DEPARTMENT OF MATHEMATICS AND PHYSICS
Visayas State University
Visca, Baybay City, Leyte PHILIPPINES
Email: information@vsu.edu.ph
Website: www.vsu.edu.ph

NAME: _____STUD. NO.: _____
CLASS TIME: _____SIGNATURE:_____

20 pts

Phys 31 **Online Quiz # 2**
March 20, 2020 9:00AM

*For those students who can submit online **on or before** the extended deadline @ 8:00AM March 21, 2020, choose only **One in Problem A, Two in Problem B, and One in Problem C,** (if you answered all, it's OK, I'll choose only your correct answers). Beyond 8:00AM or until resume of classes, **SOLVE ALL**. Your score are based on your answers. The lowest score can be obtain is 3pts out of 20pts.*

General Note:

- All solutions to be problem should be **HAND WRITTEN** and **STEP-BY STEP**.
- Use **band paper and black pen** for your solutions.
- Write your complete name, subject, class time, course/track, & affixed your signature on each of the solution papers.
- Use your own email account (with surname) in sending your solutions. Make sure files are properly attached.
- Send your solutions *to email: mfsacedon@gmail.com*

A. AVERAGE AND INSTANTANEOUS MECHANICAL POWER

Problem 1: An elevator has mass 700 kg, not including passengers. The elevator is designed to ascend, at constant speed, a vertical distance of 23 m (five floors) in 16.0 s, and it is driven by a motor that can provide up to 40 hp to the elevator. What is the maximum number of passengers that can ride in the elevator? Assume that an average passenger has mass 67 kg.

Problem 2. A 20.0-kg rock is sliding on a rough, horizontal surface at 8.00 m/s and eventually stops due to friction. The coefficient of kinetic friction between the rock and the surface is 0.200. What average power is produced by friction as the rock stops?

Problem 3 When its 85-kW (100-hp) engine is generating full power, a small single-engine airplane with mass 700 kg gains altitude at a rate of 2.5 m/s (150 m/min, or 500 ft/min^2). What fraction of the engine power is being used to make the airplane climb? (The remainder is used to overcome the effects of air resistance and of inefficiencies in the propeller and engine.)

B. IMPULSE-MOMENTUM THEOREM

Problem 4. Two vehicles are approaching an intersection. One is a 2700-kg pickup traveling at 15 m/s from east to west (the-x-direction), and the other is a 1600-kg sedan going from south

to north (the +*y*-direction) at 24 m/s. (a) Find the *x*- and *y*-components of the net momentum of this system. (b) What are the magnitude and direction of the net momentum?

Problem 5. One 110-kg football lineman is running to the right at 3 m/s while another 130-kg lineman is running directly toward him at 2.70 m/s. What are (a) the magnitude and direction of the net momentum of these two athletes, and (b) their total kinetic energy?

Problem 6. A 0.045-kg golf ball initially at rest is given a speed of 25 m/s when a club strikes it. If the club and ball are in contact for 3.00 ms, what average force acts on the ball? Is the effect of the ball's weight during the time of contact significant? Why or why not?

Problem 7. A bat strikes a 0.155-kg baseball. Just before impact, the ball is traveling horizontally to the right at 42 m/s; when it leaves the bat, the ball is traveling to the left at an angle of 30^{o} above horizontal with a speed of 53 m/s. If the ball and bat are in contact for 1.75 ms, find the horizontal and vertical components of the average force on the ball.

C. LAW OF CONSERVCATION OF MECHANICAL ENERGY

Problem 8. Two figure skaters, one weighing 675 N and the other 735 N, push off against each other on frictionless ice. (a) If the heavier skater travels at 1.80 m/s, how fast will the lighter one travel? (b) How much kinetic energy is "created" during the skaters' maneuver, and where does this energy come from?

Problem 9. On a frictionless, horizontal air table, puck *A* (with mass 0.320 kg) is moving toward puck *B* (with mass 0.450 kg), which is initially at rest. After the collision, puck *A* has a velocity of 0.130 m/s to the left, and puck *B* has a velocity of 0.730 m/s to the right. (a) What was the speed of puck *A* before the collision? (b) Calculate the change in the total kinetic energy of the system that occurs during the collision.

Problem 10. Two identical 1.0-kg masses are pressed against opposite ends of a light spring of force constant 1.85 N/cm, compressing the spring by 22 cm from its normal length. Find the speed of each mass when it has moved free of the spring on a frictionless, horizontal table.

---------- G O D B L E S S YOU ----------