

**SEM 1 – 3 (RC07 – 08)**

**F.E. (Semester – I) (Revised in 2007 – 08) Examination, May/June 2017**  
**BASIC CIVIL ENGG. & ENGG. MECHANICS**

Duration : 3 Hours

Max. Marks : 100

- Instructions :** 1) Attempt one question from each Module and totally five questions.  
2) Assume any data, if required and state them clearly.

**MODULE – I**

1. a) Explain the scope of the following in civil engineering. 10

- i) Transportation Engineering
- ii) Geo- Technical Engineering.

b) Write short notes on (any 2) : 10

- i) Use of Aluminium as a building material.
- ii) Components of road.
- iii) Types of steel sections.

2. a) Explain various components of a super-structure of a building. 5

b) Give classification of bridges. Describe any two types of bridges with neat sketches. 10

c) Differentiate between the load bearing structure and framed structure. 5



## MODULE - II

3. a) Determine the magnitude and direction of the minimum force (P) required to just start the roller over the block. The roller diameter is 600 mm and self weight is 5 KN.

10

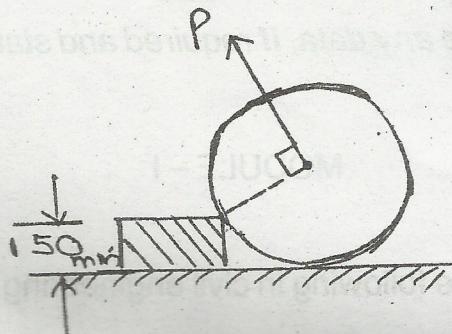


Fig. Q.No. 3 (a)

- b) Determine the value of angle "α" for which
- The tension in the string BC is minimum and corresponding tension.
  - The tensions in cables AC and BC are equal and corresponding tension.

10

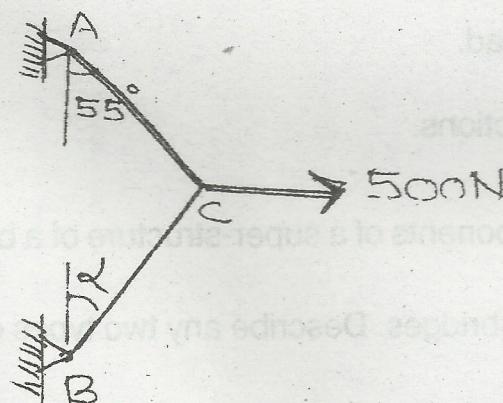


Fig. Q.No. 3 (b)

4. a) Determine the support reactions for the beam shown.

8

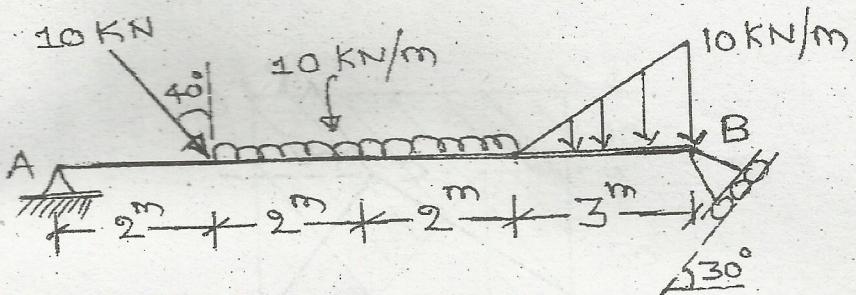


Fig. Q.No. 4. (a)

- b) Determine the magnitude of the resultant of the given force system and locate its position with respect to corner "A".

