SEM 1 – 3 (RC 07-08)

F.E. (Semester – I) (RC) (2007-08) Examination, Nov./Dec. 2018
BASIC CIVIL ENGINEERING AND ENGINEERING MECHANICS

Duration : 3 Hours | Max. Marks : 100

Instructions : *1) Answer **any 5** question, minimum **one** question from **each** Module.*
*2) Assume additional data **if** required and state them **clearly**.*
*3) Draw **neat** sketches **wherever** necessary.*

MODULE – I

1. a) Explain the importance of the following. **10**
   i) Water Resources and Irrigation Engineering.
   ii) Transportation Engineering.

   b) Write a note on : **6**
   i) Aluminium as a building material
   ii) FRP in construction.

   c) Explain the properties of hardened concrete. **4**

2. a) State the general classification of bridges. Draw a sketch of suspension bridge and label its components. **10**

   b) Explain what are the various components of a super structure of a building. **5**

   c) Write a note on Grade of concrete. **5**

MODULE – II

3. a) Determine the inclination of the wire CD ? Wires are fixed at point A and D. AB is inclined at 30° and BC is inclined at 50°. The wires carry a load of 20 KN and 30 KN at point B and C respectively. **10**

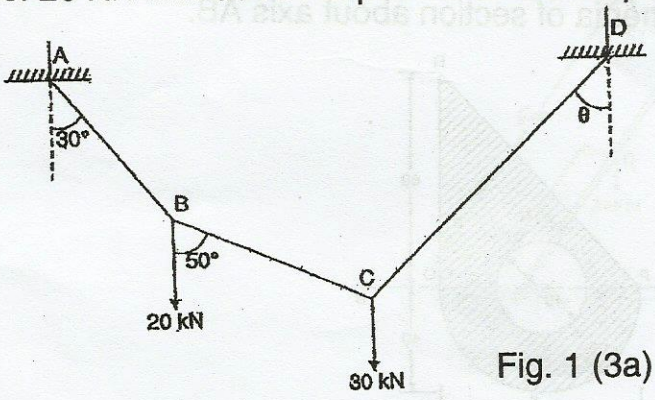

Fig. 1 (3a)

P.T.O.

b) Two cylinders weighing 600 N cylinder is supported in a frame. Determine the reaction developed at contact surfaces A, B, C and D. **10**

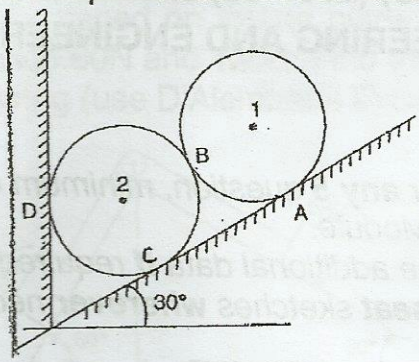

Fig. 2 (3b)

4. a) Find the resultant of the force system acting on a lamina of equilateral triangular shape. **10**

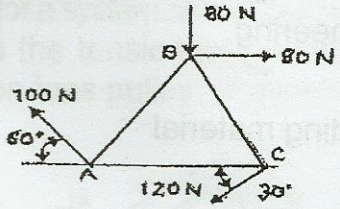

Fig. 3 (4a)

b) Determine the reaction of the beam. **10**

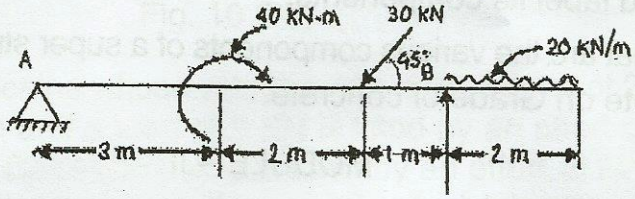

Fig. 4 (4b)

