Physics 2311. Mechanics of Solids

Ch. 8 Exam-like questions   Name:_____

Use to practice for exam.

1. If the work done by a force is independent of the path taken from the initial to final position, the force is said to be _____

   (a) non-conservative   (b) ineffective   (c) conservative
        (d) balanced   (e) deadly

2. T or F. The gravitational potential energy, mgh, of a mass depends on where h is defined to be zero.

3. T or F. The change in gravitational potential energy of a mass depends on where h is defined to be zero.

4. A system consists of a mass plus a spring attached to a wall. The work done by the spring on the mass when the mass is moved to the right of equilibrium is equal to _____

   (a) $-\Delta U_s$ (b) ΔU_s (c) $-\Delta U_g$ (d) ΔU_g (e) $k\Delta x$

5. An ideal spring hung vertically does not extend to a new equilibrium position like a real spring does when hanged vertically because ideal springs have no _____.

   (a) time   (b) shape   (c) potential energy   (d) mass   (e) force

6. A skier skis off of a frictionless ski ramp with no air resistance. She starts from rest at a height of 39. m and lands at -21 m. What is her landing speed?

   (a) 3.5 m/s   (b) 13 m/s   (c) 18 m/s   (d) 24 m/s   (e) 34 m/s

7. What is the force (in vector component form) when the potential energy is given by $U = 2k_1x^4 + k_2y$?

   (a) $-8k_1x^3\hat{i} - k_2\hat{j}$
   (b) $-2k_1x^3\hat{i} + k_2\hat{j}$
   (c) $-8k_1x^4\hat{i} + k_2y\hat{j}$
   (d) $8k_1x^3\hat{i} + k_2\hat{j}$
   (e) $-8k_1x^3 - k_2$

8. A 2 kg spring bob is hung from a spring with a spring constant of 250 N/m. What elastic potential energy is stored in the spring when it reaches its new equilibrium position? (Hint: find the change in position first! Assume $g = 9.8$ m/s^2.)

   (a) 0.56 J   (b) 0.77 J   (c) 0.88 J   (d) 125 J   (e) 500 J

9. A 5.0 kg block slides up a rough, $30°$ inclined plane with an initial speed of 8 m/s and comes to rest after a path length of 3 m. Which equation would allow you to correctly determine the coefficient of kinetic friction (which is imbedded in f_k)?

   (a) $\Delta K = \Delta U + f_k d$

   (b) $\Delta K = \Delta U - f_k d$

   (c) $\Delta K = f_k d$

   (d) $\Delta K + \Delta U = -f_k d$

   (e) $\Delta K + \Delta U + -f_k d = 0$

10. In the previous problem, if you know that the force of friction is 28.8 N, how much mechanical energy is transformed into internal energy ("heat") over the 3 m trip? (Note: there are two ways to do this one.)

    (a) 43 J   (b) 58 J   (c) 87 J   (d) 98 J   (e) 108 J

11. Use conservation of energy to determine the speed of a pendulum bob on a string of length 1.4 m as it passes the equilibrium position ($\theta = 0°$) if it swings starting from rest at $\theta = 90°$. (No air resistance.)

    (a) 1.4 m/s   (b) 5.2 m/s   (c) 14 m/s   (d) 18 m/s
    (e) 28 m/s