FE-1901

Total Number of printed pages : 04

F.E. Semester I (Revised Course 2019-20)
EXAMINATION OCTOBER 2020
Basics Of Mechanical Engineering

[Duration : Two Hours]   Total Marks 60]

Instructions :
1) Answer THREE FULL QUESTIONS with ONE QUESTION FROM EACH PART
2) Read the question paper carefully.
3) Sketches are very important. Draw neat sketches wherever required.
4) Assume suitable data if required.

PART – A

Q. 1   (a) Two cables support a 2500 N weight as shown in the figure. Determine the tension in each   6
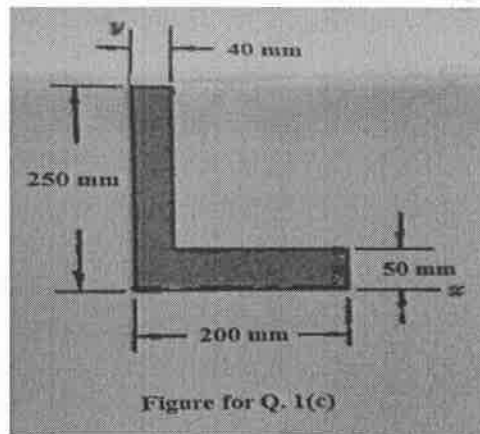cable.

Figure for Q. 1(a)
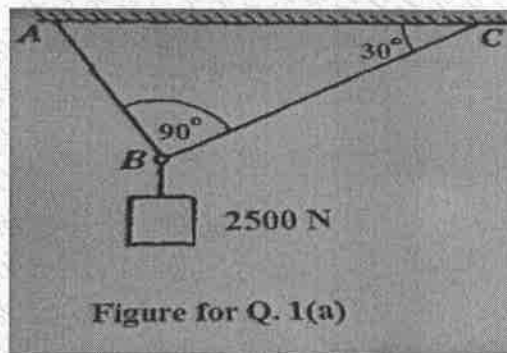
(b) The 3.6 m long ladder AB weighs 150 N. It rests against a vertical wall and on the horizontal   7
floor, as shown in the figure. What must the coefficient of friction μ be for equilibrium ?
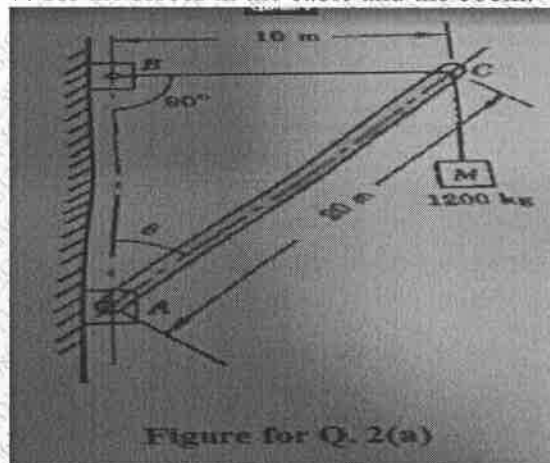Consider friction at both the ends of the ladder.

Figure for Q. 1(b)
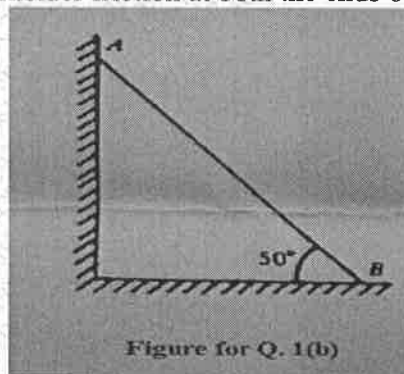
(c) Find the coordinates of the centroid of the composite area shown in the figure.   7

Figure for Q. 1(c)

Q. 2 (a) A boom 20 m long supports a mass of 1200 kg as shown in the figure. The cable BC is 7 horizontal and 10 m long. Solve for the forces in the cable and the boom.
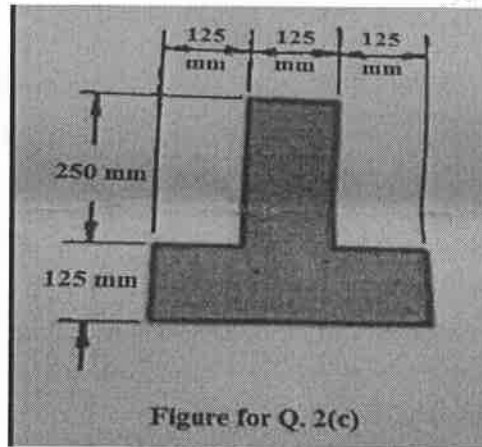

Figure for Q. 2(a)

(b) A clamp exerts a normal force of 100 N on three pieces held together as shown in the figure. 7 What force P may be exerted before the motion impends (just begins) ? The coefficient of friction between the pieces is 0.3.


