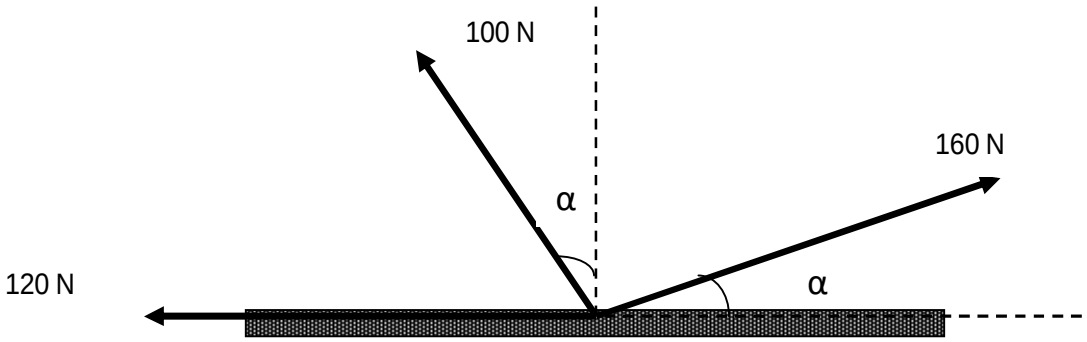
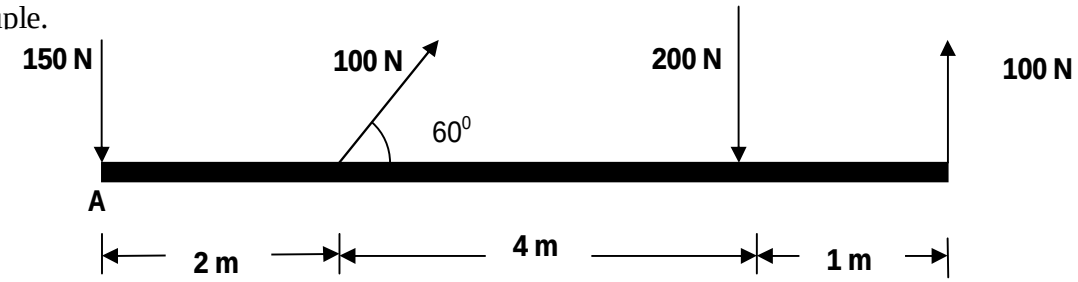
Assignment:-1

Subject Name: Applied Mechanics (MEE-1001) Session:-2017-18

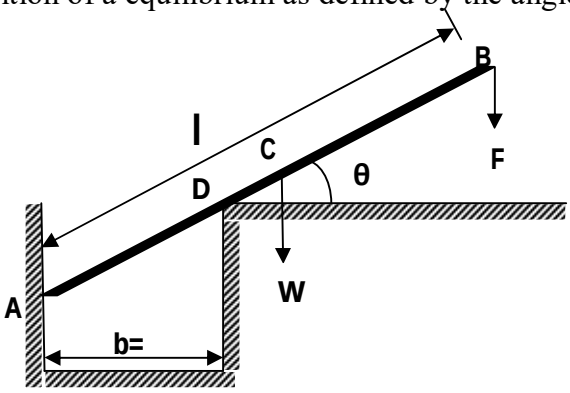
1. Three forces act on a bed plate as shown in fig. If the resultant of these forces is vertical, find the angle α. Find also the resultant of these forces.



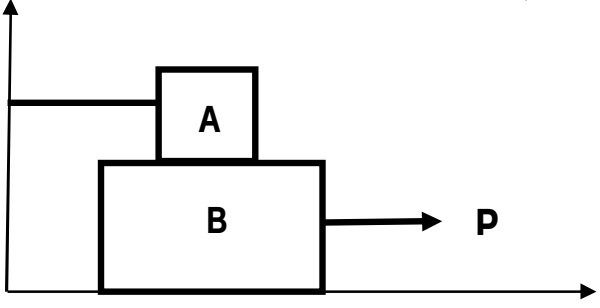
2. Reduce the system of forces acting on the beam as shown in fig. into a force at A and a couple.



