Engineering Mechanics

First Assignment (2015-16)

Last date of submission 08-02-16

1. **A force of 200 KN is acting at A. Resolve the force along two members AB and AC. Refer figure:1**
2. **A load is lifted in vertical direction with a force of 40 KN, applying by two cables passing over smooth pulleys. Find the tension T_1 if T_2 is to be minimum. What is the distance between two pulleys for this condition? Refer figure:2**
3. **Determine the angle Ɵ for strut AB, so that 400 N horizontal force has a component of 500 N acting from A to C. Also find component along member AB. Refer figure:3**
4. **Determine: (a) The required tension in cable BC if the resultant of three forces at B is to be vertical. (b) The corresponding magnitude of resultant. Refer figure:4**
5. **The striker of carom board laying on the board is being pulled by four players as shown in figure: 5. The players are sitting exactly at the centre of the four sides. Determine the resultant of forces in magnitude and direction.**
6. **A car is pulled by means of two ropes as shown in figure:6 The tension in one rope is P=2.6 KN. If the resultant of two forces applied at O is directed along the X- axis of the car. Find the tension in the other rope and the magnitude of the resultant.**
7. **Find the angle of tilt Ɵ with horizontal so that the contact force at B will be one-half at A.**
8. **Determine the horizontal distance x of which a 5 m long inextensible string holding a roller of weight 3 KN can be pulled before the string breaks. The string can withstand a maximum force of 6 KN as show in figure:8. Determine also the required force F.**
9. **The 30 Kg collar may slide on frictionless vertical rod and is connected to a 34 Kg counter-weight. Find the value of 'h' for which the system is in equilibrium. Refer figure:9**
10. **Two cylinders each of diameter 100 mm and each weighing 200 N are placed as shown in figure:10, assuming that all the contact surfaces are smooth, find the reactions at A,B and C.**
11. **Two spheres A and B of weight 1000 N and 750 N, respectively are kept as shown in the figure:11. Determine the reactions at all contact points. Radius of A = 400 mm and radius of B =300 mm.**
12. **Determine the reactions at points of contact 1,2 and 3 as shown in the figure:12.**
13. **Two smooth circular cylinder of weight W = 500 N each and radius r =150mm are connected at their centre by a string of length L =400 mm and rest upon a horizontal plane supporting above them a third cylinder of weight 1000 N and radius 150 mm as**

shown in figure:13. Find the tension in the string and pressure at the point of contact D and E.

14. **Three cylinders are piled up in a rectangular channel as shown in figure:14. Determine the reactions at point 6 between the cylinders A and the vertical wall of the channel. Mass of cylinders A,B and C are 15 Kg, 40Kg and 20 kg respectively. Radius of cylinders A, B and C is 4 cm, 6 cm and 5 cm respectively.**
15. **Two bodies weighing 150 N and 200 N respectively rest on a cylinder and are connected by a rope as shown in figure: 15. Find the reaction of cylinder on the bodies, the tension in rope and angle Ɵ assume all surface to be smooth.**

