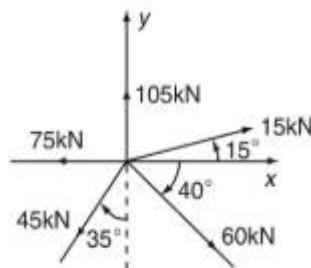


THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APR/MAY 2026****Third Semester****Mechanical Engineering****UMET24301 – ENGINEERING MECHANICS****(Common To Civil Engineering)****Regulations - 2024****Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

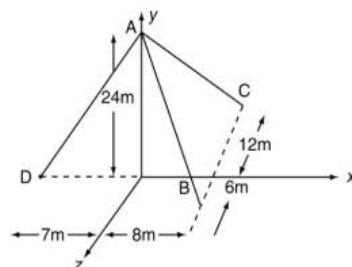
Q.No	Questions	BTL	CO	Marks
1.	State Lami's theorem.	L1	1	2
2.	Differentiate equilibrium of a particle and equilibrium of a rigid body.	L2	1	2
3.	State Varignon's theorem.	L1	2	2
4.	What is a free body diagram?	L2	2	2
5.	Write the centroidal coordinates of a semicircular lamina.	L2	3	2
6.	Mention the significance of polar moment of inertia.	L2	3	2
7.	State the laws of dry friction.	L1	4	2
8.	Define rolling resistance.	L2	4	2
9.	Write the equation of motions for rectilinear motion of a particle.	L1	5	2
10.	Interpret the principle of work and energy.	L2	5	2

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

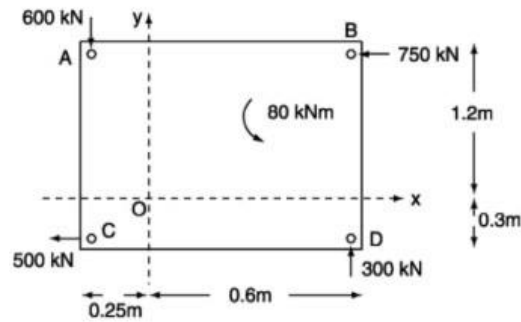
Q.No	Questions	BLT	CO	Marks
11. a i	Consider two forces F and 2F acting on a particle. If the Force F is increased by 12 kN and Force 2F is doubled, the direction of the resultant is unaltered. Find the forces acting on it.	L3	1	6
ii	Determine the magnitude and direction of the resultant of the given concurrent force system.	L3	1	10

**Or**

- b If the tension in the Wire AB is 75 kN. Determine the tension in the cable AC and AD such that the resultant of the three forces acting at A is vertical.

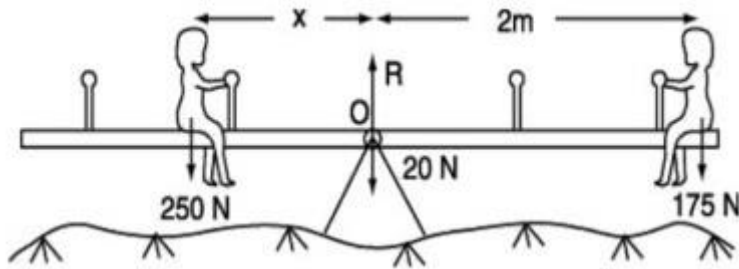


12. a Four forces and couple are acting on a rectangular plate as shown in the diagram below. Determine the magnitude and direction of the resultant of the force – couple system. Also determine the distance x from the O along the X axis where the resultant force intersect.

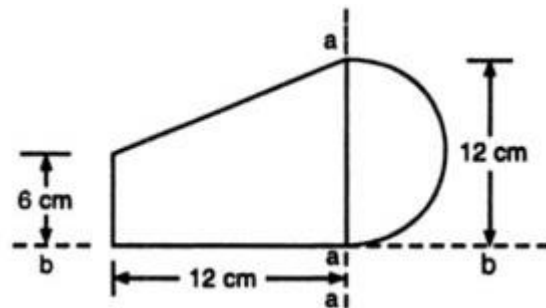


Or

- b Two children are playing seesaw game in a park. The uniform board of weight 20 N supports two children weighing 250 N and 175 N respectively as shown in the below diagram. Determine: The upward force exerted by the board on the support and the position at which the 250 N child should sit to balance the system.

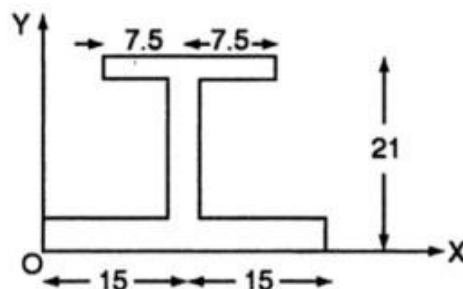


13. a Determine the centroid of the given Lamina.

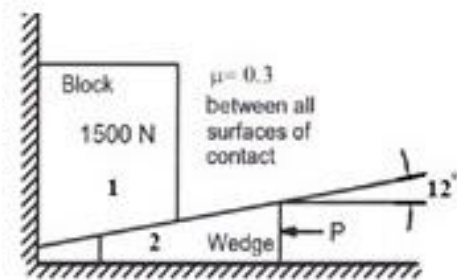


Or

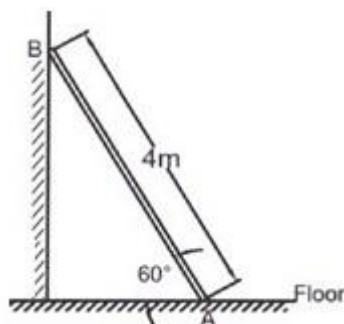
- b Find the area moment of Inertia about the centroidal axes (I_{xx} & I_{yy}) of the given I section whose flange thickness is 3 cm throughout.



14. a For the block and wedge as shown in the below diagram, determine the value of the Force P required to lift the block. Weight of the wedge is 150 N.



- b A ladder of weight 1000 N and 4 m length rests as shown in the below diagram. If a 750 N weight is acting at a distance of 3 m from the bottom of the ladder, it is at sliding point. Determine the coefficient of friction between the ladder and the floor. Assume that the coefficient of friction is same for all the contacting surfaces.



15. a The motion of the particle is defined by the relation shown below: $x = 7.5 + 22.5t - 13.5t^2 + 1.5t^3$
Where x is in m and t is in sec. Determine (a) The position where the velocity is zero (b) Position and total distance travelled when acceleration is zero and (c) plot the motion curves.

Or

- b Find the acceleration of the blocks and the tension in the cable for the given system.

