SEM – 1-3 (RC 07-08)

F.E. (Semester – I) (RC) Examination, Nov./Dec. 2015
BASIC CIVIL ENGINEERING AND ENGINEERING MECHANICS

Duration : 3 Hours

Total Marks : 100

Instructions : *1) Attempt **any five** questions choosing at least **one** question from **each** Module.*

2) Make suitable assumptions if necessary and state them clearly.

MODULE – I

1. a) With neat sketches explain the different components of loads and their functions. **8**

   b) What is SCC ? State its advantages and limitation. **6**

   c) Write a note on : **(3×2=6)**

      1) Components of buildings

      2) Aluminium as building material.

2. a) Explain the importance of the following in civil engineering. **(3×2=6)**

      1) Construction technology

      2) Hydraulics.

   b) Write a short note on : **(3×2=6)**

      1) Properties of hardened concrete

      2) Work ability.

   c) What is FRP and also write in brief the usage as a building material. **8**

P.T.O.

MODULE – II

3. a) Two cylinders P and Q weighing 10 kN each and radius 500 mm are placed as shown fig. 1. Assuming smooth surface find out reaction at all points of contacts. **10**

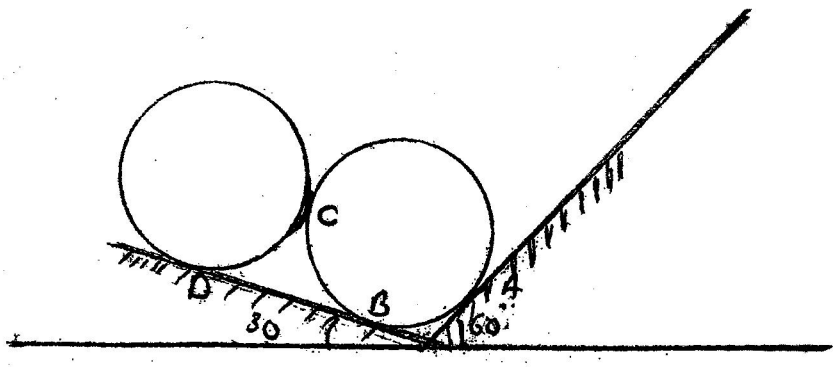

Fig. 1

b) Replace the given force into a single force and a moment acting at A Refer fig. 2 **10**