MODULE – III

5. a) Determine the moment of inertia of section about axis AB. **12**

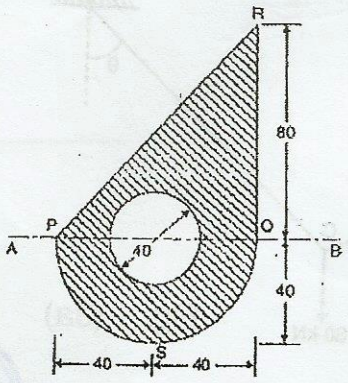

Fig. 5 (5a)

b) Find the position of the centroid of the shaded area shown. All dimensions are in mm. **8**

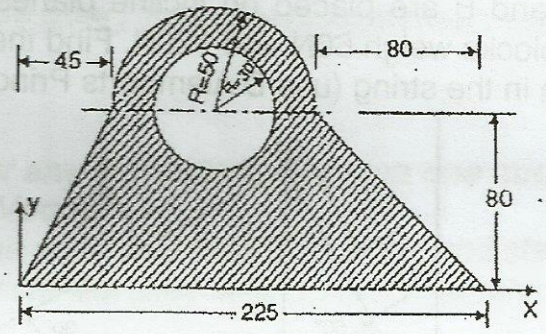

Fig. 6 (5b)

6. a) Two identical blocks of weight W are supported by a rod as shown in the fig. below. If both the blocks are in limiting equilibrium, find co-efficient of friction, assuming it to be same at floor as well as the wall. If sliding impends when $\Theta = 45°$. **10**

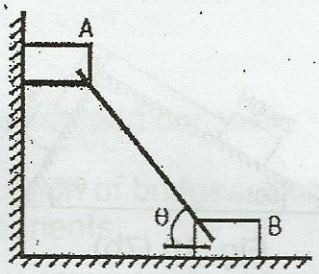

Fig. 7 (6a)

b) Determine the least value of α which the ladder may be placed at without slipping, the ladder is carrying a vertical weight of 900 N at a distance of 1m from the wall ? The coefficient of friction is 0.4 between the ladder and the wall and 0.3 between ladder and the floor. **10**

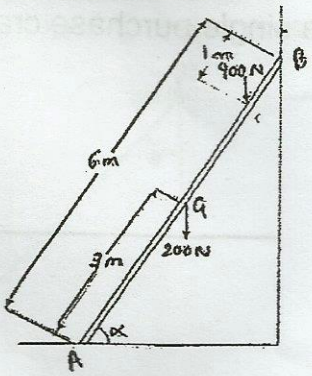

Fig. 8 (6b)

MODULE – IV

7. a) Two blocks A and B are placed on incline planes at 30° and 60° to the horizontal the blocks weigh 60N and 120N. Find the resulting acceleration and the tension in the string (use D'Alemberts Principle). **10**

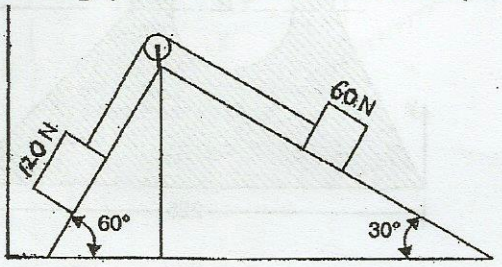

Fig. 9 (7a)

b) Determine the time required for a system shown below to attain a velocity of 9.81 m/s starting from rest. What is the tension in the string ? Assume coefficient of friction $\mu = 0.20$ and friction less pulley. Use impulse Momentum equation. **10**

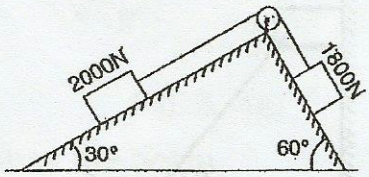

Fig. 10 (7b)

8. a) In a simple lifting machine whose velocity ratio is 30. A load of 2.4KN is lifted by an effort of 150 n and a load of 3 KN is lifted by an effort of 180N. Find the law of machine. Calculate the load lifted by an effort of 200N. Also find out the amount of effort lost in Friction, mechanical Advantage and efficiency. **10**

b) Draw a neat sketch of a single purchase crab and derive an expression for velocity ratio. **10**