

ANURAG Engineering College

(An Autonomous Institution)

I B.Tech II Semester Supplementary Examinations, June/July - 2024

ENGINEERING MECHANICS
(COMMON TO CIVIL & MECH)

Time: 3 Hours

Max. Marks: 75

Section – A (Short Answer type questions)

(25 Marks)

Answer All Questions

1. State Lami's theorem.
2. What are the steps followed while drawing free body diagrams?
3. Define the terms: i) Coulomb Friction; ii) Angle of friction.
4. Define limiting friction and impending motion.
5. What is the Centroid of a Quarter circle of radius 2 m?
6. With the help of a sketch, show where does the Centroid of semi-circle lie.
7. State Perpendicular axis theorem.
8. Define the term Moment of inertia.
9. Explain the principle of impulse-momentum.
10. Discuss the advantages of work-energy theorem.

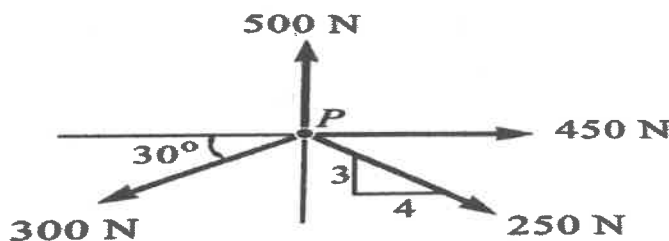
Course Outcome	B.T Level	Marks
CO1	L1	2M
CO1	L1	3M
CO2	L1	2M
CO2	L1	3M
CO3	L1	2M
CO3	L2	3M
CO4	L1	2M
CO4	L1	3M
CO5	L2	2M
CO5	L2	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks.

(5 X 10M = 50M)

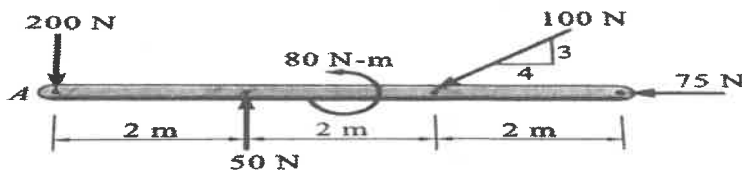
11. A) Determine the resultant of the forces acting on a particle P shown in figure.



OR

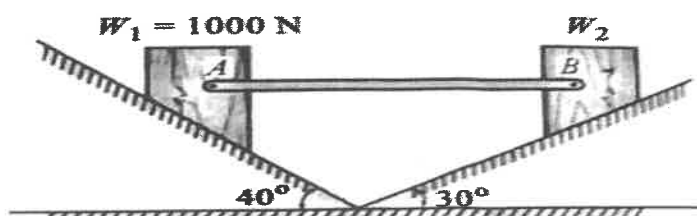
- B) Replace the system of forces and couple shown in figure by a single force couple system at A.

CO1 L3 10M



12. A) Two blocks W_1 and W_2 resting on two inclined planes are connected by a horizontal bar AB as shown in figure. If W_1 equals 1000N, determine the maximum value of W_2 for which the equilibrium can exist. The angle of limiting friction is 20° at all rubbing faces.