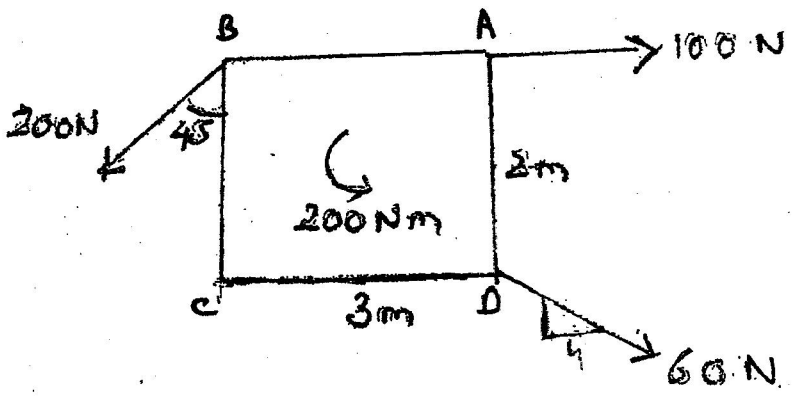

Fig. 2

4. a) Determine the support reaction for the beam as shown in fig. 3. **10**

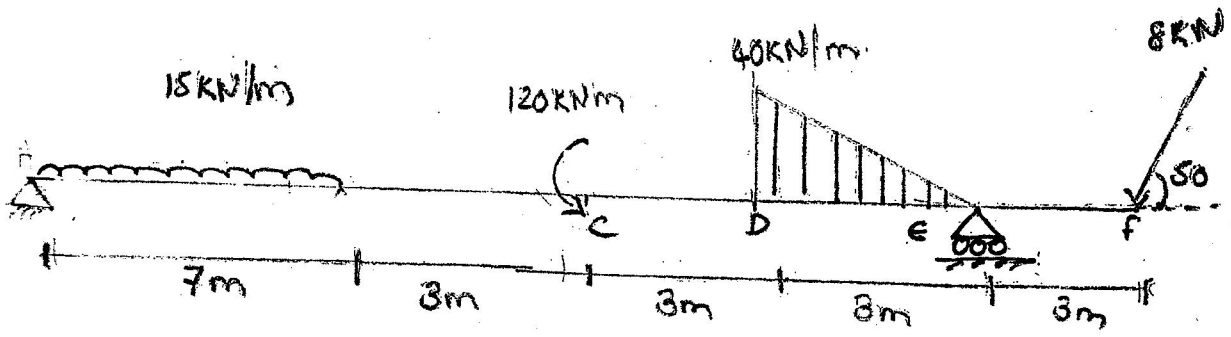

Fig. 3

b) Determine the tension in the strings AC and BC when a force of 50 kN is applied at C as shown in fig. 4. **5**

AB = 100 mm

AC = 60 mm

BC = 80 mm

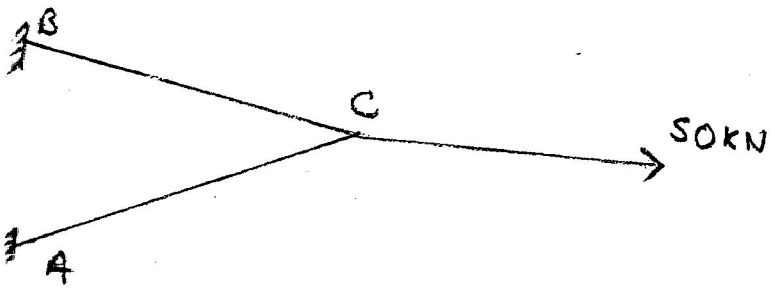

Fig. 4

c) Find the tension in the string and reaction from the wall. The weight of sphere is 100 N. Refer fig. 5 **5**

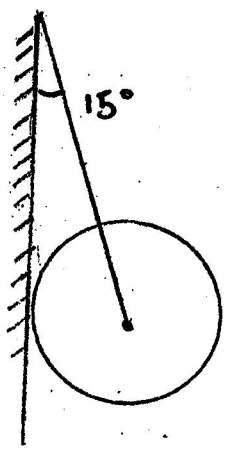

Fig. 5

MODULE – III

5. a) Determine moment of inertia of section about axis AB. Refer fig. 6. **10**

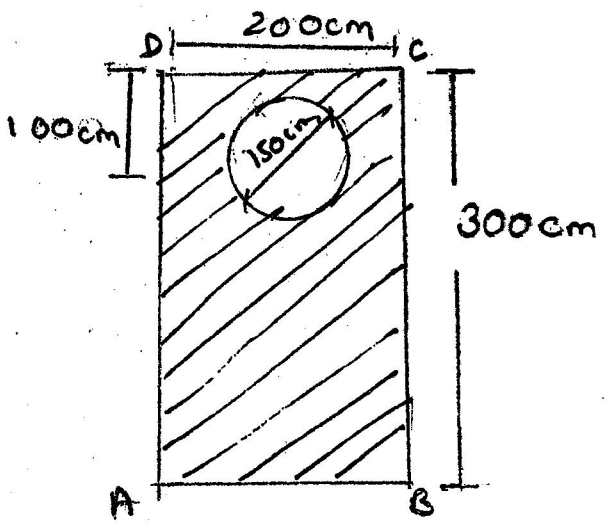

Fig. 6

b) Determine centroid of shaded area with respect to given x and y axis as shown in fig. 7. **10**

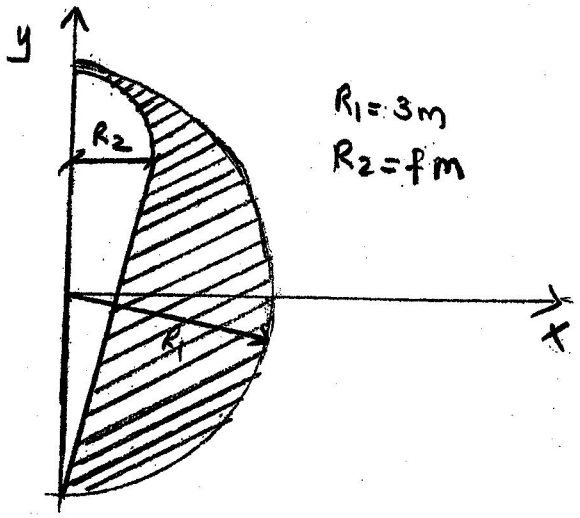

Fig. 7

6. a) Two identical blocks of weight "W" are supported by a rod as shown in fig. 8. If both the blocks are in limiting equilibrium, find coefficient of friction, assuming it to be same at floor as well as the wall. **10**

