CVR COLLEGE OF ENGINEERING
(An UGC Autonomous Institute, Accredited by NBA, NAAC with 'A' Grade)

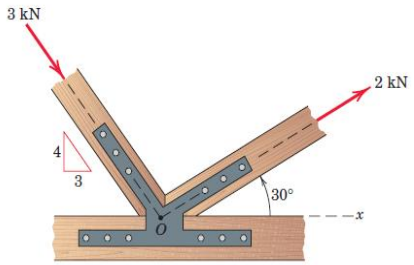
SUBJECT: APPLIED ENINEERING MECHANICS

SHORT ANSWER QUESTIONS

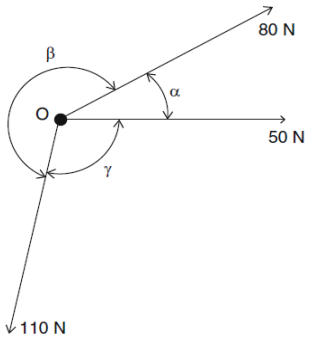
1. a) State Principle of Transmissibility. CO1
2. b) Define Resultant of forces. CO1
3. Define Force. What are its characteristics? CO1
4. Define Moment of a Force and State Varignon's Theorem. CO1
5. Define beam and list out various types of Beams, Loadings and Types of Supports with neat Sketches. CO1
6. Define Equilibrium of a body and Free body diagram. CO1
7. Differentiate between Active and Reactive forces. CO1
8. Define friction and list out the types of friction. CO2
9. Define Limiting Friction and Impending Motion. CO2
10. What is meant by Co-efficient of friction? What are the dimensions of Co-efficient of friction? CO2
11. Differentiate between static friction and kinetic friction. CO2
12. Define: Angle of Friction, Angle of Repose and Cone of Friction. CO2
13. What is a wedge and write its applications? CO2
14. Define Virtual displacement and Virtual Work. CO2
15. State the principle of Virtual Work. CO2
16. a) State Triangle law of Forces & Polygon law of forces. CO1
    b) State Lami's Theorem.

LONG ANSWERS QUESTIONS

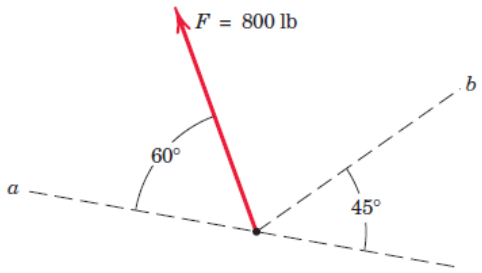
1. The Two Structural members, one of which is in tension and the other in compression, exert the indicated forces on joint *O*. Determine the magnitude of the resultant **R** of the two forces and the angle which **R** makes with the positive *x*-axis. CO1



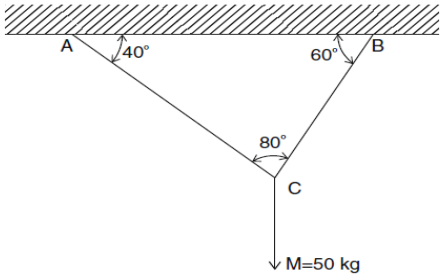
2. Three concurrent forces of 50, 80, and 110 N shown are in equilibrium condition. Find the angles that these forces make with each other to keep the system in equilibrium. CO1



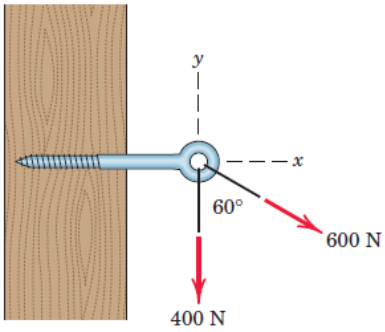
3. Determine the components of the 800-lb force **F** along the oblique axes *a* and *b*. Also, determine the projections of **F** onto the *a*- and *b*-axes. (note: 1-lbf = 4.48 N) CO1



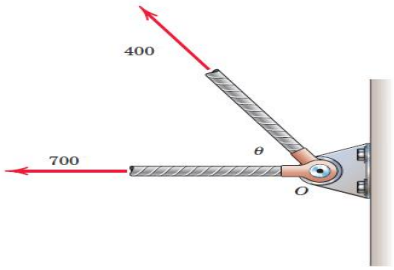
4. A 50-kg sign is suspended by two cables as shown in Find the tension in each cable. CO1



