I B. Tech I Semester Supplementary Examinations, November - 2020
ENGINEERING MECHANICS
(Com. to CE,ME,CSE,PCE,IT,Chem E, Aero E, AME, Min E, PE, Metal E, Textile Engg)

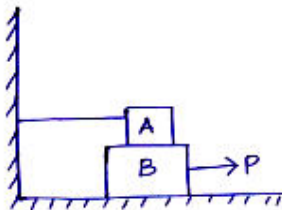Time: 3 hours   Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

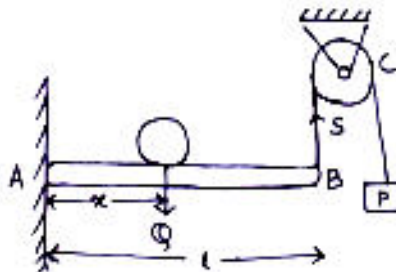1. a) Define Coulomb's law of dry friction.   (3M)

    b) Write the equilibrium equations for spatial systems.   (4M)

    c) Explain Pappu's second theorem.   (3M)

    d) Give the expression for the mass moment of inertia of a cone.   (4M)

    e) What is a general plane motion? Give some examples.   (4M)

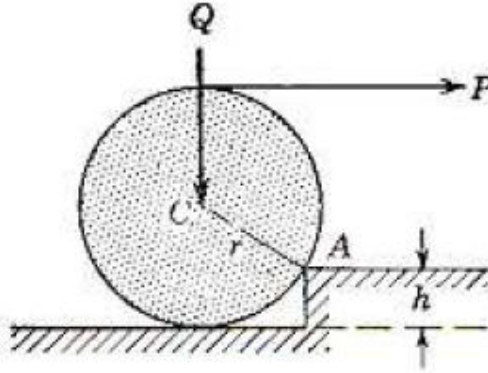   f) Explain Impulse momentum method.   (4M)

PART –B

2.   Block A weighing 1000N rests over block B which weighs 2000N as shown in   (16M)
        figure. Block A is tied to wall with a horizontal string. If the coefficient of friction
        between blocks A and B is 0.25 and between B and floor is 1/3, what should be
        the value of P to move the block (B), if
        (a) P is horizontal.
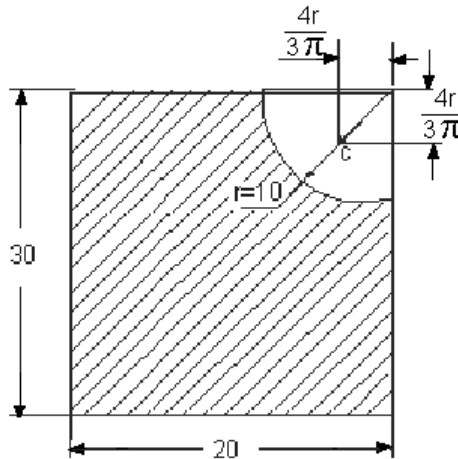   (b) P acts at 30° upwards to horizontal.

3. a) The beam AB in figure is hinged at A and supported at B by a vertical cord which   (8M)
        passes over a frictionless pulley at C and carries at its end a load P. Determine the
        distance x from A at which a load Q must be placed on the beam if it is to remain
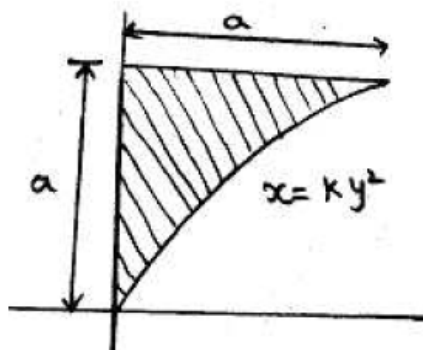   in equilibrium in a horizontal position. Neglect the weight of the beam.

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b) A roller of radius r = 0.3 m and weight Q = 2000 N is to be pulled over a curb of (8M) height h = 0.15 m.by a horizontal force P applied to the end of a string wound around the circumference of the roller. Find the magnitude of Prequired to start the roller over the curb. As shown in the Figure below
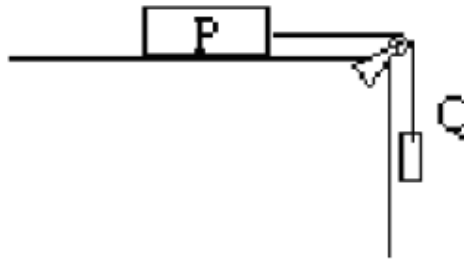

4. a) From the first principle find the centroid of a right angle triangle of height h (8M) and breadth b.

b) Find the centroid of the area shown in figure below. All dimensions are in cm. (8M)

5. a) Calculate the moment of inertia of the shaded area about the x – axis (8M)

b) Find out the mass moment of inertia of a right circular cone of base radius Rand mass M about the axis of the cone. (8M)

6. a) A particle under a constant deceleration is moving in a straight line and covers a distance of 20 m in first two seconds and 40 m in the next 5 seconds. Calculate the distance it covers in the subsequent 3 seconds and the total distance covered, before it comes to rest. (8M)

b) Find the acceleration of the moving loads as shown in figure below. Take mass of P=120 kg and that of Q=80 Kg and coefficient of friction between surfaces of contact is 0.3. Also find the tension in the connecting string. (8M)

7. a) An automobile moving with a uniform velocity of 40Kmph is accelerated by increasing the traction force by 20%. If the resistance to motion is constant, find the distance traveled before it acquires 50Kmph.Use work-energy method. (8M)

b) A solid cylinder and a sphere are started top of an inclined plane, at the same time, and both roll without slipping down the plane. If, when the sphere reaches the bottom of incline, the cylinder is 12m, what is the total length 'S' of the incline? (8M)