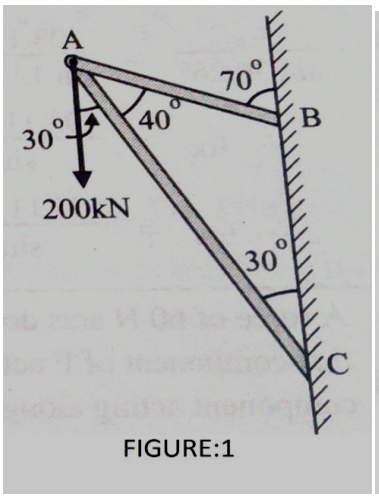


FIGURE:1

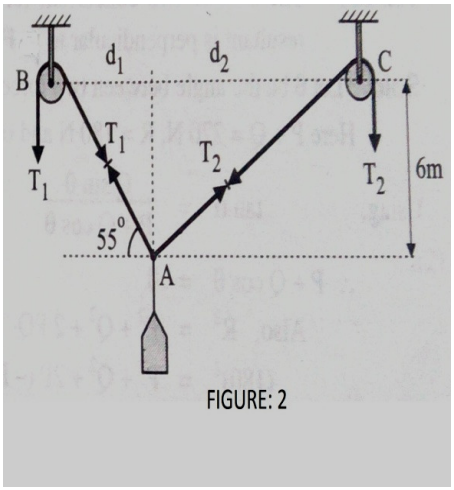


FIGURE: 2

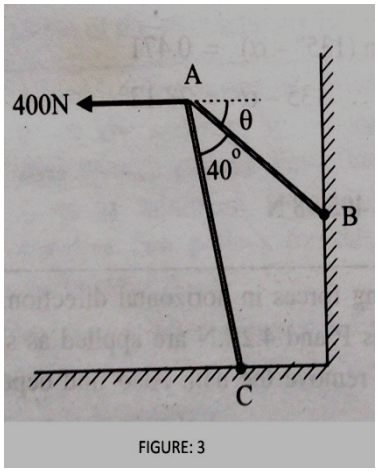


FIGURE: 3

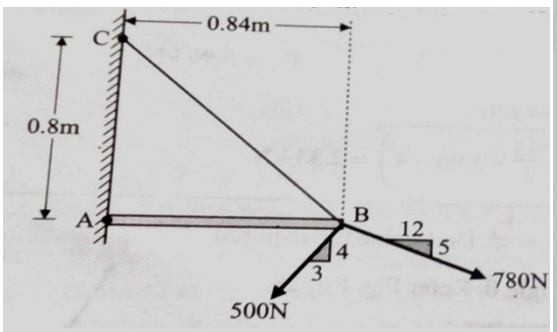


FIGURE: 4

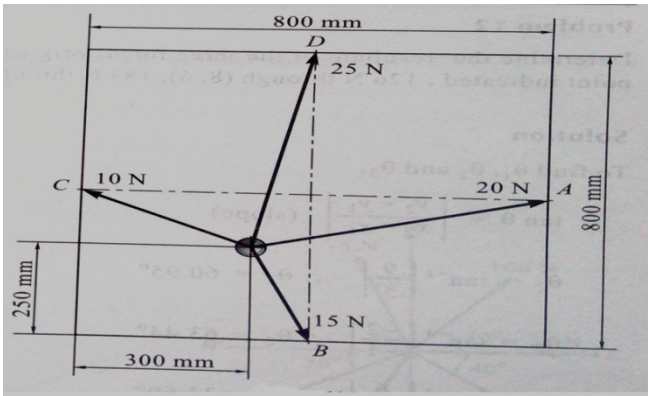


FIGURE: 5

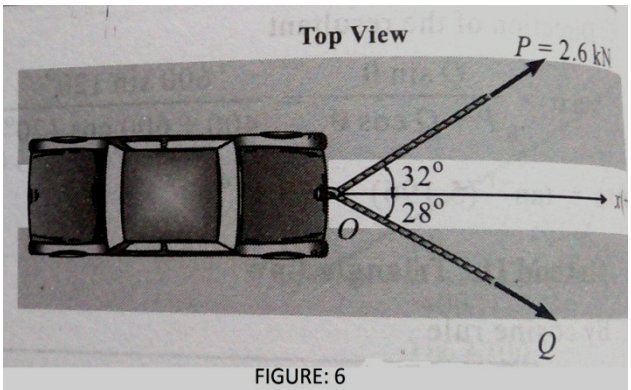
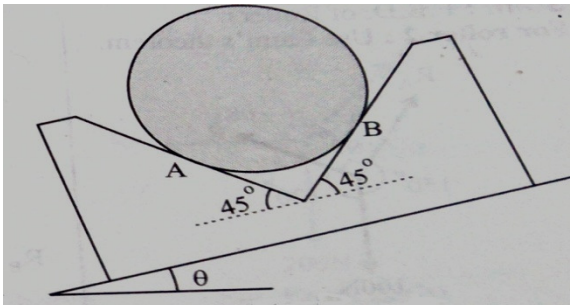


