

St. ID: _____, Name: _____

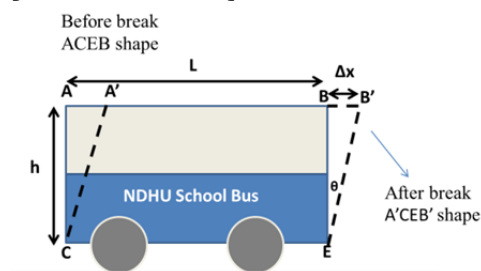
Chapter 11-13, Serway; ANY TYPES OF CHEATING WILL MAKE YOU FAIL!

Please write down the answers on the blank space or on the back of this paper. Answer should be in english. [] indicates the question points.

1. Suppose you are riding bicycle straightly to join the class from your dormitory and let your bicycle's wheels are not similar in radius, one is larger than other. If both wheels pass the distance $2\pi r$ per second, (a) Compare the angular momentum of both wheels. Let wheel's mass, $m_1=6$ kg, $m_2=1.5$ kg and radius $r_1=0.25$ m $r_2=0.50$ m respectively. Now if you need to take a turn to the left to enter in the physics department's cycle garage, (b) during your turn will there any torque be produced at the center of the wheels? (c) If yes, what will be the direction of the torque? Let the wheels are rotating across XY plane. [25+2+3=30]



2. (a) What are the dimension of "Stress" and "Strain"? Let a bus starts journey from central library with the speed 50 km/hr and suddenly driver pressed break strongly to avoid an accident in front of main gate. At that moment the upper part of the bus tilt toward the ahead, Δx cm with respect to the lower part. According to figure if the bus length $L=20$ m, $\Delta x = 30$ cm and $h = 3$ m, (b) find the Shear stress, Strain and Shear Modulus. Let the driver created the 600 N force during break in the horizontal direction. [10+10+10+10 = 40]



3. (a) Let NASA send a satellite of mass 3×10^5 kg to the earth orbit. If it revolves around earth at the altitude 3.0×10^8 m from the earth surface, find the gravitational potential of the satellite-earth system. (b) If a meteoroid starts falling towards the earth from the same altitude of satellite, calculate its acceleration due to earth's gravitation. Let the mass of earth $M = 5.97 \times 10^{24}$ kg, radius $R = 6.4 \times 10^6$ m and $G = 6.67 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$. [15+15=30]