

MODEL PAPER

Subject Code: R161111/R16

Set No - 1

I B. Tech I Semester Regular Examinations Nov. - 2016

ENGINEERING MECHANICS

(Common to AE, AME, BioTech, ChemE, CE, EEE, ME, MetalE, MinE, PCE, PE)

Time: 3 hours

Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**
 Answering the question in **Part-A** is **Compulsory**,
Four Questions should be answered from **Part-B**

PART-A

1. (a) Explain superposition law and law of transmissibility
- (b) Define equilibrium of a body and give conditions of equilibrium when subjected to forces.
- (c) Define Truss and free body diagram.
- (d) Differentiate centroid and center of gravity.
- (e) State Transfer theorems.
- (f) Define motion. Write different types of motion.
- (g) Write Impulse-Momentum equation

[7 x 2 = 14]

PART-B

2. (a) Explain various force systems with neat sketches.
- (b) A 108 N block is held on a 40° incline by a bar attached to a 150 N block on a horizontal plane shown in Figure.1. The bar which is fastened by smooth pins at each end is inclined 20° to the horizontal. The coefficient of friction between each block and its plane is 0.325. For what horizontal force P, applied to 150 N block will motion to the right be impending?

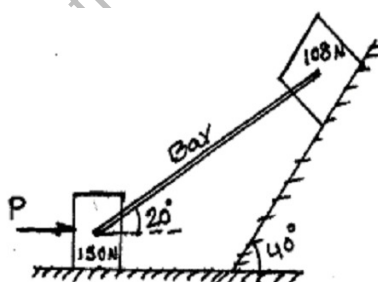


Figure.1

[6+8]

3. (a) A beam AB is located supported and loaded as shown in Figure.2. Find the reactions at the supports.

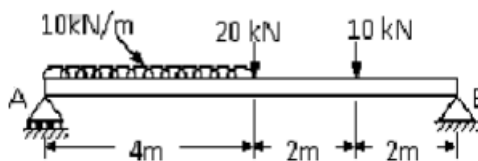


Figure.2

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3. (b) Two identical rollers, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in below Figure.3. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C.

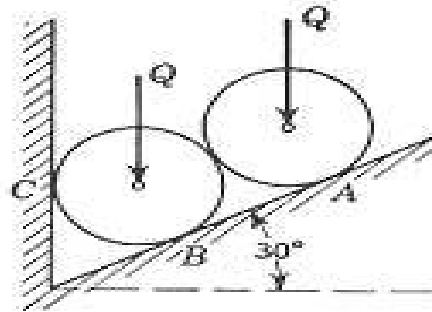


Figure.3

[7+7]

4. (a) Locate the centroid of a shaded area as shown in Figure.4.

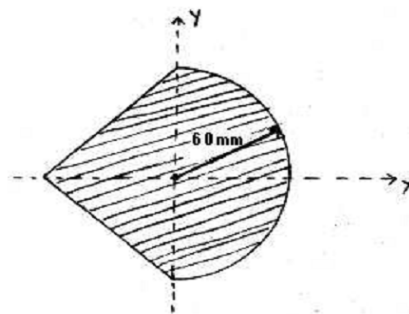


Figure.4

- (b) Uniform lamina shown Figure.5 consists of rectangle, a semi circle and a triangle. Find the center of gravity.

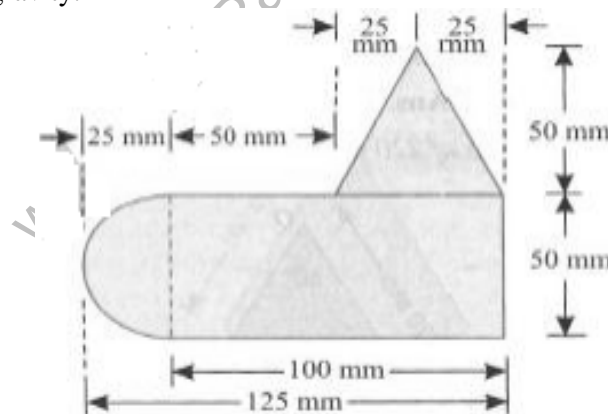


Figure.5

[7+7]

5. (a) Find out the mass moment of inertia of a right circular cone of base radius R and mass M about the axis of the cone.

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5. (b) Find the moment of inertia of the area in the given Figure.6 about the axis 'AB'

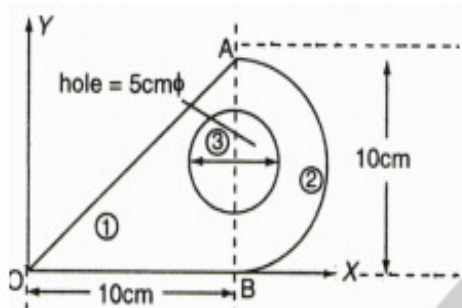


Figure.6

[6+8]

6. (a) A car has an initial speed of 25m/s and a constant deceleration of 3m/s^2 . Determine the velocity of the car when $t=4\text{s}$. What is the displacement of the car during the 4s time interval? How much time is needed to stop the car?
- (b) A projectile is fired with an initial velocity of 250m/s at a target located at a horizontal distance of 4km and vertical distance of 700 m above the gun .Determine the value of firing angle to hit the target .Neglect air resistance.

[7+7]

7. (a) Two blocks of masses M_1 and M_2 are connected by a string as shown in Figure.7 below Assuming the coefficient of friction between block M_1 and the horizontal surface to be μ if the system is released from rest, find the velocity of the block A after it has moved a distance of 1 m Assume $M_1=100\text{kg}$.and $M_2=150\text{kg}$ and $\mu=0.20$.

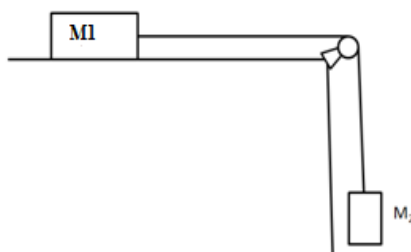


Figure.7

- (b) Derive Work-energy equation.

[10+4]
