Assignment 10

1. A mass m = 2 kg is attached to a spring with a force constant k = 400 N/m. The mass is initially at rest and in contact with a frictionless surface. If a force F = 50 N is applied to the mass, causing it to move at a constant velocity, determine:

   a) The work done by the force F.
   b) The work done by the spring force.

2. A schoolbag weighing 5 kg is initially at rest on a frictionless surface. A constant horizontal force F = 10 N is applied to the bag. Determine:

   a) The work done by the force F.
   b) The work done by the surface friction.

3. A container holds 10 kg of water at 20°C. The water is heated by a furnace with a heat source of 500 W. After 1 hour, the temperature of the water increases to 30°C. Determine:

   a) The heat supplied to the water.
   b) The change in internal energy of the water.

4. A piece of an ice cube with a mass of 1 kg and a temperature of 0°C is placed in a constant temperature environment at 20°C. The ice cube eventually melts completely. Determine:

   a) The heat supplied to the ice cube.
   b) The change in internal energy of the ice cube.

5. A 5 kg block is pushed horizontally with a constant force of 100 N. The block is initially at rest and moves a distance of 5 meters. Determine:

   a) The work done by the force F.
   b) The change in kinetic energy of the block.

6. A container holds 10 kg of water with an initial temperature of 20°C. The water is heated until its temperature reaches 30°C. Determine:

   a) The heat supplied to the water.
   b) The change in internal energy of the water.

7. A spring with a force constant k = 200 N/m is stretched by a distance of 0.1 m from its equilibrium position. Determine:

   a) The potential energy stored in the spring.
   b) The work done in stretching the spring.

8. A mass m = 2 kg is attached to a spring with a force constant k = 400 N/m. The mass is initially at rest and in contact with a frictionless surface. If a force F = 50 N is applied to the mass, causing it to move at a constant velocity, determine:

   a) The work done by the force F.
   b) The work done by the spring force.

9. A schoolbag weighing 5 kg is initially at rest on a frictionless surface. A constant horizontal force F = 10 N is applied to the bag. Determine:

   a) The work done by the force F.
   b) The work done by the surface friction.

10. A container holds 10 kg of water at 20°C. The water is heated by a furnace with a heat source of 500 W. After 1 hour, the temperature of the water increases to 30°C. Determine:

    a) The heat supplied to the water.
    b) The change in internal energy of the water.

11. A piece of an ice cube with a mass of 1 kg and a temperature of 0°C is placed in a constant temperature environment at 20°C. The ice cube eventually melts completely. Determine:

    a) The heat supplied to the ice cube.
    b) The change in internal energy of the ice cube.

12. A 5 kg block is pushed horizontally with a constant force of 100 N. The block is initially at rest and moves a distance of 5 meters. Determine:

    a) The work done by the force F.
    b) The change in kinetic energy of the block.

13. A container holds 10 kg of water with an initial temperature of 20°C. The water is heated until its temperature reaches 30°C. Determine:

    a) The heat supplied to the water.
    b) The change in internal energy of the water.

14. A spring with a force constant k = 200 N/m is stretched by a distance of 0.1 m from its equilibrium position. Determine:

    a) The potential energy stored in the spring.
    b) The work done in stretching the spring.

15. A mass m = 2 kg is attached to a spring with a force constant k = 400 N/m. The mass is initially at rest and in contact with a frictionless surface. If a force F = 50 N is applied to the mass, causing it to move at a constant velocity, determine:

    a) The work done by the force F.
    b) The work done by the spring force.