Physics 1 (PHY105)
Final Exam.

Second Semester, Term 132
Date: Monday 02/06/2014

PRINCE SULTAN UNIVERSITY
جامعة الأمير سلطان

Name:	
ID number:	
Section number or time:	
Instructor's name:	

Important instructions:

1. Examination time: 2 hours.
2. Write your name now before starting with the questions.
3. Switch off your mobile phone and put any books and notes away.
4. Check that you have 8 pages in total, including this cover page and a scratch paper.
5. You may use a calculator but you may *not* borrow one.

Good Luck!

Mark

Part 1: 11 multiple choice questions, 1 points each.

Circle the letter of the most correct answer using a pen. **Use $g = 9.80$ m/s².**

Q (1)

Consider following Physical quantities, which one is a vector?

A) Speed.   B) Time.   C) Weight.   D) Power.

Q(2)

Which one of the following is the basic unit in SI system?

A) N   B) m/s²   C) s   D) m³

Q(3)

A stone is thrown straight upward. When it reaches its highest point then,

A) Both its velocity and acceleration are zero.
B) Its velocity is zero but its acceleration is not zero.
C) Its velocity is not zero but its acceleration is zero.
D) Neither its velocity nor its acceleration is zero.

Q(4)

Elastic collision of two billiard balls means,

A) Only the momentum of balls is conserved. B) Only the kinetic energy of balls is conserved

C) Both kinetic energy and momentum of balls is conserved. D) None of the above is correct.

Q(5)

In a conservative force of field like gravity.

A) Work done along a closed path is zero. B) Work done along a closed path is not zero.

C) Work done depends on the shape of the path. D) None of these.

Q(6)

A ball is dropped from 4.9 m above the ground. How long does it take for the ball to reach ground?

A) 10 seconds.   B) 4.9 seconds.   C) 1 second.   D) 0.1 second.

Q(7)
A mass of 200 kg slides down a frictionless incline plane inclined at an angle of 30°. Its acceleration is,

A) 3.0 m/s².   B) 4.9 m/s².   C) 9.8 m/s².   D) 8.49 m/s².

Q(8)

The apparent weight of a 70 kg man in an elevator with a downward acceleration of 3.8 m/s^2 is,

    A) 266 N   B) 420 N   C) 686 N   D) 952 N.

Q(9)

A player stops a ball of mass 0.25 kg moving at 20 m/s. The work done by player is,

    A) 320 J.   B) 200 J.   C) - 80 J.   D) - 50 J

Q(10)

A 1200 kg car can accelerate from rest to 90 km/h in 6 seconds. The power of its engine is,

    A) 10^4 W   B) 6.25×10^4 W   C) 3.75×10^5 W   D) None

Q(11)

A car with tires of radius 32 cm, its wheel rotates at angular speed of 77 rad/s, while driving on a city street. Linear speed of tire rotation is,

    A) 12.25 m/s   B) 24.64 m/s   C) 38.5 m/s   D) None.

Q(12)   (2 marks)

A car moves on a circular path of radius 50 m. If coefficient of static friction is 0.25 on a rainy day, what is the greatest speed car can have without skidding?

A) 40 km/h.   B) 45km/h.   C) 81 km/h.   D) None of these.

Q (13)   (2 marks)

A baseball player throws a rotating ball travelling along positive x-axis. Initial angular speed of the ball is 40 rad/s. When ball is caught after 0.5 seconds its angular speed has decreased to 38 rad/s. How many revolutions does the ball makes before being caught?

    (A) 19.5 rev.   B) 9.75 rev.   C) 3.1 rev.   D) None of these

Part 2: Solve the following **five** problems in the provided space.

 Show all your work and include the appropriate units. **Use $g = 9.8$ m/s^2.**

Q1.   (5 marks)

An electric car starts from rest and accelerates at a rate of 2 m/s^2 in a straight line until it reaches a speed of 20 m/s. The car then slows down at a constant rate of 1 m/s^2 until it stops.

(a) What is total travel time of the electric car?

(b) How far does the electric car travel from start to stop?

Q. 2   (5 marks)

A football is kicked for a long pass with an initial speed of 10 m/s in a direction 30° above the horizontal and it lands at the same level on the football ground.

    (a) What was the horizontal distance covered by the football?

   (b) What was the maximum vertical height reached by the football?

    (c) What is the velocity of the football when it hits the ground? (write velocity in vector form)

Q.3.   (5 marks)

A block of mass m_1 = 2 kg and block m_2 = 4 kg are connected by a massless string over a massless and frictionless pulley. Block m_2 is on a frictionless surface inclined at 30°. Block m_1 rests on a horizontal surface, coefficient of kinetic friction between m_1 and the surface is 0.5.

(a) Find the magnitude of acceleration of blocks.
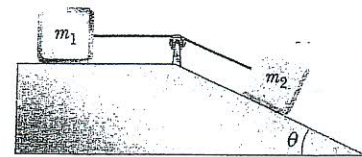
(a) What is the tension in the string?

Q4   (5 marks)

A 5 kg block 'm_1' is released on a frictionless track from point 'A' at the height of 5 m. It makes an inelastic collision with the block 'm_2' of mass 10 kg initially at rest on a horizontal surface at point 'B'. Both masses stick together after collision and stop at point 'C' 1.5 m away from the point of collision.

(a) Determine the velocity of masses just after collision.
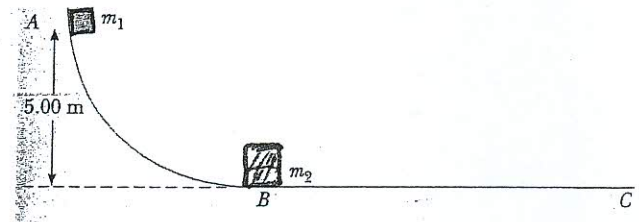

(b) What is the coefficient of kinetic friction between masses and the surface?

Q.5   (5 marks)

A cannon is attached to a carriage, mass of the cannon and its carriage is 5000 kg.
The cannon can only move along horizontal x-axis when it is fired. This cannon has
a spring attached to it with force constant 2×10^4 N/m. The cannon fires 200 kg
cannonball at a velocity of 125 m/s at an angle of 45° above the horizontal. (See
figure)

(a) Find the recoil speed of the cannon.
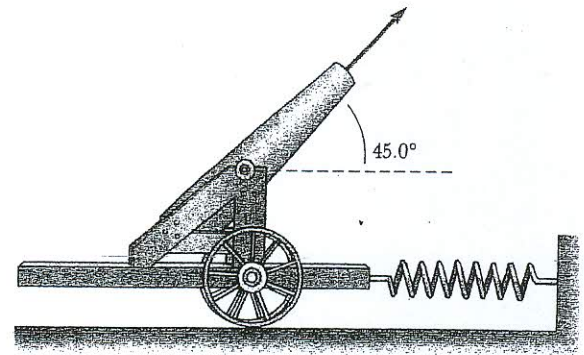
(b) What is the maximum extension of the spring when cannon is fired?

(c) What maximum force is exerted by spring on cannon system?

Scratch sheet. DO NOT REMOVE.