Figure for Q. 2(b)
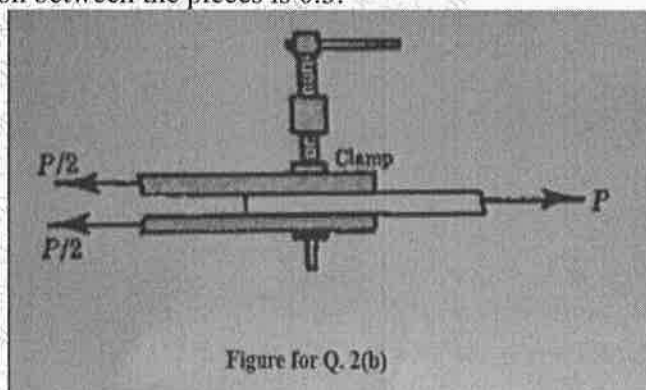
(c) Referring to the figure, determine the moment of inertial of the composite area about the horizontal base. 6

Figure for Q. 2(c)

Q. 3 (a) Block B rests on the block A, and is attached by a horizontal rope BC to a wall as shown in the figure. What force P is necessary to cause motion of block A to impend (just begin) ? The coefficient of friction between block A and block B is $\frac{1}{4}$, and between block A and the floor is $\frac{1}{3}$. Block A has a mass of 14 kg and block B has a mass of 9 kg. **10**

Figure for Q. 3(a)
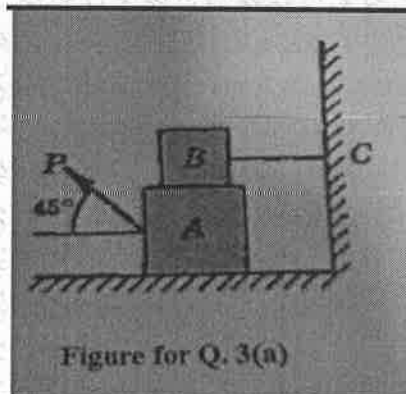
(b) Determine the moment of inertial about a centroidal axis parallel to the base of the composite area shown in the figure. **10**

Figure for Q. 3(b)
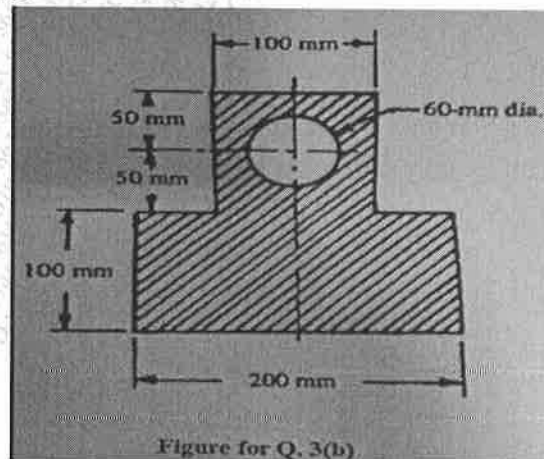
PART – B

Q. 4   (a) What is a thermodynamic system ? What are intensive and extensive properties ?   5

(b) What do you understand by path function and point function ? What is work ? What is heat   5
transfer ?

(c)   Write a note on casting.   5

(d)   Write a note on drilling machine.   5

Q. 5   (a)   Explain what you understand by thermodynamic equilibrium. What is a quasi-static process ?   5
(b)   Explain displacement work.   5
(c)   Write a note on metal joining processes.   5
(d)   Write a note on milling machine.   5

Q. 6   (a)   Explain specific heat and latent heat.   5
(b)   Discuss the Kelvin-Planck statement of the second law of thermodynamics.   5
(c)   Write a note on forging.   5
(d)   Write a note on lathe machine.   5

PART -C

Q. 7   (a)   What do you mean by a rigid body ? State work-energy principle for a rigid body.   5
(b)   State the impulse-momentum equation. A force F acts on a 50kg mass for 5 second. During this   5
time interval, the speed changes from 1.5 to 3 m/s. Determine the value of the force F.
(c)   Discuss the Clausius statement of the second law of thermodynamics.   5
(d)   Write a note on sheet metal forming.   5

Q. 8   (a)   State the D'Alembert's principle and explain.   5

(b)   State and explain the theorem of parallel axes for moment of inertia.   5

(c)   State the first law of thermodynamics for a closed system   5

(d)   Write a note on grinding machine.   5