

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Third Semester

Mechanical Engineering

ME3351 - Engineering Mechanics

(Common to Civil Engineering)

Regulations - 2021

Duration : 3 Hrs

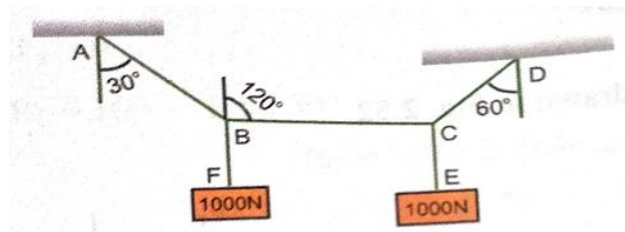
Maximum Marks : 100

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	Questions	BLT	CO	Marks
1.	State Newton's First Law.	L1	1	2
2.	What are all the characteristics of forces?	L2	1	2
3.	Write down the conditions of equilibrium of a particle in space.	L2	2	2
4.	Distinguish between couple and moment.	L1	2	2
5.	Define Pappus and guldinus theorem 1.	L2	3	2
6.	Determine MI of an isosceles triangle with base 150mm and sides of 125mm about its base.	L2	3	2
7.	Illustrate the characteristics of general plane motion.	L1	4	2
8.	What is the coulomb's law of dry friction?	L1	4	2
9.	Analyze the impulse & momentum equation.	L2	5	2
10.	Define i) Work ii) Energy	L1	5	2

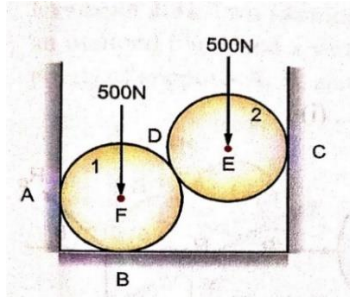
PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11. a	A string ABCD attached to two fixed points A and D has two equal weights of 1000N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles of 30° and 60° respectively, to the vertical as shown in fig. Find the tensions in the portions AB, BC and CD of the string, if the inclination of the portion BC with the vertical is 120° .	L2	1	16

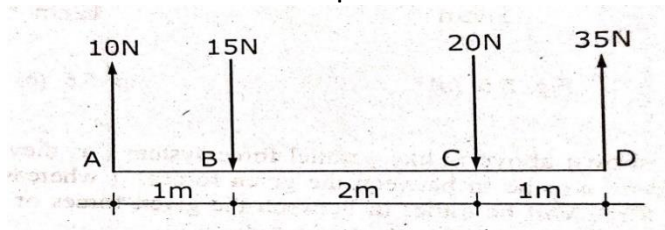


Or

- b Two spheres each of weight 500N and of radius 100mm rest in a horizontal channel of width of 360mm as shown in fig. Find the reactions on the point of contact A,B and C. Assume all the surfaces to be smooth. L2 1 16

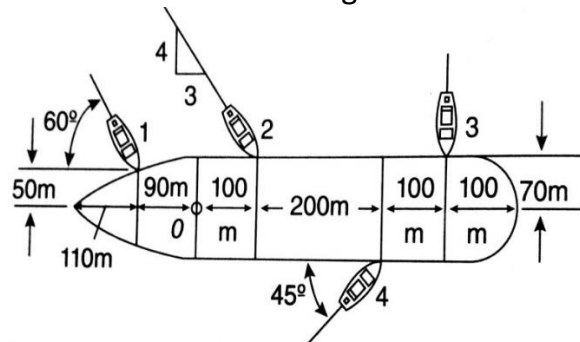


12. a Four parallel forces of magnitudes 10N, 15N, 20N, and 35N are shown in fig. Determine the magnitude and direction of the resultant. Find the distance from point A. L3 2 16

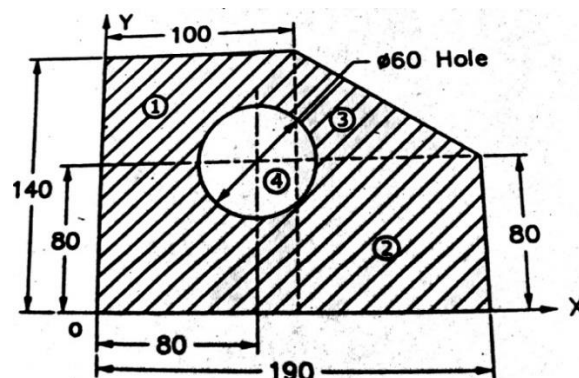


Or

- b Four tug boats are used to bring a large ship to its pier. Each tug boat exerts a 5000 N force in the direction as shown in Fig. Determine the equivalent force - couple system at point 'O' and the point on hull where a single more powerful tug boat should push to produce the same effect as the original four boats. L3 2 16