8

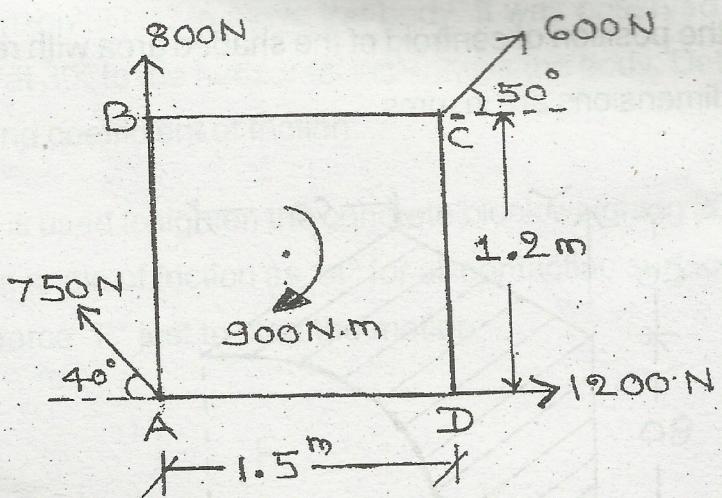


Fig. Q.No. 4. (b)



- c) Determine the value of the force (P) if the maximum permissible forces in the member AC and BC are 12 KN and 8 KN respectively.

4

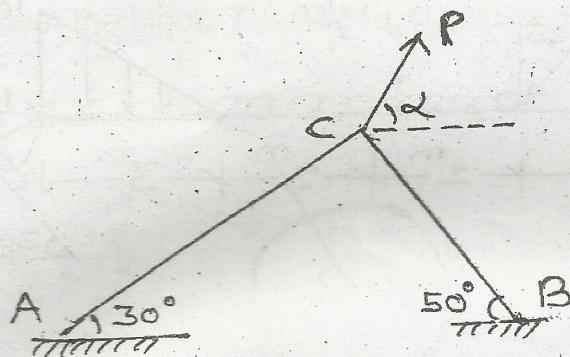


Fig. Q.No. 4. (c)

## MODULE – III

5. a) Determine the position of centroid of the shaded area with respect to axes shown. All dimensions are in mms.

8

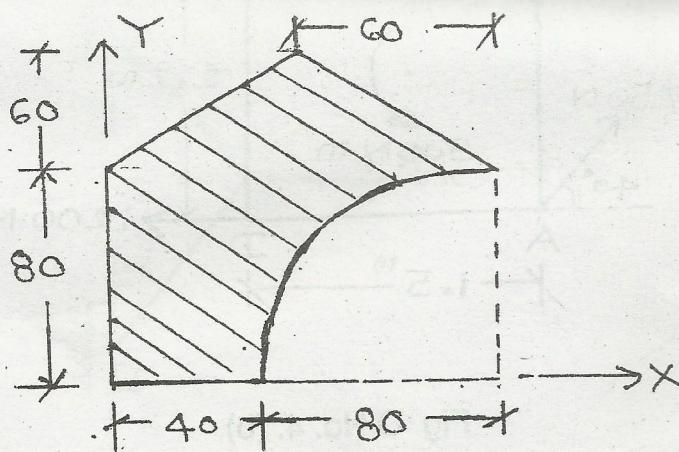


Fig. Q.No. 5 a)

- b) Determine moment of inertia of the plane figure shown about both the centroidal axes. Also determine polar moment of inertia about corner "A". All the dimensions are in mms.

12

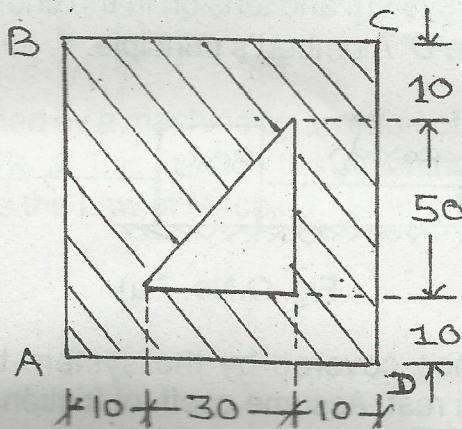


Fig. Q.No. 5 b)

6. a) A body resting on a rough horizontal plane requires a pull of 18 KN acting at  $30^\circ$  to the horizontal just to move the body. It was observed that a push of 22 KN acting at  $30^\circ$  to the horizontal just moves the body. Determine weight of the body and coefficient of friction.