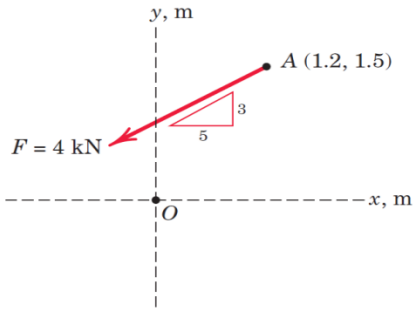
5. Determine the resultant R of the two forces shown by (a) applying the parallelogram law of forces (b) applying method of components. CO1



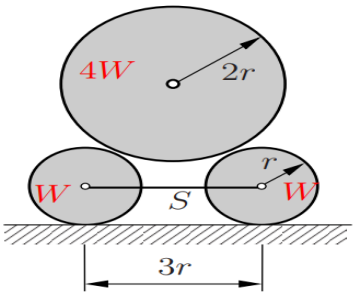
6. At what angle must the 400 N force be applied in order that the resultant R of the two forces have a magnitude of 1000 N? For this condition what will be the angle between resultant R and the horizontal? CO1



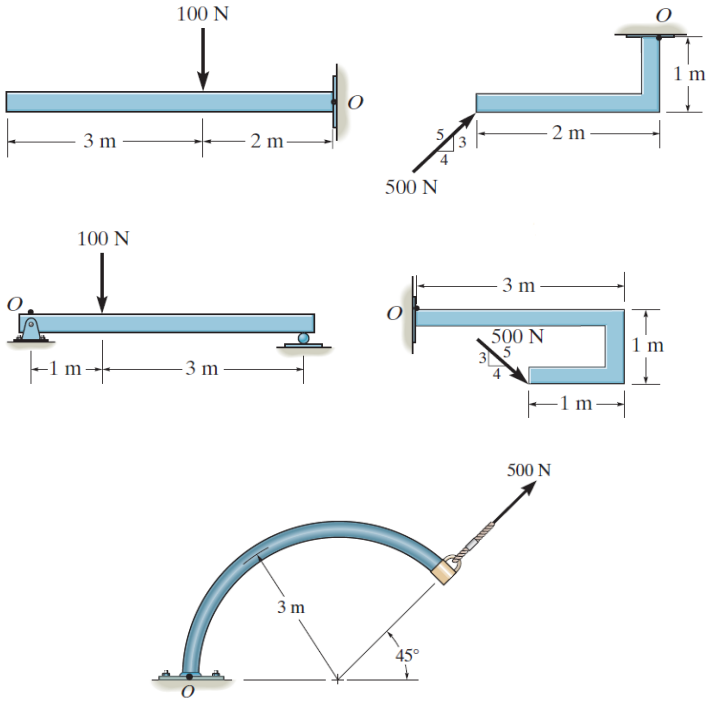
7. The 4-kN force F is applied at point A. Compute the moment of F about point O. Also determine the coordinates of the points on the x- and y-axes about which the moment of F is zero. CO1



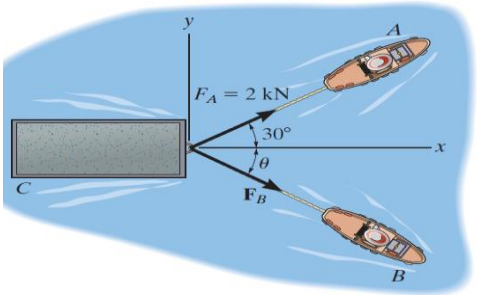
8. A large cylinder (weight 4W, radius 2r) lies on top of two small cylinders, each having weight W and radius r. The small cylinders are connected by a wire S (length 3r). All surfaces are smooth. Determine all contact forces and the magnitude of force S in the wire. CO1



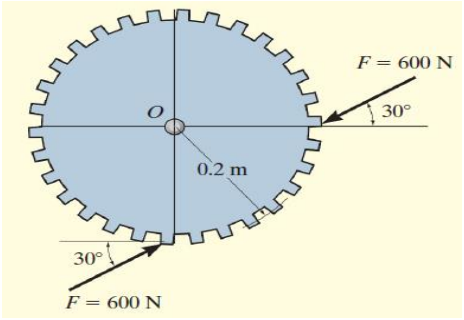
9. In each case of following diagrams, determine the moment of the force about point O. CO1



10. If the resultant force of the two tugboats is required to be directed towards the positive x axis, and FB is to be a minimum, Determine the magnitude of FB and also the Resultant of forces? CO1