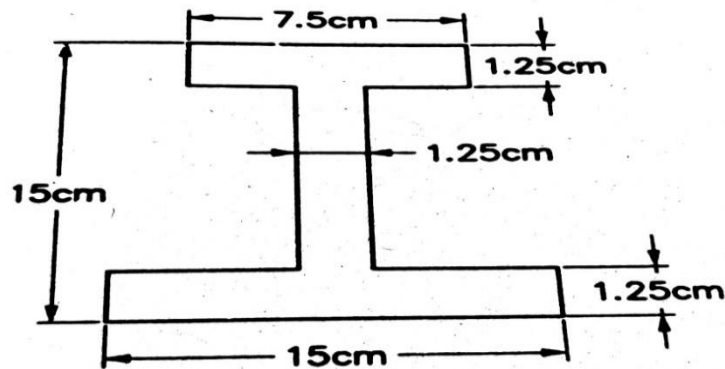


13. a Locate the centroid of area. L3 3 16

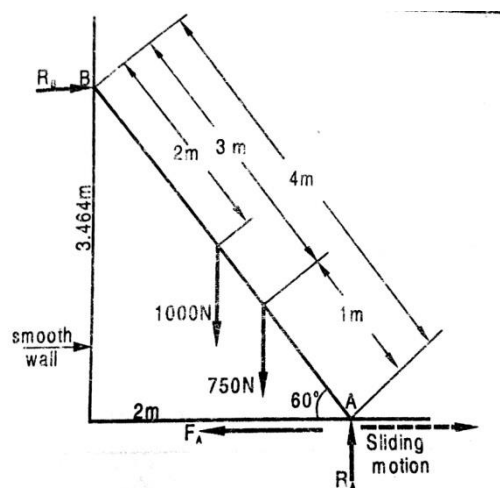


Or

- b Find the moment of inertia of a symmetrical I section about its centroidal axes. L3 3 16

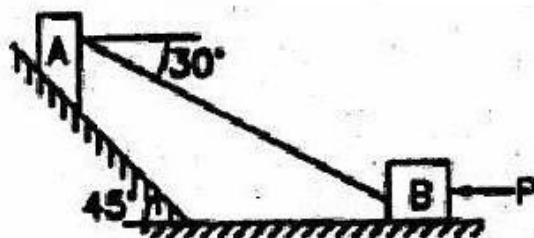


14. a A Ladder weight 1000 N and length 4 m rests. If a 750 N weight is applied at a distance of 3 m from the top of ladder, it is at the point of sliding. Determine the coefficient of friction between ladder and the floor. L3 4 16

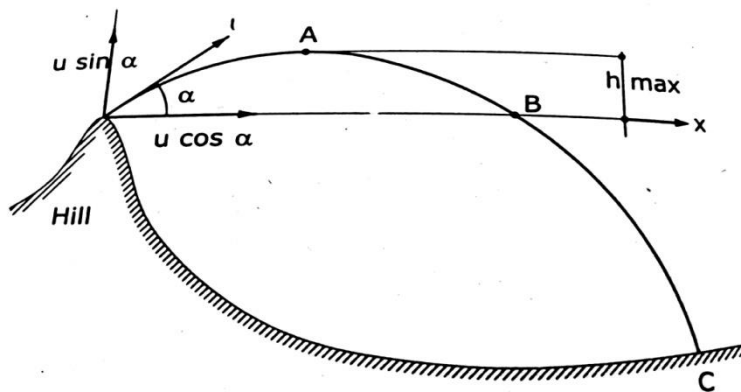


Or

- b Block A weighing 1000 N rests on a rough inclined plane whose inclination to the horizontal is 45° . It is connected to another block B, weighing 3000 N rests on a rough horizontal plane by a weightless rigid bar inclined at an angle of 30° to the horizontal as shown in fig. Find the horizontal force required to be applied to the block B just to move the block A in upward direction. Assume angle of friction as 15° at all surfaces where the residing. L3 4 16



15. a A Soldier fires a bullet at an angle of 30° (upward from the horizontal) from his position on hill to strike a target which is 61m lower than the position of the soldier. The initial velocity of the bullet is 91.5 m/s. Calculate i) The Maximum height to which the bullet will raise above the horizontal ii) The Actual Velocity with which it will hit the target. iii) The Total time required for the flight of the bullet.



Or

- b A body weighing 1200N is resting on a rough plane inclined at 20° to the horizontal as shown in fig. It is pulled up the plane from rest by means of a light flexible rope running parallel to the plane and passing over a light frictionless pulley at the top of the plane. The portion of rope beyond the pulley hangs vertically and carries a weight 800 N at the end. If the coefficient of friction for the plane and the body is 0.2, find i) a tension in rope ii) acceleration of the body and iii) distance moved by the body in 3 seconds, starting from rest.

