Code: CE2T4

I B.Tech - II Semester – Regular Examinations – JULY 2015

ENGINEERING MECHANICS
(CIVIL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer **all** the questions.   All questions carry equal marks

$$11 \times 2 = 22 \text{ M}$$

1. a) Define the law of parallelogram of forces. What is the use of this law?
   b) What do you mean by scalar and vector quantities? Give some examples.
   c) State the Coulomb's laws of Dry friction?
   d) Differentiate between centroid and centre of Gravity?
   e) Explain the principle of virtual work?
   f) Define statics, kinematics, kinetics and dynamics?
   g) A body starting from rest moves in a straight line whose equation of motion is given by $S = t^3 - 2t^2 + 3$. Find the velocity and acceleration after 5 seconds.
   h) State D'Alemberts's Principle and mention its applications.
   i) Distinguish between the uniform motion and the uniformly accelerated motion.
   j) Differentiate between curvilinear and rectilinear motion?
   k) A stone is dropped into a well and the splash is heard after 2.50 sec later. Determine the depth of water surface level by assuming the velocity of sound is 330m/s

PART – B

Answer any *THREE* questions.   All questions carry equal marks.   3 x 16 = 48 M

2. Determine the centroid of the built-up section as shown in Figure-1 and also find out the moment of inertia about horizontal axis?(Dimensions are in mm)   16 M
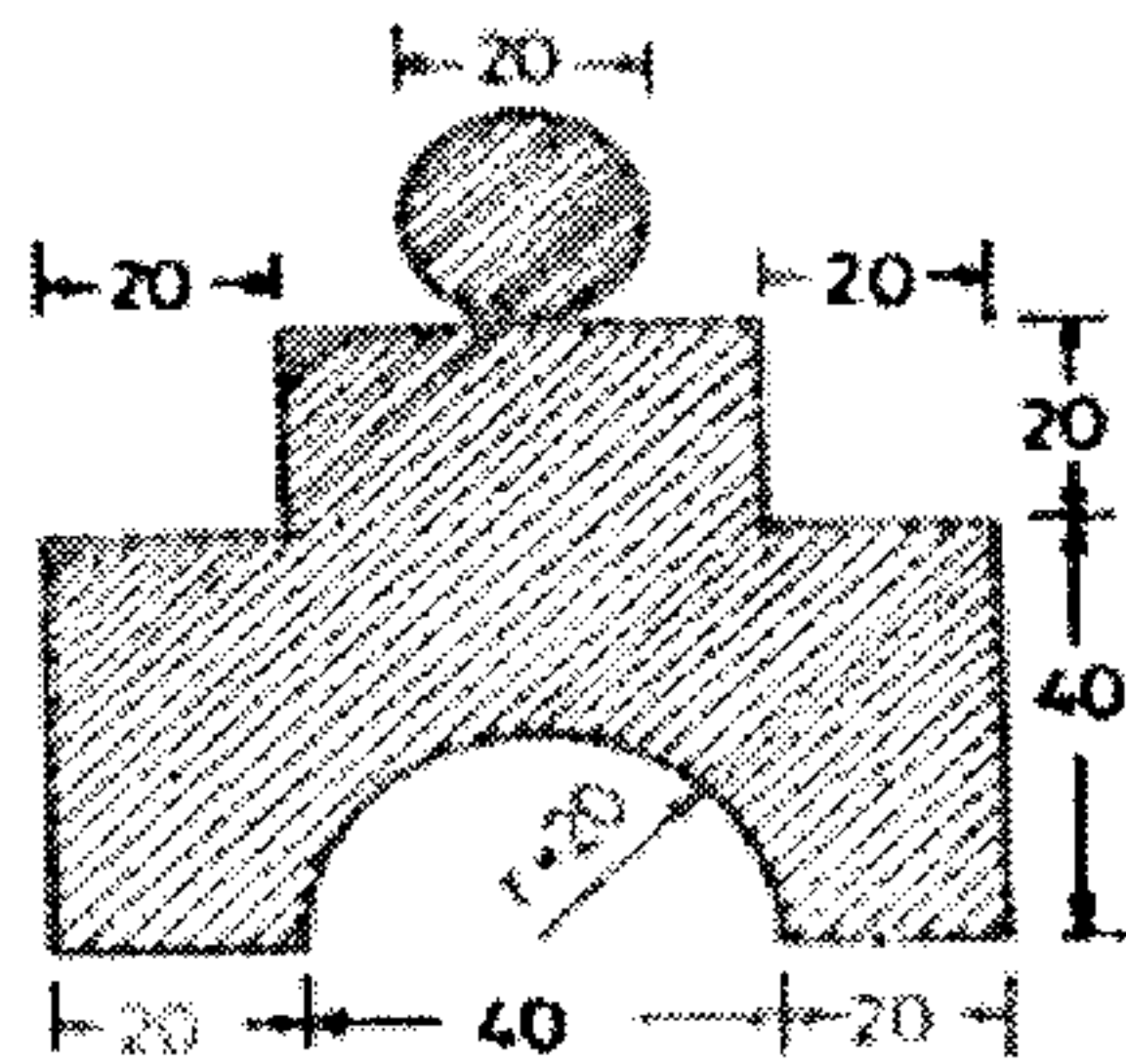

