide without friction on a pipe. If released from rest at the position shown, where the spring is unstretched, what speed will the collar have after moving 50 mm? The spring constant is 2000 N/m. (6)



**Fig. Prob. 3**

- Q.4 Rod DC has an angular speed  $\omega_1$  of 5 rad/sec at the configuration shown. What is the angular speed of bar AB? (6)

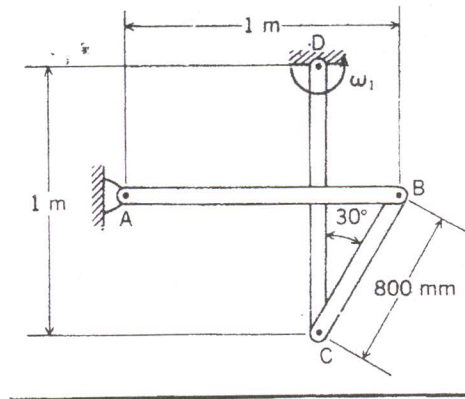


Fig. Prob. 4

- Q.5 A stepped cylinder has the dimensions  $R_1 = 0.30$  m and  $R_2 = 0.65$  m, and the radius of gyration,  $k$  is 0.35 m. The mass of the stepped cylinder is 100 kg. Weights A (490.5 N) and B (784.8 N) are connected to the cylinder. How far does A move in 5 sec? In which direction does it move? (8)

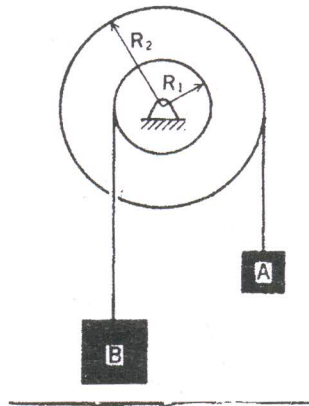


Fig. Prob. 5

- Q.6 Assume a perfectly plastic impact as the 5 kg body falls from a height of 2.6 m onto a plate of mass 2.5 kg. This plate is mounted on spring having a spring constant of 1772 N/m. Neglect the mass of the spring as well as friction and compute the maximum deflection of the spring after impact. (8)

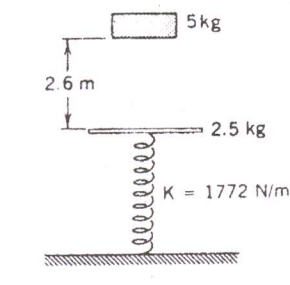


Fig. Prob. 6

Q.7 Light rods AD and BC are pinned together at C and support a 300 N and a 100 N (8) load. What are the support reactions at A and B?

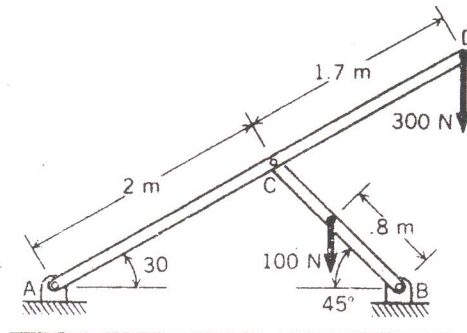


Fig. Prob. 7

Q.8 What are the forces in the cables shown supporting a 50 kg mass? Cable BD lies in zy (8) plane.

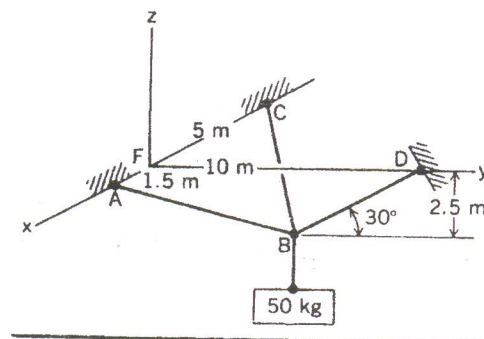


Fig. Prob. 8

Q.9 Answer the following: (6)

1. What is the simplest resultant in case of a coplanar force system?
2. State true or false:
  - Triangle rule can not be used for addition of two couple vectors.
  - Moment of a force about an axis is a vector.
  - In a plane truss all members are two force members.
3. What is the instantaneous velocity of the ICR?
4. What is the relationship between the linear momentum and the angular momentum?