8

- b) A  $15^\circ$  wedge is used to tighten the concrete block weighing 20 KN as shown. Assuming the angle of friction as  $14^\circ$  for all contacting surfaces, determine the value of force "P" just to start the motion.

12

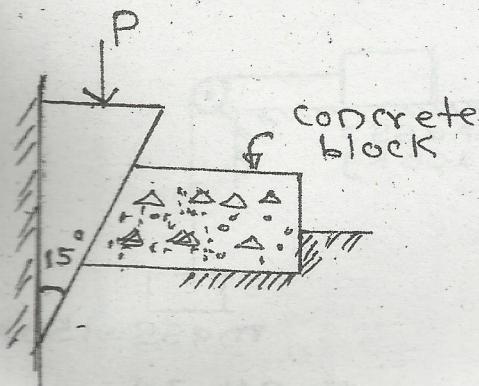


Fig. Q.No. 6 (b)



## MODULE – IV

7. Solve any two of the following :

- a) Two masses of 80 kg and 20 kg are connected by a cord as shown. Determine the acceleration of the system and tension in the chord. Assume coeff. of friction =  $\mu = 0.30$ . Use D' Alembert's principle.

10

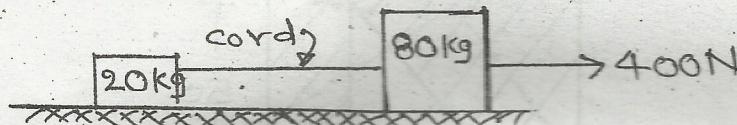


Fig. Q.No. 7 a)

- b) Determine the distance covered by the system to attain a velocity of 30 m/sec starting from rest. Assume coeff. of friction =  $\mu = 0.20$  for all the contacting surfaces. Use "Work Energy" method.

10

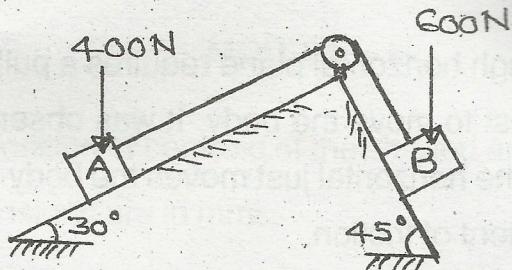


Fig. Q.No. 7 b)

- c) Determine the time required for the system shown to attain a velocity of 5 m/sec starting from rest. What is magnitude of tension in the string ? Determine the distance covered by the system in that period. Assume coeff. of friction  $\mu = 0.20$ . Use "Impulse Momentum" equation.

10

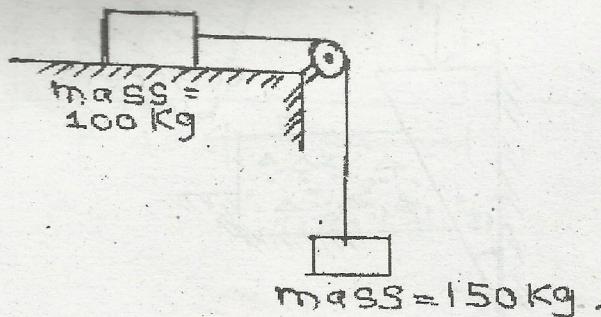


Fig. Q.No. 7 c)

8. a) In a differential wheel and axle, the wheel has diameter of 180 mm and the diameters of axles are 90 mm and 70 mm resp. An effort of 38 N lifted a load of 420 N. Find 10
- i) Mechanical advantage, velocity ratio and efficiency.
  - ii) The effort lost in friction at a load of 600 N if efficiency at this load is 60%.
  - iii) Law of machine.
- b) Determine the load lifted by a machine by an effort of 12 N if velocity ratio = 18 and efficiency is 60% at this load. If the machine has constant frictional resistance, determine the Law of Machine. What is the effort required to lift a load of 90 N ? 10
-