Applied Physics (NS1001)

Course Instructor(s):
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Section(s): BS-(CS, SE,AI,DS,Cyber security)

...g Sciences

0838

Sessional-II Exam

Total Time (Hrs): 1
Total Marks: 40
Total Questions: 2
Date: Nov 2, 2024

Roll No _____ Course Section _____

Student Signature _____

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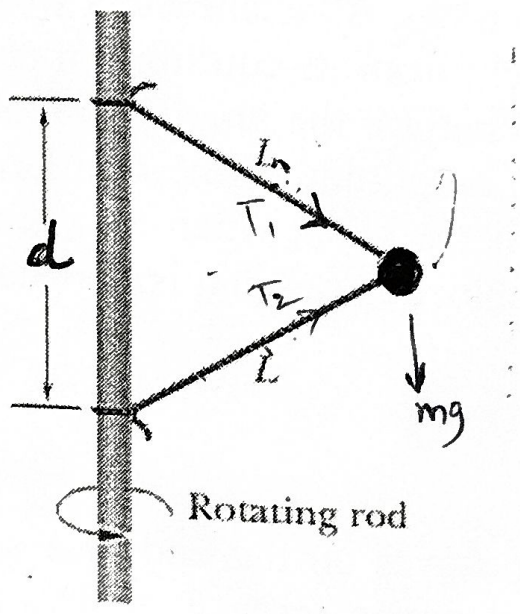
Attempt all the questions.

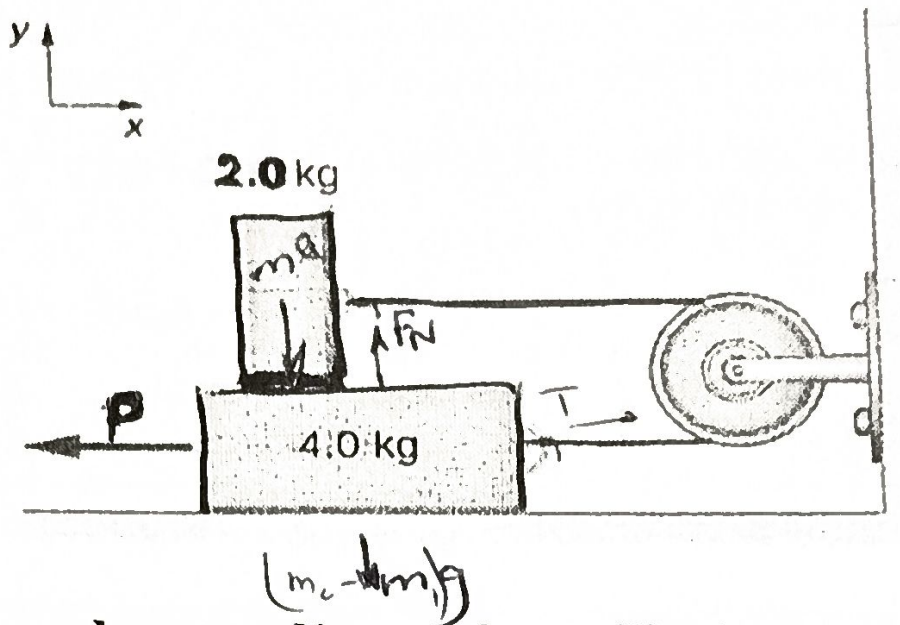
CLO:2 Use the Newtonian Mechanics having application in game programming along with simulations.

Question 1[10+10]

Q1. (i) In the figure given below, a 1.34kg ball is connected by means of two massless strings, each of length L=1.70m to a vertical rotating rod. The strings a... to the rod with separation d= 1.70m and are taut. The tension in the upper string is 35N. What is the (a) tension in the lower string (b) the magnitude of the net force on the ball and speed of the ba...?



Q1. (ii) The two blocks of figure are attached to each other by a massless string that is wrapped around a frictionless pulley. When the bottom 4 kg block is pulled to the left by the constant force **P**, the top 2 kg block slides across it to the right. Find the magnitude of the force necessary to move the blocks at constant speed. Assume that the coefficient of kinetic friction between all surfaces is 0.400. Free body diagram is mandatory.



CLO: 3 Use basic understanding of oscillations and waves graphically & mathematically.

Question 2[5+10+5]

Q2. (i) A 50.0-g object connected to a spring with a force constant of 35.0 N/m oscillates on a horizontal, frictionless surface with an amplitude of 4.00 cm. Find (a) the kinetic energy and (b) the potential energy when the position is 3.00 cm.

Q2. (ii) A block whose mass m is 680 g is fastened to a spring whose spring constant k is 65 N/m. The block is pulled a distance $x = 11$ cm from its equilibrium position at $x = 0$ on a frictionless surface and released from rest at $t = 0$. (a) What are the angular frequency, the frequency, and the period of the resulting motion? (b) What is the amplitude of the oscillation? (c) What is the maximum speed v_m of the oscillating block, and where is the block when it has this speed? (d) What is the magnitude a_m of the maximum acceleration of the block? (e) What is the phase constant ϕ for the motion?

Q2. (iii) A 50g hard-boiled egg moves on the end of a spring with force constant k = 25 N/m. its initial displacement is 0.3m. A damping force $F_x = -bv_x$ acts on the egg, and the amplitude of the motion decreases to 0.1 m in 5 sec. Calculate the magnitude of the damping constant b.