EX/MET/AM/ME/T/1A/114/2017(S)

Bachelor of Metallurgical Engineering (1st Year 1st Semester) Special Supplementary

Subject : Engineering Mechanics

Full Marks : 100 **Time : Three Hours**

Answer any five questions :

1. (a) Refer to fig A and find out the moment of the force about the base O and the X axis.
   (b) Refer to fig B and replace the system of forces with an equivalent force to be applied at A.

   10+10

2. (a) Refer to Fig. C and draw the free body diagrams of each member.
   (b) Refer to Fig D and find out the support reactions.

   10+10

3. (a) Refer to Fig E and find out the force required to move the lower block.
   (b) Refer to Fig F and find the maximum distance upto which the person can climb without causing the ladder to slip. Take the mass of ladder as 24 kg and the mass of the man as 60 kg.

   10+10

4. (a) Refer to Fig G and find out the centroid of the shaded area.
   (b) Refer to Fig H and find out I_{xx} for the shaded area.

   10+10

5. (a) Refer to fig I and find out the velocity of the projectile to reach the target.
   (b) Refer to Fig J and find out the velocity of the hammer just after impact using impulse momentum principles.

   10+10

6. Write short notes on any four : 4X5=20
   (a) Coulomb's laws of dry friction
   (b) Theorems of Pappus and Guldinus
   (c) Area moment of inertia.
   (d) Work energy principle
   (e) Free body diagram
   (f) Parallel axis theorem

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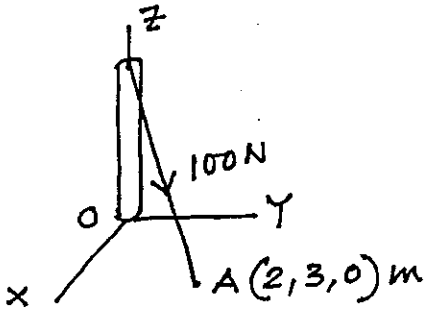

Fig A

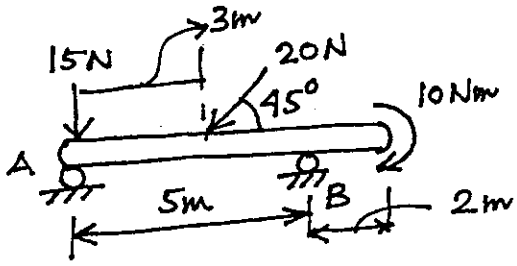

Fig B

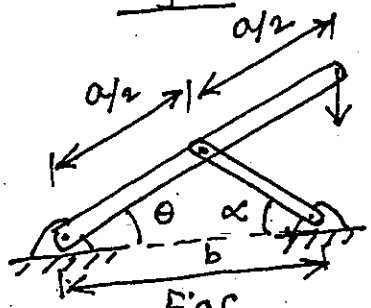

Fig C

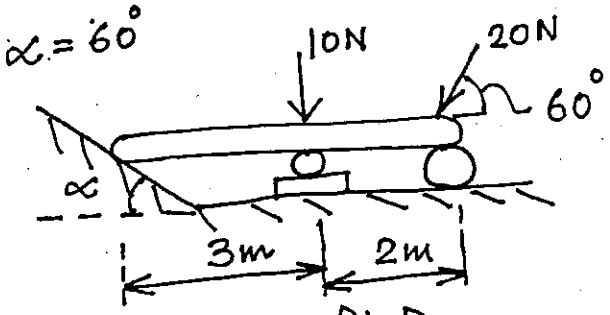

Fig D

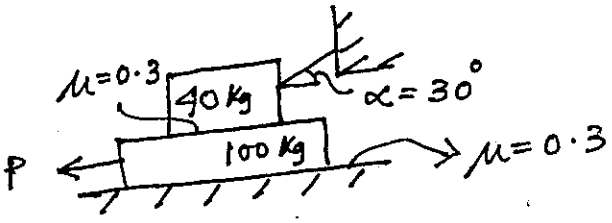

Fig E

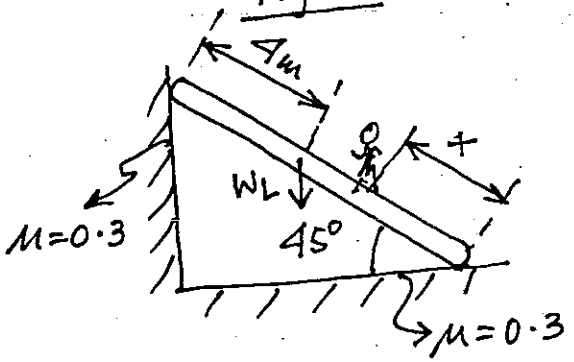

Fig F

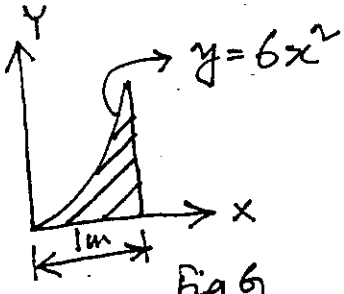

Fig G

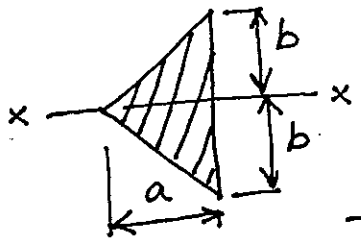

Fig H

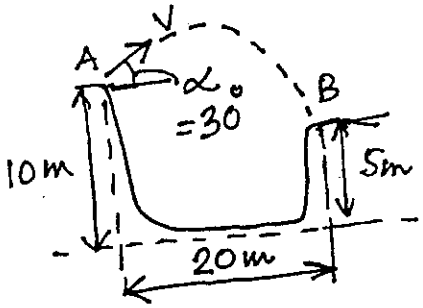

Fig I

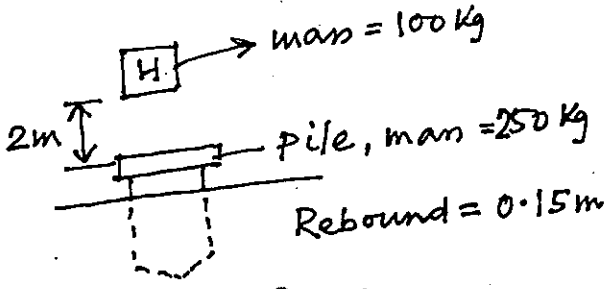

Fig J