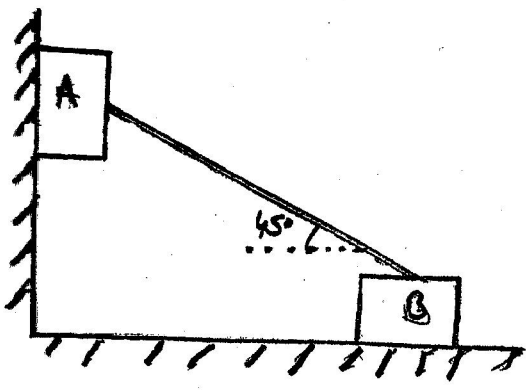

Fig. 8

b) Neglecting the weight of the wedge, determine the magnitude of the force P required to raise the 50 kN weight, take $\mu = 0.3$ for all the surfaces. Refer fig. 9 **10**

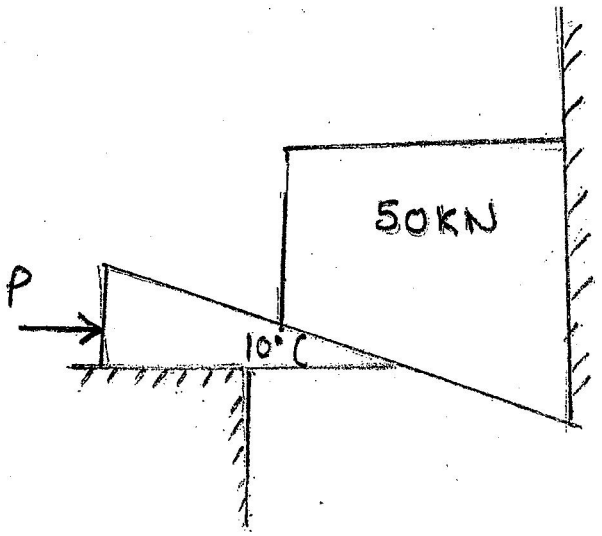

Fig. 9

MODULE – IV

7. a) Determine the time required for the weights shown in the fig. 10 to attain a velocity of 10 m/sec. What is the tension in the chord, take $\mu = 0.2$. Use impulse momentum method. **10**

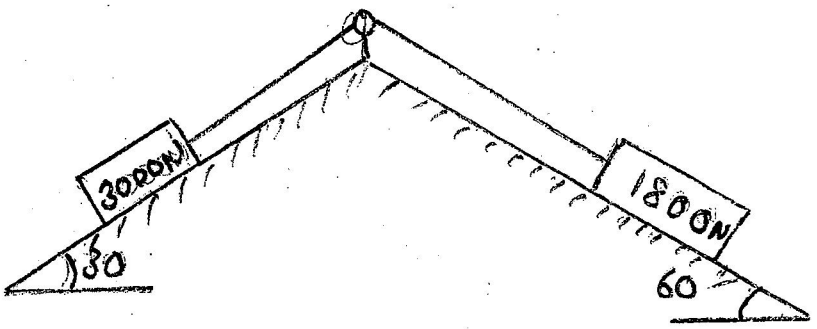

Fig. 10

b) A motorist travelling at a speed of 80 kmph suddenly applies brakes and halts after skidding 60 m. determine the time required to stop the car, and the coefficient of function between the tyers and the road use D'Alemberts principle. **10**

8. a) In a simple machine whose velocity ratio is 30 a load of 2800 N is lifted by an effort of 160 N and a load of 3200 N is lifted by an effort of 200 N find the law of machine and calculate the load that could be lifted by a force of 200 N. Calculate also

   i) The amount of effort wasted in overcoming the function.

   ii) Mechanical advantage.

   iii) Efficiency. **10**

   b) With a neat sketch explain wheel and differential axel and also derive equation for velocity ratio. **10**