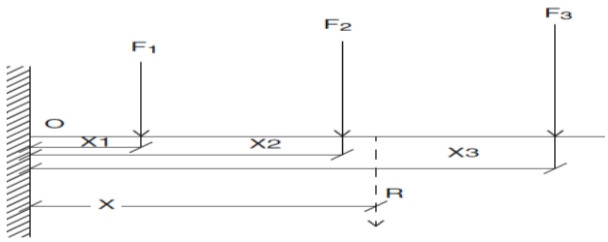


11. Determine the magnitude and direction of the couple moment acting on the gear in the following figure CO1

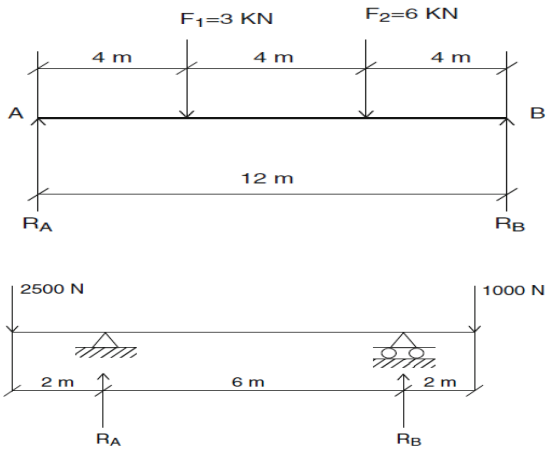


12. Given a group of parallel forces F_1 = 2,000 N, F_2 = 5,000 N, F_3 = 3,000 N acting on a beam as shown Fig., find:

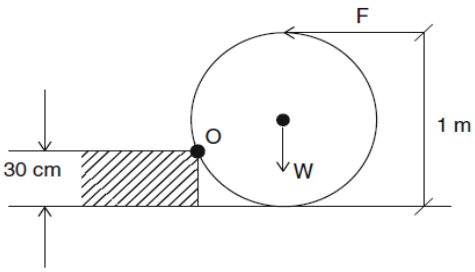
a. The resultant of the forces.
b. The distance of the resultant from point O (left end of the beam) (assume x1 = 2 m, x2 = 5 m, and x3 = 8 m) CO1



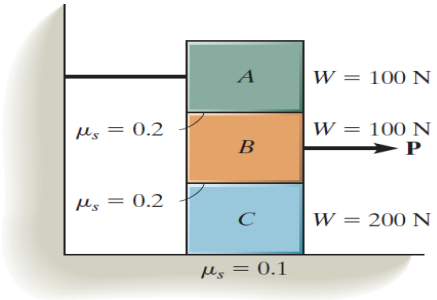
13. Find the reactions RA and RB of the supports for the beams shown in the following two figures by using Principle of virtual work. CO2



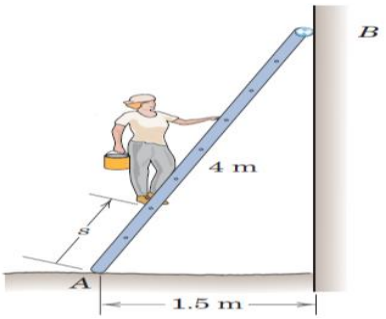
14. A wheel 1 m in diameter weighs 150 N with its load. Find the horizontal force F necessary to start the wheel rolling over an obstruction 30 cm high. CO1



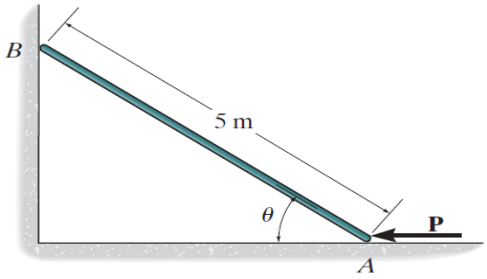
15. Determine the force P to move block B. CO2



16. Determine the distance s to which the 90-kg painter can climb without causing the 4-m ladder to slip at its lower end A. The top of the 15-kg ladder has a small roller, and at the ground the coefficient of static friction is 0.25. The mass center of the painter is directly above her feet. CO2



17. Determine the magnitude of force P required to hold the 50-kg smooth rod in equilibrium at an angle 60º. CO2



18. A light string ABCDE whose extremity A is fixed, has weights W1 and W2 attached t it at B and C. It passes round a small smooth peg at D carrying a weight of 300N at the free end E as shown in fig. CO1