Physics 4A   Winter 2006   February 10, 2006
Professor C. M. Surko   Quiz 2

Be sure to indicte your Code Number and the Test Form on the front of your Blue Book
The Test Form is indicated on the bottom of this page.

Please see preceeding page for potentially useful formulae. This exam contains 11 problems.

Problems 1 - 5, inclusive count 4 points each; and problems 6 - 11 count 8 points each.

Partial credit will be given for Problems 6 - 11, so please show your work clearly.

There will be no partial credit for problems 1 -5.

Please put the answers to problems 1 - 5 on the first page inside your blue book.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Please note: If no answer is correct, choose the answer that is closest.

1) <u>This problem relates to Figure 1 on the formula pages</u>. A heavy box is dragged along a surface by a force $\vec{F}$ in two situations: (i) a horizontal surface; and (ii) a surface inclined at an angle to the horizontal. The magnitude of the applied force, $\vec{F}$, is the same for both. The normal force to the surface in (ii) , as compared to the normal force in (i), is
  A) greater
  B) the same
  C) less
  D) less for some angles of the incline and greater for others
  E) not enough information is provided to answer this question

2) This problem relates to Figure 2 on the formula pages. A circus performer of weight W walks on a suspended cable. The tension in the wire is
  A) approximately W
  B) approximately W/2
  C) much less than W
  D) much greater than W
  E) depends on whether the performer stands on one foot or two.

3) A crane operator lowers a steel ball weighing 16,000 N with a downard acceleration of 3 m/s^2.
   The tension in the cable (in N) in this case is
  A) 4900   B) 16,000   C) 21,000   D) 48,000   E) 11,000

4) Suppose you suspend a lead block from your hand by a string. The reaction force (as per Newton's third law) to the force of gravity on the block is the force exerted by
   A) the string on the block
   B) the block on the string
   C) the string on the hand
   D) the hand on the string
   E) the block on the Earth

5) This problem relates to Figure 3 on the formula pages. A block weighing 70 N and a block weighing 35 N are connected by a string as shown. If the pulley is massless, and the pulley and the surface are frictionless, the magnitude of the acceleration of the 35-N block (in m/s^2) is
   A) 9.8   B) 1.6   C) 4.9   D) 3.3   E) 6.7

The following questions are not multiple choice. Please show your work in addition to the answer in your blue book.

6) This problem relates to Figure 4 on the formula pages. Two blocks (A and B) are in contact on a horizontal fricitionless surface. A 36 Newton force is applied to A, as shown. In this case, what is the magnitude of the force of A on B?

7) A ball is suspended from the ceiling of an antomobile by a cord. The car rounds a horizontal curve having a radius of 45 m at a constant speed of 22 m/s. In this case, what is the angle (in degrees) that the cord makes with the vertical?

Situation I. This situation relates to Figure 5 on the formula pages. Two blocks A and B are arranged as shown, connected by a cord over a frictionless pulley. Block A rests on a plane inclined at an angle $\theta = 30^0$ to the horizontal and has a mass $m_A = 10$ kg. The coefficient of static friction of block A on the plane is $\mu_s = 0.40$ and the coefficient of kinetic friction is $\mu_k = 0.30$.

8) In Situation I, what is the largest value of the mass of block B (in kg) such that the block B will not move downward?

9) In Situation I, what is the mass of block B if block B accelerates upward at a rate a = 2 m/s^2?

Situation II. This problem relates to Figure 6 on the formula pages. A tether ball with mass m = 1.5 kg is suspended from a cord of length L = 3 m that is tied to a vertical pole. The ball makes a uniform circular orbit in the horizontal plane. The angle of the cord from the vertical is $\theta = 30^0$.

10) In Situation II, what is the tension in the cord?

11) In Situation II, what is the speed of the ball?

1) C
2) D
3) E
4) E
5) D
6) No Correct Answer Was Provided.
7) No Correct Answer Was Provided.
8) No Correct Answer Was Provided.
9) No Correct Answer Was Provided.
10) No Correct Answer Was Provided.
11) No Correct Answer Was Provided.