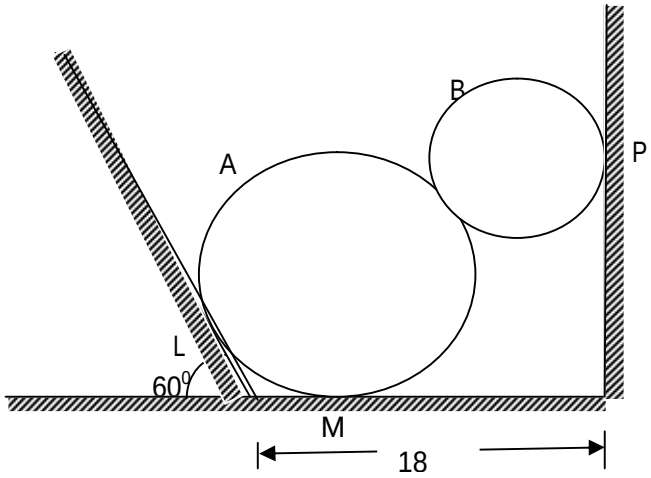
3. A prismatic bar AB of weight W=10 N is resting against a smooth vertical wall at A and is supported at the smooth knife edge point D shown in fig. If a vertical force F=20 N is applied at the end B, Find the position of a equilibrium as defined by the angle θ. Length of prismatic bar is 7m.



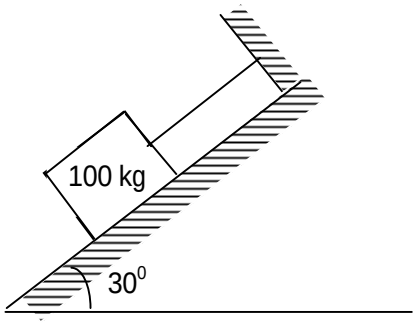
4. Two blocks A and B of 5 kg and 10 kg weights, respectively, are in equilibrium as shown in fig . If the coefficient of friction between all the contact surfaces in contact is 0.3, find the force P required to move the block B.



5. Two cylinders A and B rest in the horizontal channel as shown in the fig. The cylinder A has weight of 1000 N and radius 9cm. The cylinder B has weight of 400 N and radius 5 cm. The channel is 18 cm wide at the bottom with one side vertical. The other side is inclined at an angle of 60^0 with the horizontal. Find the reactions at points L, M and P.



6. One end of string is attached to fixed wall and other is attach to a block of mass 100 kg which is kept on rough inclined plane of inclination 30º with the horizontal as shown in figure. The coefficient of friction between block and inclined plane is 0.15. Find the tension in the string.

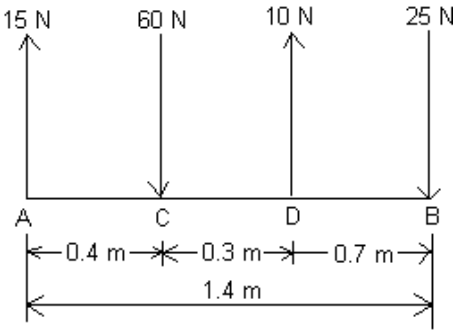


7. The forces 10 N, 15 N, 20 N, 40 N and 80 N are acting at one of the angular points of a regular hexagon, towards the other five angular points, taken in order. Find the magnitude and direction of the resultant force.

8. A rigid bar is subjected to a system of parallel forces as shown in fig. Reduce this system to:

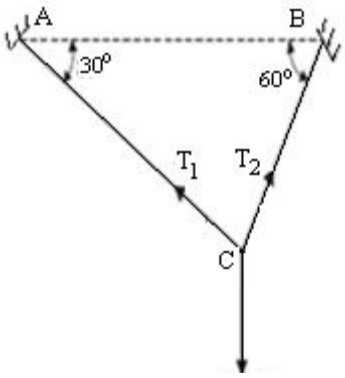
(i) single force system

(ii) a single force moment system at B.

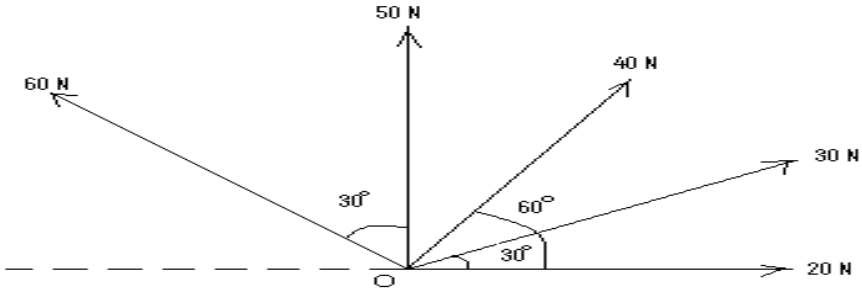


9. Derive the relationship between tensions T_1 & T_2 on two sides of a belt passing over a rotating rough pulley with coefficient of friction μ.

10. Two strings are tied to two points A & B at the same level and are tied together at a point C. A mass of weight 100 N is hanging from the point C. Find tensions T_1 and T_2 in the strings.

