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Total Pages : 4

**008304****Mar. 2022****B.Tech. (ECE/EIOT) - III SEMESTER****Engineering Mechanics (ESC-01)**

Time : 90 Minutes]

[Max. Marks : 25

*Instructions :*

1. *It is compulsory to answer all the questions (1 mark each) of Part-A in short.*
2. *Answer any three questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

**PART-A**

1. (a) Define Force system in brief. (1)
- (b) Define Stress and Strain for engineering materials. (1)
- (c) Differentiate between static and dynamic frictions. (1)
- (d) Write the statement of parallel axis theorem of moment of inertia. (1)
- (e) What is conservative forces? Explain with examples. (1)
- (f) Define term resonance in mechanical vibrations. (1)
- (g) Write D'Alemberts principle. (1)

- (h) Write "Work-Energy principle". (1)
- (i) Write similarity and differences between work and moment. (1)
- (j) Define zero force member and how it can be found in a given truss. (1)

### PART-B

2. (a) Three forces keep a particle in equilibrium. One acts towards east, another towards north-west and third towards south. If the first be 5N, find the other two. (2)
- (b) The block shown in Fig. 1 is acted on by its weight  $W = 400 \text{ N}$ , a horizontal force  $f = 600 \text{ N}$  and pressure exerted by the inclined plane. The resultant  $R$  of three forces is parallel to the incline. Determine  $P$  and  $R$ . Does the block move up or down the plane? (3)

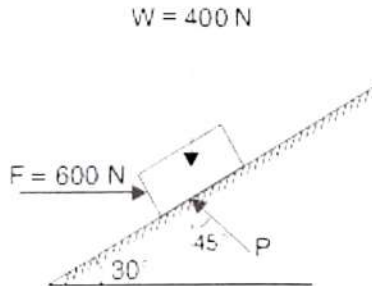


Fig. 1

3. (a) Determine the centroid of the lamina as shown in Fig. 2. (2)

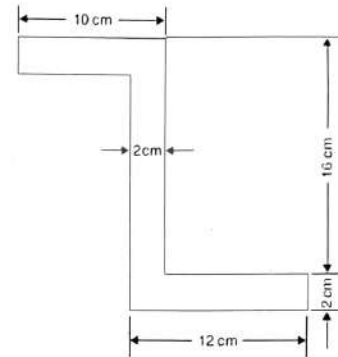


Fig. 2

- (b) Find the moment of inertia of the area shown in Fig. 3 about the axis AB. (3)

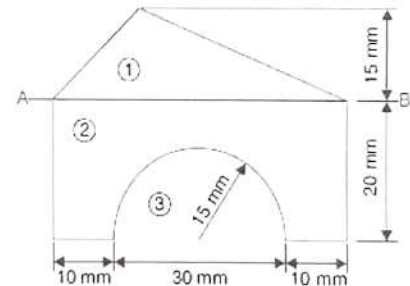


Fig. 3

4. A 13 m ladder weighing 250 N is placed against a smooth vertical wall with its lower end 5 m from the wall. The coefficient of friction between the ladder and the floor is 0.3.

What is the friction force acting on the ladder at the point of contact between the ladder and the floor? The centre of gravity of the ladder is at the mid-point of its length. Show that the ladder will remain in equilibrium in this position. (5)

5. A body weighing 8 N rests on a rough plane inclined at  $15^\circ$  to the horizontal. It is pulled up the plane from the rest, by means of a light flexible rope running parallel to the plane. The portion of the rope, beyond the pulley hangs vertically down and carries a weight of 60 N at the end. If the co-efficient of friction for the plane and the body is 0.22. Find : (a) Tension in the rope, (b) The acceleration with which the body moves up and (c) Distance travelled in 2 second. (5)

6. Determine the force in each member of the truss and state if member are in Tension or Compression.  $P_1 = 30$  kN,  $P_2 = 15$  kN. Refer Fig. 4. (5)

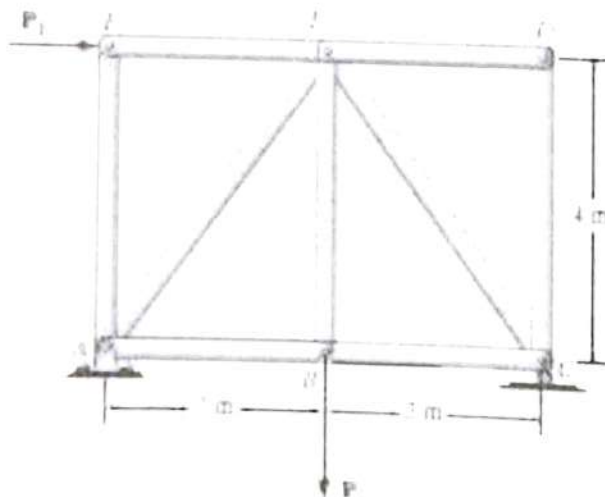


Fig. 4