2013

Structure-I

Paper : Eng.-1.5

Full Marks : 100

Time – 3(Three hours)

The figures in the margin indicate full marks for the questions
Answer all questions from the following

1. Define the following along with diagram   5×4=20
   if necessary (attempt any five)
   (a) Angle of friction
   (b) Laws of Static Friction
   (c) Concurrent Force
   (d) Perfect Frame
   (e) Collinear Forces
   (f) Parallelogram laws of force

2. The figure shows a wooden girder consisting of   20
   seven members each of 3m length freely supported
   at its free and points
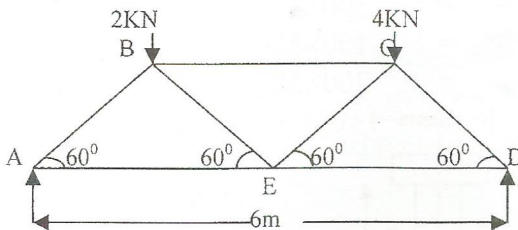
The girder is loaded at B and C as shown. Find the
forces in each members of the girder, indicating
whether the force is compressive or tensile.

P.T.O.

(2)

3. A ladder 5m long rests on a horizontal ground and   20
leans against a smooth vertical wall at an angle 70^0
with the horizontal. The weight of the ladder is 900N
and acts at the middle. The ladder is at the point of
sliding, when a man weighting 750N stands on a rung
1.5m from the bottom of the ladder. Calculate the
co-efficient of friction between ladder and floor.

Or,

The body resting on a rough horizontal plane, required   20
a pull of 180N inclined at 30^0 to the plane just to move
it. It was found that a push of 220N inclined at 30^0
to the plane just moved the body. Determine the weight
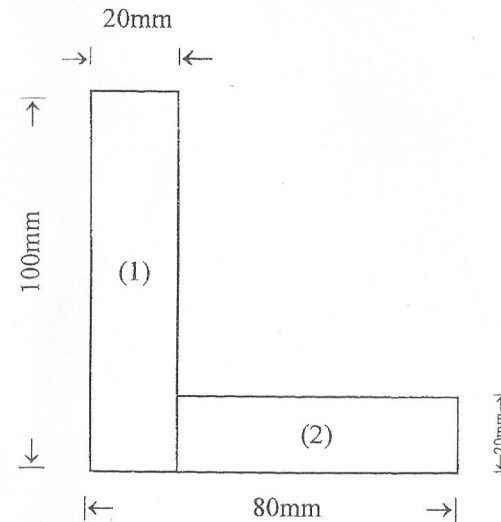of the body and co-efficient of friction.

4. (a) Write down the effects of a force and   5+15=20
characteristics of a force.
   (b) Find the magnitude of the two forces, such that
they act right angles, their resultant is $\sqrt{10}N$.
But if they act at 60^0, their resultant is $\sqrt{13}N$

5. An I section has the following dimensions in mm units.   20
   Bottom Flange =   300×100
   Top Flange   =   150×50
   Web   =   300×50
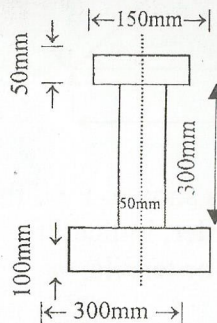
Determine mathematically the position of centre of gravity of
the section.

(3)

Or,

Find the Moment of Inertia about centroid X-X and Y-Y axes
of the angle section shown in the figure.