Figure-1

3. a) Determine the maximum weight that can be lowered by a person who can exert a 300 N pull on rope if the rope is wrapped 2 turns round a spur as shown in Figure-2 coefficient of friction between spur and the rope is 0.3.
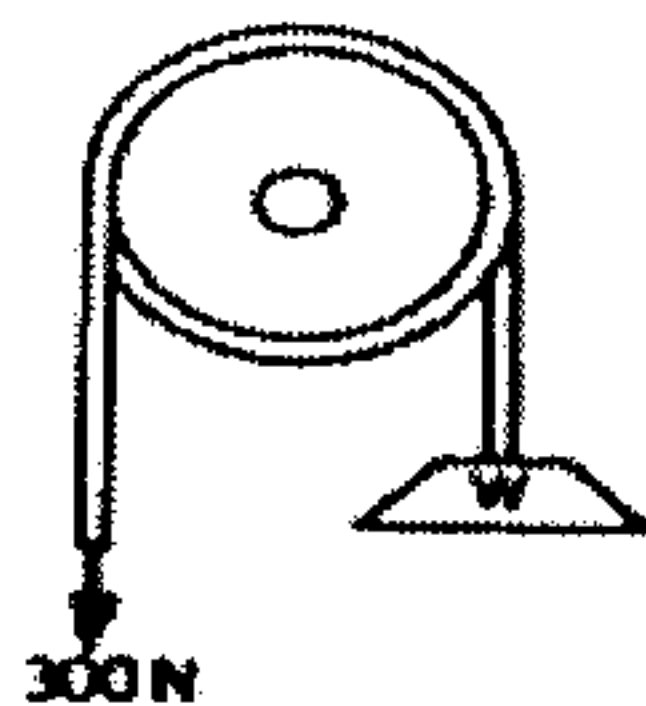
8 M

Figure-2

b) Find the horizontal force P required to pull the block A of weight 150 N which carries B of weight 1280 N as shown in Figure-3. Take angle of limiting friction between floor and block as 14^0 and that between wall and block B as 13^0 and coefficient of limiting friction between the blocks as 0.3.
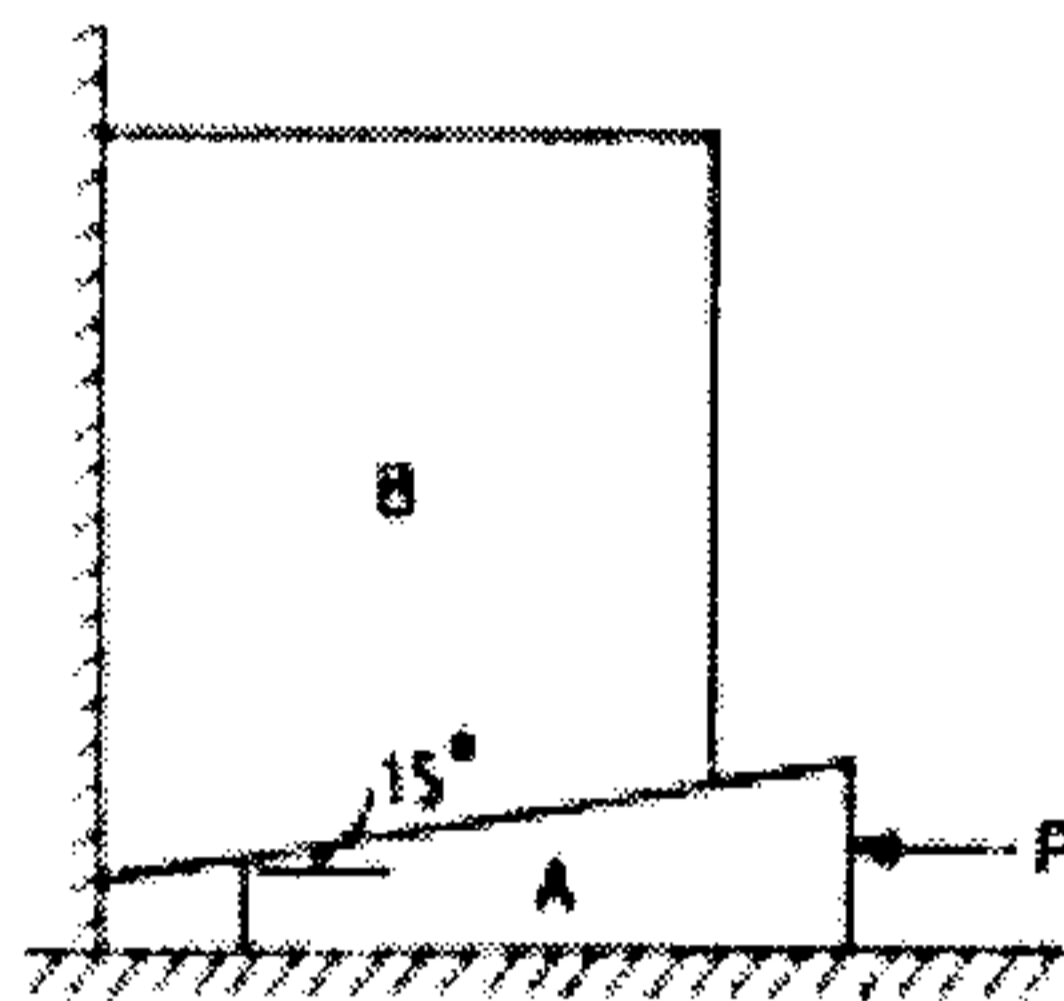
8 M

