<u>Chapter # 8 (Potential Energy & Conservation of Energy)</u>

1- A simple pendulum consists of a 2.0 kg mass attached to a string of length = 1.0 m. It is released from rest at X as shown in Fig. Its speed at the lowest point Y is:

a. 3.1 m/s
b. 4.4 m/s
c. 1.6 m/s
d. 5.2 m/s
e. 0.0 m/s

2- A 3.0 kg mass starts from rest and slides a distance d = 1.0 m down a frictionless 60 deg incline, where it contacts an unstressed spring as in Fig. The mass slides an additional 35 cm as it is brought momentarily to rest by compressing the spring. Find the spring constant of the spring.

a. 561 N/m
b. 262 N/m
c. 363 N/m
d. 664 N/m
e. 465 N/m

3- A projectile of mass 0.50 kg is fired with an initial speed of 10 m/s at an angle of 60 deg above the horizontal. The total mechanical energy (relative to ground level) of the projectile at its highest point is:

a. 25.0 J   b. 18.8 J   c. 6.25 J   d. 50.0 J   e. 0.0 J

4- Under the action of a conservative force, 96 J of work are required to move an object from point A to point C, 130 J of work to move the object from point B to point D, and 59 J of work to move the object from point B to point C (see Fig). How much work is required to move the object from point A to point D?

a. 178 J
b. 133 J
c. 96 J
d. 167 J
e. 286 J

5- A pedulum of length 1.2 m and mass M is released from rest from point A where it makes an angle of 30 degrees with the vertical (see Fig). If the kinetic energy of the mass is 36 J at the bottom of its path (B), calculate the work done by the tension (T) in the string from point A to point B.

a. 0 J
b. 36 J
c. 18 J
d. 48 J
e. 0.5 J

6- A 2.5 kg hangs at rest from the free end of a vertical spring attached by one end to the ceiling. What is the change in elastic potential energy of the spring when the mass is lifted straight up until the spring reaches its unstretched position? (k=240 N/m)

a. -1.25 J   b. 2.50 J   c. -4.60 J   d. 1.80 J   e. -3.90 J

7- Which of the following quantities CANNOT be used as a unit of potential energy?

a. kg*m/s**2   b. watt*second   c. Joule   d. kg*m**2/s**2   e. N*m

8- Two masses are connected as shown in fig. The coefficient of kinetic friction between the 2.0-kg mass and the surface is 0.400. The system starts from rest. What is the speed of the 6.0-kg mass at the instant when it has fallen 1.5 m? Assume that the pulley is massless and frictionless.

a. 4.37 m/s
b. 3.74 m/s
c. 5.00 m/s

d. 5.05 m/s
e. 5.42 m/s

9- A 2.0-kg block is pushed on a rough horizontal plane by a 12-N force acting parallel to the plane. If the block moves with a constant speed of 1.5 m/s, how much power is lost due to the frictional force ?
a. +18 W b. +11 W c. -11 W d. +29 W e. -29 W

10- Which of the following bodies has the largest kinetic energy ?
a. Mass 2M and speed 3V . b. Mass 3M and speed V . c. Mass 3M and speed 2V .
d. Mass M and speed 4V . e. Mass 4M and speed 2V .

11- A block of mass 2.0 kg is released from rest and slides down a rough track of radius R = 1.0 m, as shown in the Fig. If the speed of the block at the bottom is 4.0 m/s, What is the energy dissipated by the frictional force acting on the block?

a. 3.6 J
b. 3.6 J
c. 19.6 J
d. 19.6 J
e. 16.0 J

12- A stone is thrown up at an angle with a speed of 30.0 m/s from the top of a building which is 50 m high, as shown in the Fig. Find the speed of the stone when it is 20 m above the ground.
a. 38.6 m/s b. 49.7 m/s
c. 27.3 m/s d. 20.2 m/s
e. 12.5 m/s

13- A 3-kg block starts at rest and slides a distance d down a smooth 30-deg Incline, where it contacts a spring of negligible mass, as shown in the Fig. It slides an additional 0.2 m as it is brought momentarily to rest by compressing the spring. The force constant of the spring is 400 N/m. Find the initial separation d between the mass and the spring.
a. 0.344 m
b. 0.566 m
c. 0.211 m
d. 0.722 m
e. 0.435 m

14- A spring of force constant 100 N/m rests on an inclined plane that has the same length as the spring. The inclined plane makes an angle of 45 deg with the horizontal. A block of mass 0.1 kg is pressed against the spring, compressing it a distance of 0.2 m, and then released. Find the maximum height the block reaches above the point at which it leaves the spring. [$Y_{max}=V_0^2 \sin^2\theta_0/(2g)$]
a. 0.95 m
b. 5.30 m
c. 1.02 m
d. 0.55 m
e. 1.30 m

15- A block of mass 1 kg is released from rest and slides down a frictionless track of height 1 m above a table. At the bottom of the track, where the surface is horizontal, the block strikes and compresses a spring constant 400 N/m (see Fig). Find the maximum distance through which the spring is compressed.
a. 0.221 m
b. 0.532 m
c. 0.710 m
d. 0.615 m
e. 0.935 m