

SEM 1 – 3 (RC 07-08)

F.E. (Sem. – I) (RC) Examination, May/June 2016
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) Write a short note on : (3×3=9)
- 1) Structural Engineering
 - 2) Environmental Engineering
 - 3) Surveying.
- b) What is FRP and also write in brief the usage as building material. 6
- c) With a neat sketch, distinguish between load bearing and framed structure. 5
2. a) With neat sketches explain the different components of super structure. 5
- b) With neat sketches state the different components of roads and their functions. 5
- c) Give the general classification of bridges. Draw a neat sketch of suspension bridge and label its components. 10

MODULE – II

3. a) Determine the support reaction for the beam shown in fig 1. 10

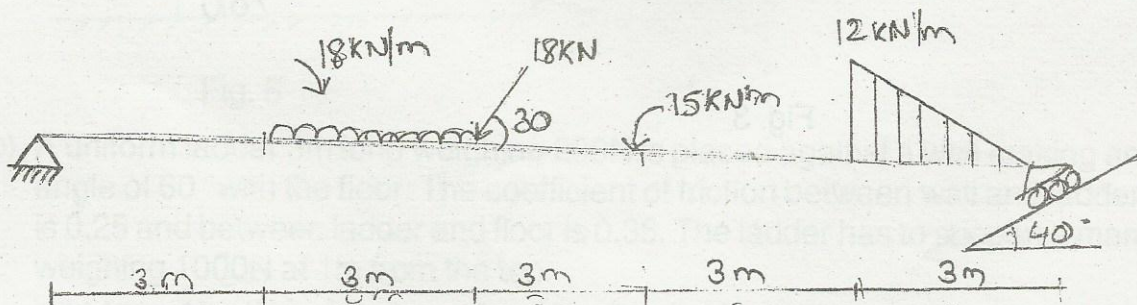


Fig. 1



- b) Five coplanar forces are acting on a triangular plate as shown. Determine the resultant locate its position from A. Refer fig. 2

10

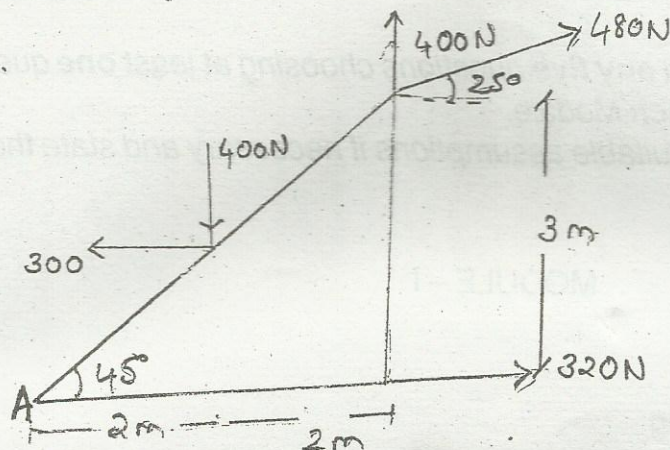


Fig. 2

4. a) Replace the given force system into a single force and a moment at A. Refer fig 3.

10

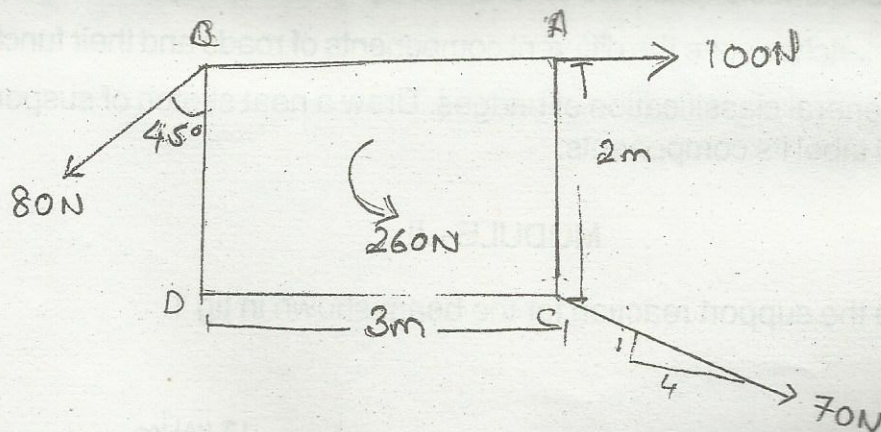


Fig. 3



- b) Two smooth spheres each weighing 100N and radius 250mm are in equilibrium in a channel section as shown in fig. 4. Find the reaction at all contacting points A, B, C and D assuming all the surfaces to be smooth.

10

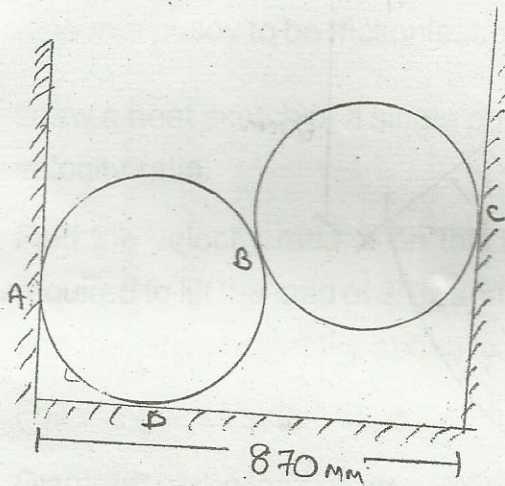


Fig. 4

MODULE – III

5. a) Determine the minimum force required to move the wedge shown in the fig. 5. The coefficient of friction is 0.25 for all contact surfaces.

