King Saud University
College of Science
Department of Physics and Astronomy

First Term 1437-38	**PHYS 210**	**Classical Mechanics 1**
Monday, Nov 07, 2016	**First Midterm Exam**	**15:00 – 16:30 pm**

Name:	
ID number:	

Write your selected answer for each question here (Q1 to Q14):

Q1	Q2	Q3	Q4	Q5
Q6	Q7	Q8	Q9	Q10
Q11	Q12	Q13	Q14	

Please do not forget to write your name and ID number on this page

Assume $g = 9.8\ m/s^2$ in all questions.

Please choose the right answer for questions from (Q1 to Q14)

Q1: The difference between elastic and inelastic collisions is:

a) The linear momentum is conserved in the elastic collision only
b) The linear momentum is conserved in the inelastic collision only
c) The kinetic energy is conserved in the elastic collision only
d) The kinetic energy is conserved in the inelastic collision only
e) The linear momentum is not conserved in the inelastic collision only

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Q2: A 2.0-kg object moving 5.0 m/s collides with and sticks to an 8.0-kg object initially at rest. Determine the kinetic energy lost by the system as a result of this collision.

a) 20 J
b) 15 J
c) 30 J
d) 25 J
e) 5.0 J

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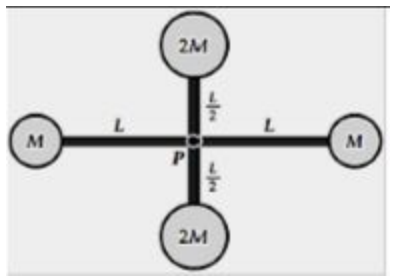
Q3: The rigid object shown is rotated about an axis perpendicular to the paper and through point P. The rotational kinetic energy of the object as it rotates is equal to 2.0 J. If M = 1.3 kg and L = 0.5 m, what is the angular velocity of the object? (Neglect the mass of the connecting rods and treat the mass of rigid objects as point particles).



a) 2.3 rad/s b) 1.5 rad/s c) 1.7 rad/s d) 2.1 rad/s e) 2.87 rad/s

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Q4: $Kg.m^2/s^2$ is a unit for measuring the:

a) Force b) momentum c) rotation inertia d) torque e) impulse

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Q5: A car and a large truck travelling at the same speed make a head on collision and stick together. Which vehicle experiences the larger change in the magnitude of momentum

a) The change in the magnitude of momentum is the same for both
b) The car
c) The truck
d) Impossible to determine
e) More information is required

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Q6: A wheel (radius = 8 cm) that rotates about a fixed axis starts from rest and accelerates at a constant rate to an angular velocity of 9 rad/s in 3 s. What is the magnitude of the tangential acceleration of a point on the rim of the disk?

a) 0.24 m/s^2 b) 0.16 m/s^2 c) 0.12 m/s^2 d) 0.18 m/s^2 e) 0.30 m/s^2

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Q7: According to Newton's second law, the angular acceleration experienced by an object is directly proportional to:

a) its moment of inertia
b) the net applied torque
c) the object's size
d) the object mass
e) choices a and b above are both valid

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Q8: A 2.00 kg particle has the xy coordinates (-1.20 m, 0.500 m), and a 4.00 kg particle has the xy coordinates (0.600 m, -0.750 m). Both lie on a horizontal plane. At what x and y coordinates must you place a 3.00 kg particle such that the center of mass of the three-particle system has the coordinates (-0.500 m, -0.700 m)?

a) (-1.1 m, -1.45 m)
b) (-1 m, -1.4 m)
c) (-1.5 m, -1.43 m)
d) (-0.5 m, -0.7 m)
e) (-1 m, -1.5 m)

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Q9: If you know the impulse that has acted on a body of mass *m* you can calculate

a) its initial velocity
b) its final velocity
c) its final momentum
d) the change in its velocity
e) its acceleration during the impulse.

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Q10: An automobile accelerates from zero to 30 m/s in 6.0 s. The wheels have a diameter of 0.40 m. What is the average angular acceleration of each wheel?

a. 5.0 rad/s2
b. 15 rad/s2
c. 25 rad/s2
d. 35 rad/s2

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Q11: A disk has a moment of inertia of 3.0×10^{-4} kg×m^2 and rotates with an angular speed of 3.5 rad/sec. What net torque must be applied to bring it to rest within 3 s.

a) 4.5×10^{-3} N.m b) 7.5×10^{-4} N.m c) 3.5×10^{-4} N.m
d) 5.0×10^{-4} N.m b) 6.5×10^{-4} N.m

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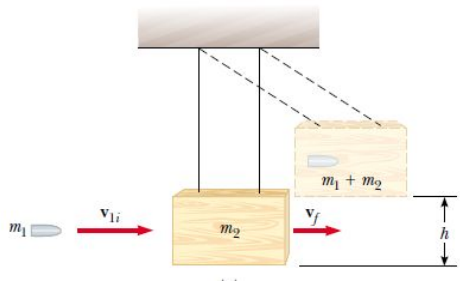
Q12: In a ballistic pendulum experiment as shown in the attached figure, suppose that h = 5.00 cm, m_1 = 5.00 g, and m_2 = 1.00 kg. The initial speed (v_{1i})of the bullet is:

a) 199 m/s b) 142 m/s c) 284 m/s d) 45 m/s e) 90 m/s



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Q13: If you are trying to loosen the very tight screw from a piece of wood with a screw driver and fail, then you should choose a screw driver which is

a. Longer
b. Fatter
c. Shorter
d. Thinner
e. Both (a.) and (b.) are correct.

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Q14: The impulse is measured by the following unit:

a) kg.m/s^2 b) kg.m^2/s^2 c) kg.m/s d) kg.m^2/s e) kg.m.s

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Q15: In the attached figure, block 1 has mass m_1, block 2 has mass m_2 , and the pulley, which is mounted on a horizontal axle with negligible friction, has radius R and mass M. Prove that the acceleration of the two masses is given as the follows:

where I is the moment of inertia of the pulley.

Assume that $m_2 > m_1$.