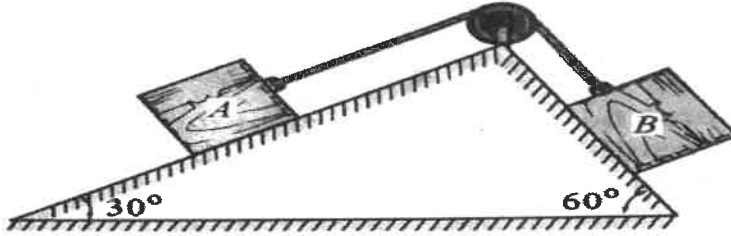
CO2 L3 10M



OR

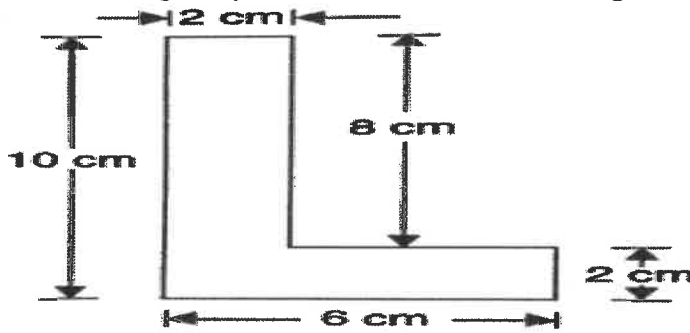
- B) Two blocks A and B are placed on inclined planes as shown in figure. The block A weighs 1000N. Determine minimum weight of the block B for maintaining the equilibrium of the system. Assume that the blocks are connected by an inextensible string passing over a frictionless pulley. Coefficient of friction μ between the block A and the plane is 0.25. Assume the same value for μ_B

CO2 L3 10M



13. A) Find the centre of gravity of the L section shown in figure.

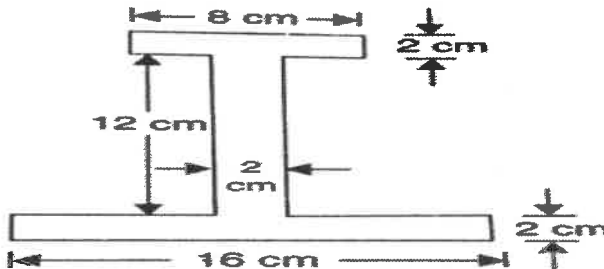
CO3 L3 10M



OR

- B) Find the centre of gravity of the I section shown in figure?

CO3 L3 10M



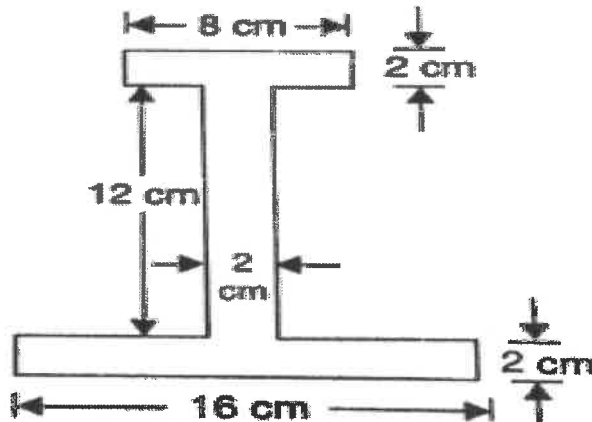
14. A) Derive the mass moment of inertia of a right circular cone of base radius R, height H and mass M about its axis.

CO4 L3 10M

OR

- B) For the I-section shown in figure, find the moment of inertia about the Centroidal axis X-X perpendicular to the web.

CO4 L3 10M

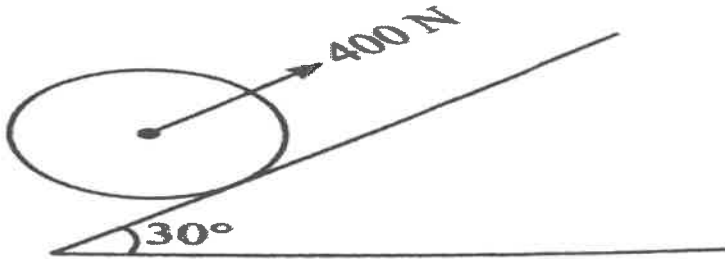


15. A) Find the work done in moving a 20 kg wheel by 2m up in an inclined plane with an angle of inclination equal to 30° coefficient of friction 0.25, if a force of 400N is applied at the center of the wheel as shown in the figure. What will be the angular velocity of the wheel after the wheel has travelled 4 m up the plane? Take radius of the wheel to be 0.1 m.

CO5

L3

10M



OR

- B) Describe and derive the work energy equation.

CO5

L3

10M