FIGURE: 6



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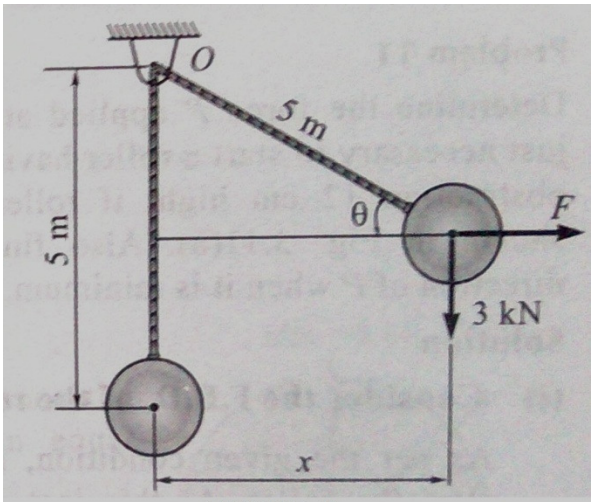


FIGURE: 8

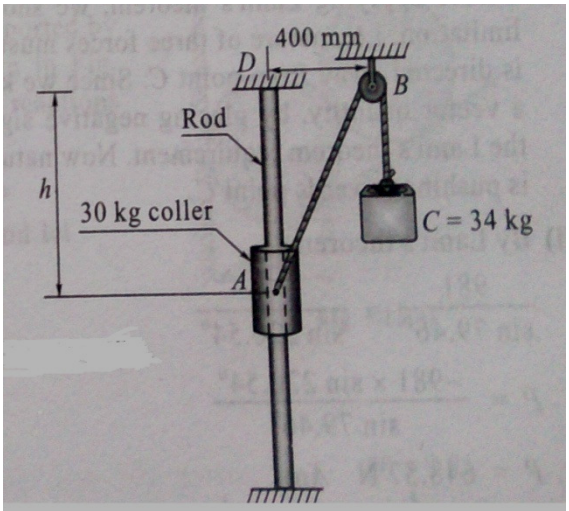


FIGURE: 9

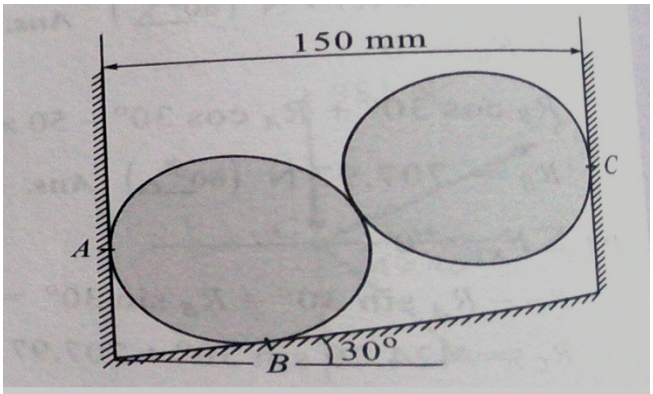


FIGURE: 10

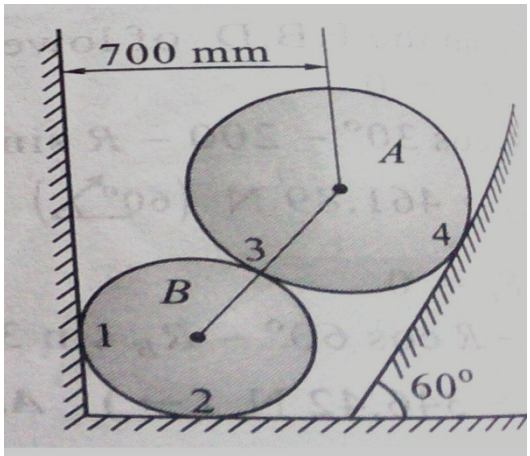
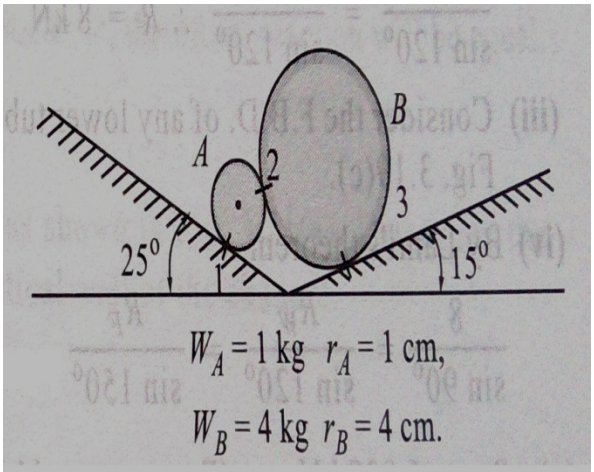


