

OR

- 4 a. State the laws of static friction. (04 Marks)
 b. Define :
 i) Angle of friction
 ii) Coefficient of friction
 iii) Cone of friction. (06 Marks)
 c. Determine the force P just required to slide the block B in arrangement shown in Fig.Q4(c). Find also the tension in the string, take weight of block A = 500N, B = 1000N and $\mu = 0.2$ (for all contact surfaces).

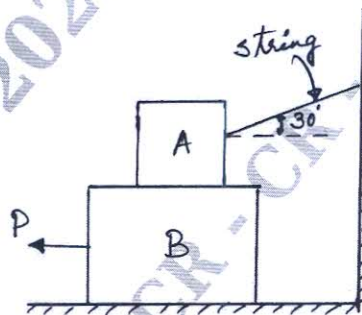


Fig.Q4(c)

(10 Marks)

Module-3

- 5 a. State and prove Varignon's theorem of moment. (10 Marks)
 b. Determine the reactions at the supports A and B for the beam as shown in Fig.Q5(b).

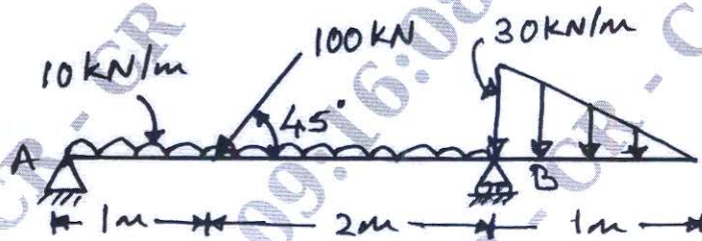


Fig.Q5(b)

(10 Marks)

OR

- 6 a. Explain with neat sketch :
 i) Types of loads
 ii) Types of support
 iii) Types of beams. (10 Marks)
 b. Determine the resultant of the system of forces acting on a lamina as shown in Fig.Q6(b) locate the distance of the resultant from point 'O'.

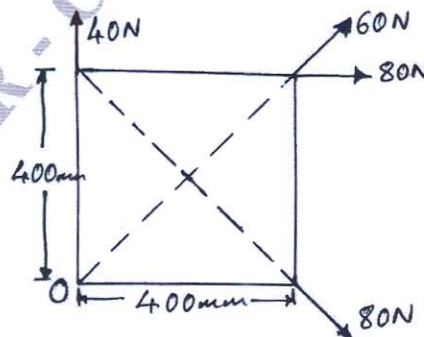


Fig.Q6(b)
2 of 3

(10 Marks)

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Module-4

- 7 a. State and prove parallel axis theorem. (08 Marks)
 b. With reference to the co-ordinate axis x and y, locate the centroid of the shaded area as shown in Fig.Q7(b).

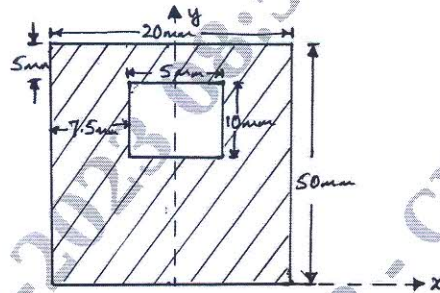


Fig.Q7(b)

(12 Marks)

OR

- 8 a. Determine the centroid of a triangular lamina about its base by method of integration. (08 Marks)
 b. Determine the moment of inertia of the section along the horizontal axis passing through the centroid of the section shown in Fig.Q8(b).

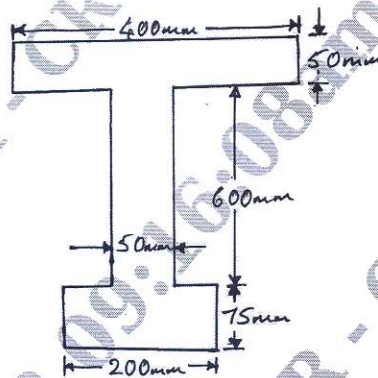


Fig.Q8(b)

(12 Marks)

Module-5

- 9 a. A stone is dropped into a well. After 4 seconds the sound of splash is heard. If the velocity of sound is 330m/s. Find the depth of the well upto the water surface. (10 Marks)
 b. A projectile is launched from a gun. After 3.783 seconds, the velocity of the projectile is observed to make an angle of 30° with the horizontal and at 4.79 seconds it reaches its maximum height. Calculate the initial velocity and angle of projection. (10 Marks)

OR

- 10 a. What is a projectile? Define the following terms briefly :
 i) Angle of projection
 ii) Horizontal range
 iii) Vertical height
 iv) Time of flight. (10 Marks)
 b. The motion of a particle starting from rest is defined by $a = 10t - t^2$, where a is in m/s^2 and t is in seconds. Find the displacement before it starts in reverse direction of motion and velocity when acceleration changes its direction. (10 Marks)

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