Code : R7100105

R07

B.Tech I YEAR(R07) Supplementary Examinations, May/June 2010
APPLIED MECHANICS)
(Civil Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE questions
All questions carry equal marks
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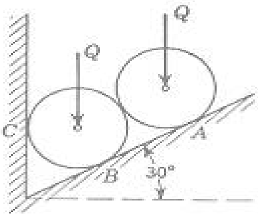
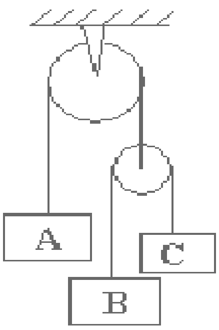
1. (a) Define free body diagram, Transmissibility of a force and resultant of a force.
   (b) Two identical rollers, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in Figure. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C.




2. (a) Explain the types of friction with examples.
   (b) Two equal bodies A and B of weight 'W' each are placed on a rough inclined plane. The bodies are connected by a light string. If $\mu_A = 1/2$ and $\mu_B = 1/3$, show that the bodies will be both on the point of motion when the plane is inclined at $\tan^{-1}$ (5/12).
3. (a) Distinguish between initial tension and centrifugal tension in a belt.
   (b) An open belt of width 80 mm connects a pulley of diameter 600 mm on the secondary shaft to a pulley of diameter 400 mm on the machine shaft. The shafts are three meters apart. The secondary shaft has a speed of 100 r.p.m. Find the maximum permissible stress in the belt if the safe working tension is 15 N/mm width and $\mu = 0.3$.
4. (a) From the first principles determine product of inertia for right angle triangle of base ' b' and altitude ' h'.
   (b) State and prove transfer formula for product of inertia.
5. (a) Define mass moment of inertia and explain Transfer formula for mass moment of inertia.
   (b) Derive the expression for the moment of inertia of a homogeneous sphere of radius 'r' and mass density 'w' with reference to its diameter.
6. A ladder AB of 3m length remains in contact with the vertical wall and horizontal floor and the angle of inclination of the ladder with horizontal is $60^0$. The ladder moves such that its ends remain in contact with the vertical wall at B and horizontal floor at A. If the end A moves with a linear velocity of 0.1m/s, find the velocity of its upper end B. If the linear acceleration of the end A is $0.05m/s^2$ , find the acceleration of the end B and the resultant acceleration of the ladder AB.
7. If $W_a$:$W_b$:$W_c$ is in the ratio of 3:2:1 , find the accelerations of the blocks A, B, and C. Assume that the pulleys are weightless. {As shown in the Figure.




8. A weight of 10N attached to a spring oscillates at a frequency of 60 oscillations per minute. If the maximum amplitude is 30mm, find the tension induced in the spring. Also find the spring constant and the maximum velocity in the spring.

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