FIGURE: 11



$W_A = 1\text{ kg}$ $r_A = 1\text{ cm}$,

$W_B = 4\text{ kg}$ $r_B = 4\text{ cm}$.

FIGURE: 12

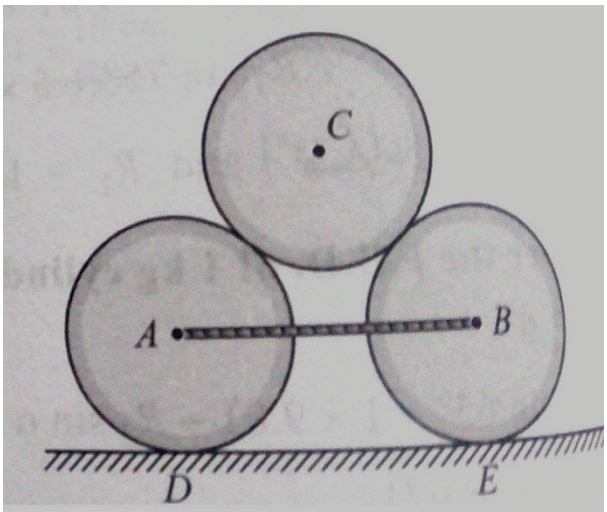


FIGURE: 13

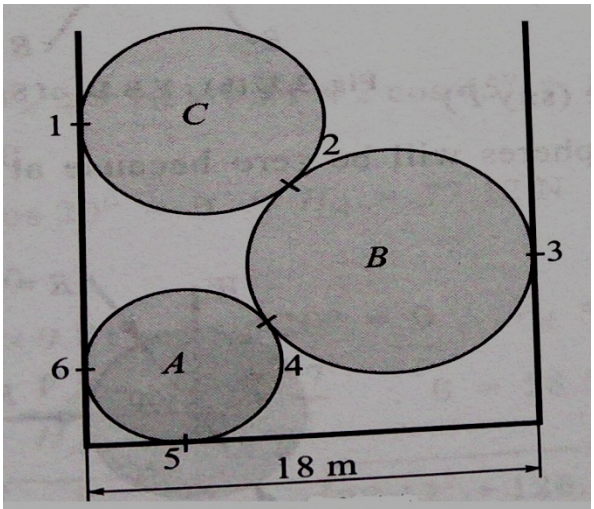


FIGURE:14

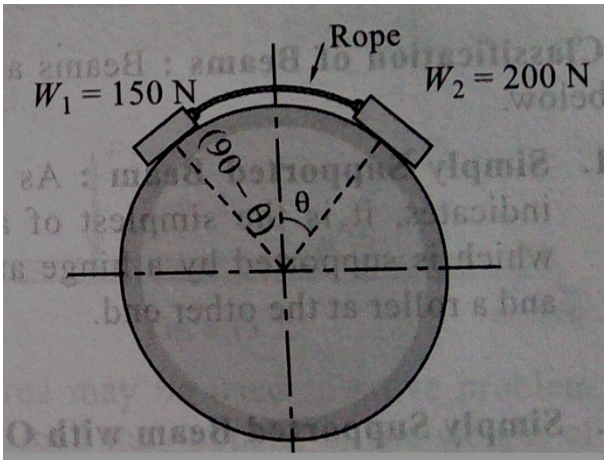


FIGURE:15