

Code No: 152AH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year II Semester Examinations, July/August - 2021

ENGINEERING MECHANICS

(Common to CE, ME, MCT, MMT, AE, MIE, PTM)

Time: 3 Hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) The force system shown in the figure 1 has a resultant of 200 N towards Y-axis. Compute the values of P and θ required to give the same resultant.

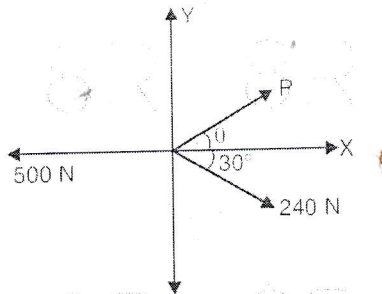


Figure: 1

- b) A man weighing 72 N stands on the middle rung of a 25 N ladder resting on smooth floor and against a wall. The ladder is prevented from slipping by a string OD. Find the tension in string and reactions at A and B as shown in the figure 2. [5+10]

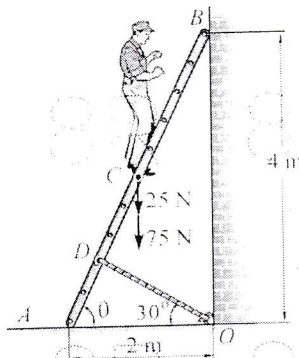


Figure: 2

2. A 100 N load is supported by the three cables as shown in the figure 3. Determine the tensions in cables AB, AC and AD. [15]

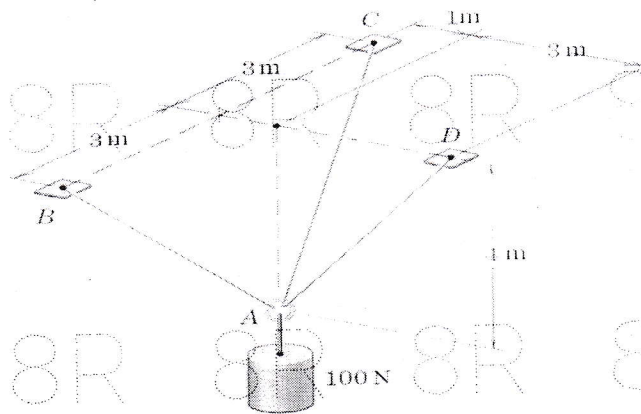


Figure: 3

3. The horizontal position of the 500-kg rectangular block of concrete is adjusted by the 5° wedge under the action of the force P as shown in figure 4. If the coefficient of static friction for both wedge surfaces is 0.30 and if the coefficient of static friction between the block and the horizontal surface is 0.60, determine the least force P required to move the block. [15]

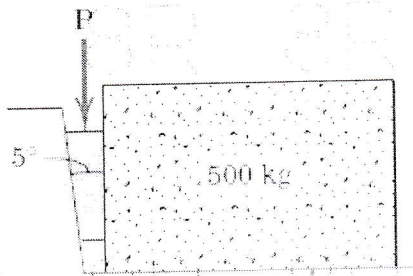


Figure: 4

- 4.a) Find the coordinates of the centroid of the shaded area with respect to the axes shown in the Figure 5. All dimensions are in mm.

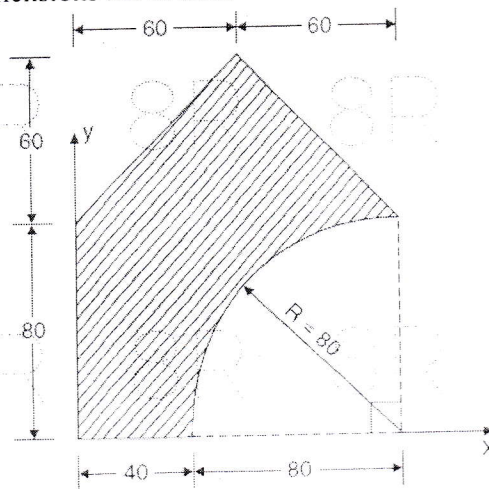


Figure: 5

- b) Find the Centroid of the shaded area shown in the figure 6. [7+8]

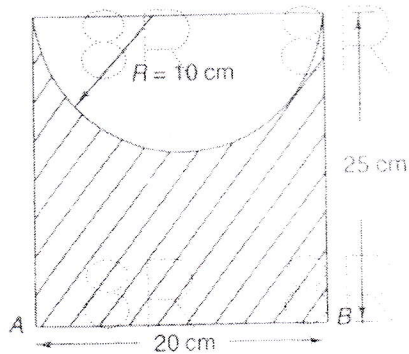


Figure: 6

5. Calculate the moment of inertia for the figure 7 about centroidal axes. [15]

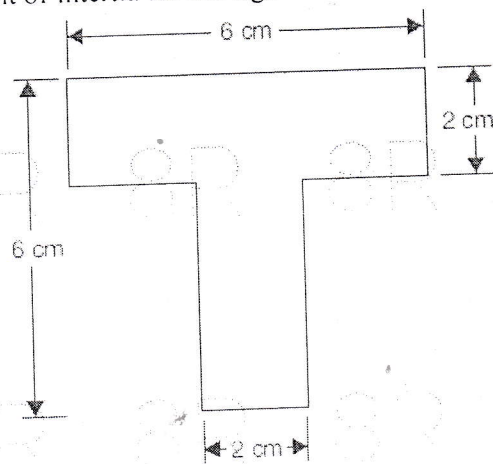


Figure: 7

6. A motorist is travelling at 90 kmph, when he observed a traffic light 250 m ahead of him turns red. The traffic light is timed to stay red for 12 sec. If the motorist wishes to pass the light without stopping, just at it turns green, determine: a) the required uniform deceleration of the motor and b) speed of the motor as it passes the traffic light. [7+8]
- 7.a) A bullet of mass 30 g is fired into a body of mass 10 kg, which is suspended by a string 0.8 m long. Due to this impact, the body swings through an angle 30° . Find the velocity of the bullet.
- b) A ball overtakes another ball of twice its own mass and moving with $1/7$ of its own velocity. If coefficient of restitution between the two balls is 0.75, show that the first ball will come to rest after impact. [7+8]
8. Two blocks weighing 100 N and 40 N are supported at the ends of a rope of negligible weight which is passing over a rough surface of pulley mounted on the horizontal axis. The pulley may be assumed as a solid disc with a weight of 50 N. Find the tension in two ropes and linear acceleration of the blocks. [15]