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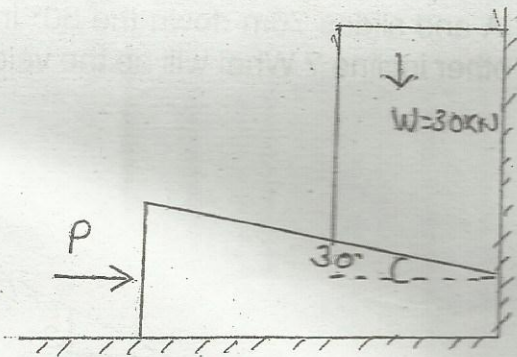


Fig. 5

- b) A uniform ladder 3m long weighing 200N is placed against a wall making an angle of 60° with the floor. The coefficient of friction between wall and ladder is 0.25 and between ladder and floor is 0.35. The ladder has to support a man weighing 1000N at 1m from the top.

What must be the minimum value of horizontal force 'P' applied at floor level to prevent slipping ?

10



6. Find the moment of inertia of the shaded area about x-x axis as shown in fig 6. 20

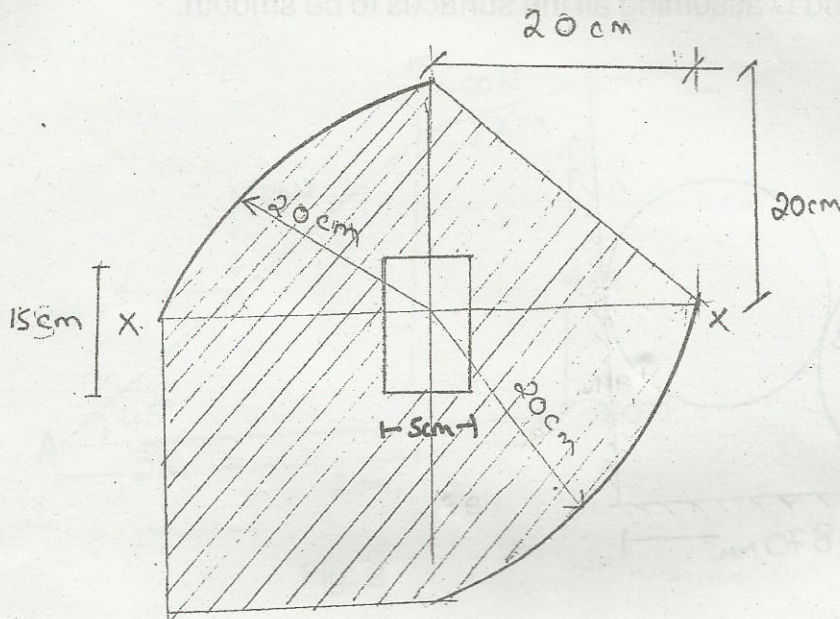


Fig. 6

MODULE - IV

7. a) A 800N body moves along two inclines for which the coefficient of friction is 0.2. If the body starts from rest at A and slides 70m down the 30° incline, how far will it then move along the other incline? What will be the velocity when it returns to B? Refer fig. 7.

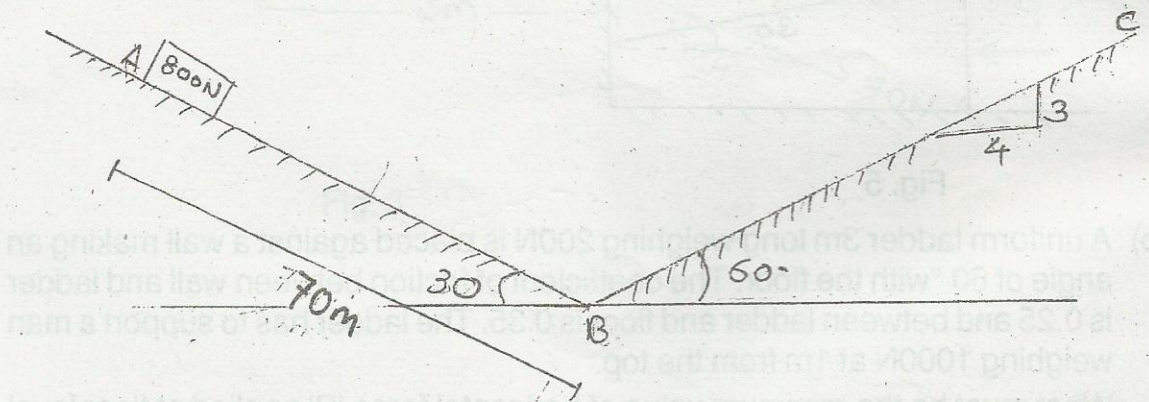


Fig. 7



b) Determine the time required for the system to attain a velocity of 5m/sec starting from rest. What is the tension in the string ? How much distance will be covered by the system in that period ? Assume coeff. of friction $\mu = 0.20$ (assume pulley to be frictionless). Use impulse momentum equation. 8

8. a) Draw a neat sketch of a single purchase crab and derive an expression for velocity ratio. 8

b) Find the velocity ratio, if on this machine an effort of 100N and 160N are required to lift the load of 3KN and 9KN respectively. Find the law of machine and the efficiency at the above loads.

Following are the specification of a single purchase crab

Diameter of the load drum = 200mm

Length of level arm = 1.2m

Number of teeth on pinions = 10

Number of teeth on spur wheel = 100

12