Figure-3

4. A simply supported beam AB of span 10m is loaded as shown in Figure-4. Calculate the reactions at A and B using principle of virtual work. 16 M
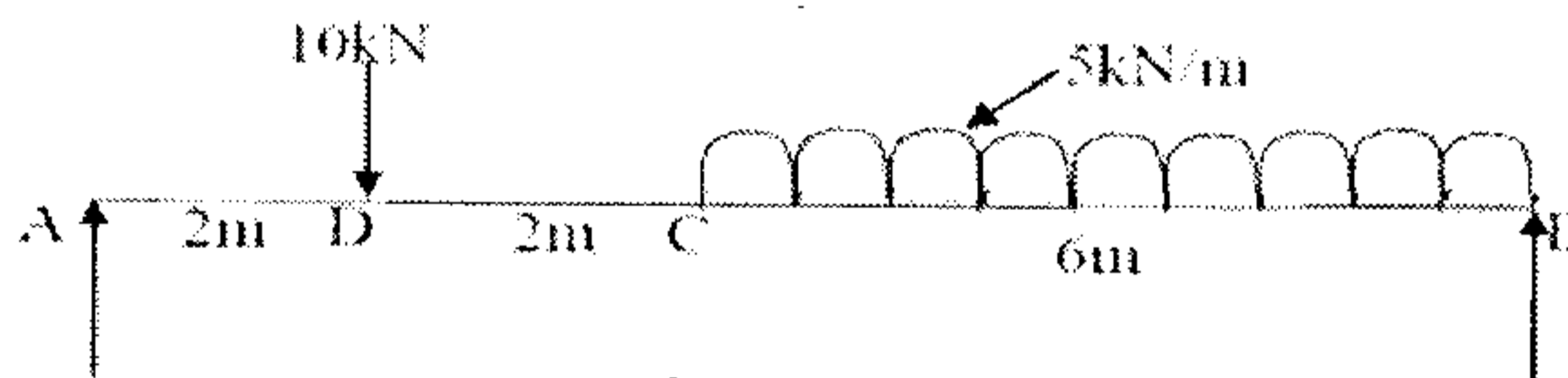

Figure-4

5. a) Two weights of 300 N and 450 N are hung to the ends of a rope passing over a frictionless ideal pulley. What is the tension in the ends of the rope? Using work energy equation calculate the distance moved by the blocks in increasing the velocity of the system from 2m/s to 4m/s.

8 M

b) A cricket ball is bowled with a constant speed of 20m/s. the ball was hit with a velocity of 48m/s at an angle of 30° with the horizontal. Find the force exerted by the bat if the impact lasts for 0.02sec and weight of the ball is 1 N.   8 M

6. A wheel rotating about a fixed axis at 20 rpm is uniformly accelerated for 70 seconds during which it makes 50 revolutions.   16 M

    Find: i) the angular velocity at the end of this interval and
           ii) time required for the speed to reach to 100 revolutions per minute.