UITians

ECS-185

B.E. (IInd Sem.) (CGPA) (Civil Engg.) Exam.-2013

ENGINEERING MECHANICS

Paper - CE-204

Time Allowed : Three Hours
Maximum Marks : 60

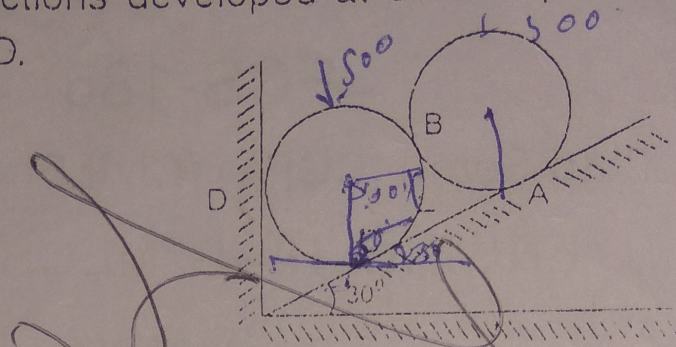Note : All questions are compulsory. Internal choice are mentioned with questions.

Q.I   Fill in the blanks—   2 each
   (a) Lami's theorem is applicable if a body is in equilibrium under the action of *three* number of forces.
   (b) The centre of gravity of a sphere lies at the ...... of the sphere.
   (c) The bending moment of a cantilever beam of length L and carrying a v.d.l. of w per unit length is .... at the free end.
   (d) Semi central angle in cone of friction is equal to ......
   (e) Coefficient of restitution is the ratio of ....
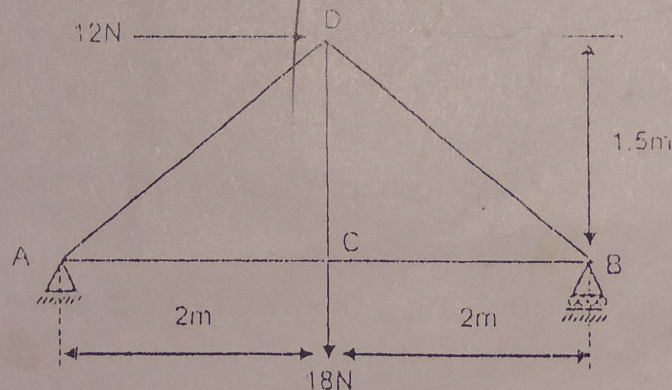
Q.II   (a) Explain Lami's theorem.   2

(b) Two identical cylinders each weighing 500 N are placed in a trough as shown in figure. Determine the reactions developed at contact points A, B, C and D.
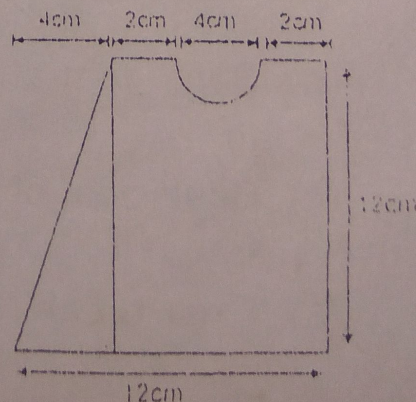

or

(a) Explain Varignon's theorem. 3

(b) Find the forces in different members of truss as shown in figure. 7

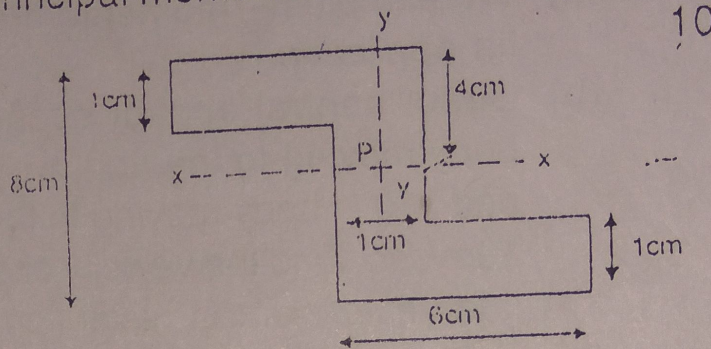Q.III Determine the moment of inertia of the plane area as shown in figure about its centroidal axis.

or

Find the product of inertia of the symmetrical z section as shown in figure with respect to x and y axes. Calculate the location of the principal axes and the values of the principal moment of inertia of the section about point P.   10

Q.IV (a) What is meant by gear train ? Name the different type of gear train and state where each is use. 5

(b) A simple gear train consists of two gears only each gear mounted on separate parallel shafts. The number of teeth on the driving and driven gears are 28 and 70 respectively if the driving gears turns 1200 revolution per minute. Determine — 5

(i) Speed ratio and train value of the gear train

(ii) Speed of driven gear

or

A block weighing 500 N just starts moving down a rough inclined plane when supported by a force of 200 N acting parallel to the plane in upward direction. The same block is on the verge of moving up the plane when pulled by a force of 300N acting parallel to the plane. Find the inclination of the plane and coefficient of friction between the inclined plane and the block. 10

Q.V (a) Explain D - Alembert's principle.   3
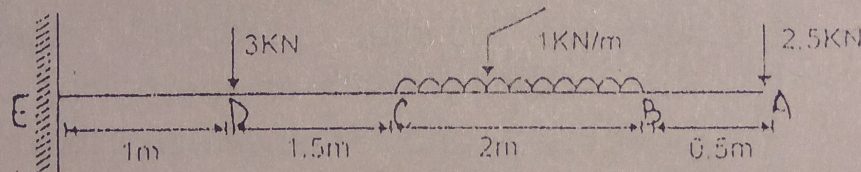
(b) A train weighing 5000N starts from rest and

accelerates uniformly to 75 km/hr in 40 seconds. If the frictional resistance is estimated to 3 KN per 1000 KN of weight of trains, work out the maximum power required and power required to maintain the speed of 75 Km./hr.   7

or

(a) Write impluse- momentum equation and mention its application.   3

(b) Direct central impact occurs between a 300 N body moving to the right with a velocity of 6m/sec and 150 N body moving to the left with a velocity of 10m/sec. Find the velocity of each body after impact if the coefficient of restitution is 0.8.   7

Q.VI   (a) Draw the SF and B.M. diagram for a cantilever of length L carrying a point load w at the free end. 3

(b) Draw Shear force and Bending moment diagram for the beam loaded as shown in figure.   7

or

Draw the Shear force and Bending moment diagram for the beam loaded as shown in figure. Find the value of maximum bending moment and the point at which it occurs.   10