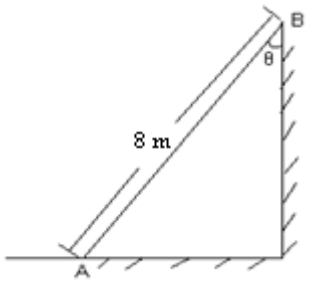


11. Five forces are acting at a point as shown in figure. Calculate their resultant in magnitude and direction.

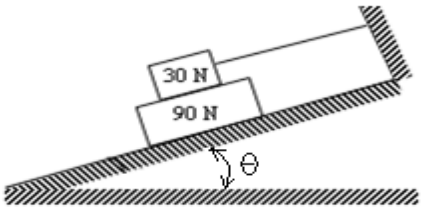


12. Two forces F and 3F are acting on a rigid body. When the first force is reduced by 150N and the second force is doubled, the direction of the resultant remains unchanged. Determine the value of the force F.

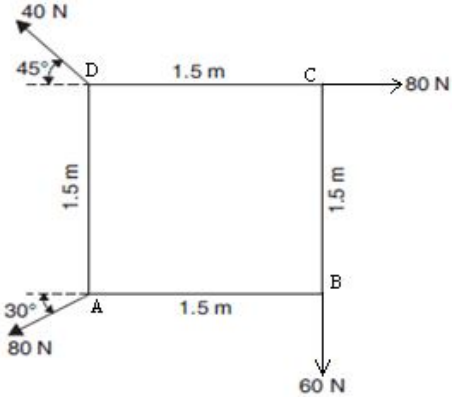
13. A ladder AB, 8 meter long, leans against a vertical wall and rests on a horizontal floor. Its weight is 250 N. A man weighting 900 N stands at a distance of 1 m from the top of the ladder. The coefficient of friction between the floor and ladder is 0.25, and between the wall and the ladder is 0.4. Determine the least value of angle θ such that ladder does not slip.



14. What should be the value of the angle θ in the fig. such that the motion of 90 N block impends down the plane? The coefficient of friction μ for all the surfaces is 1/3.

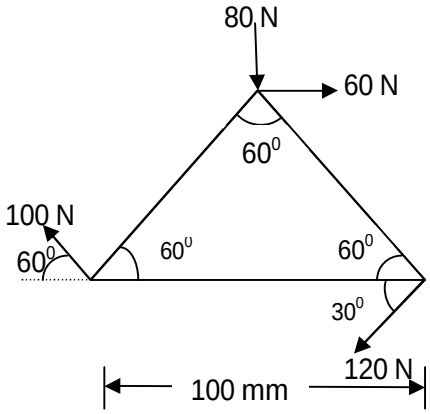


15. A body is under the action of four coplanar forces as shown in the fig. Find the magnitude, direction and position of the resultant of the given force system from the point A.



16. A heavy spherical ball of weight 150N rests in a V-shaped block whose sides are inclined at 30^0 and 45^0 to the horizontal. Find the reactions at the point of contacts at the sides of the block.

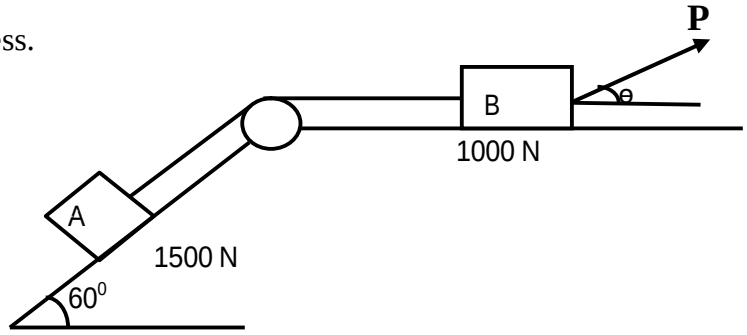
17. Find the resultant of the force system as shown in fig. acting on the lamina of equilateral triangular shape.



18. Find the power transmitted by a belt running over a pulley of 600 mm diameter at 200 rpm. The coefficient of friction between the pulleys is 0.25, angle of lap 160^0 and maximum tension in the belt is 2.5 KN.

19. State and proof the Varignon's theorem.

20. As shown in fig., determine the least value of the force P to cause motion to impend rightward. Assume the coefficient of friction under the blocks to be 0.2 and the pulley to be frictionless.



21. A uniform ladder of 5 m length and 250 N weights is placed against a rough vertical wall in a position where its inclination to the vertical is 30^0. A man weighing 800 N climbs the ladder. At what position will he induce slipping? The coefficient of friction for both the contact surfaces of the ladder is 0.2.

22. Two cylinders A and B of diameters 6 cm and 3 cm and weighing 80kN and 20kN, respectively are placed as shown in fig. Assuming all the contact surfaces to be smooth, find the reactions at the wall.