Homework 2: Energy storage Answers

1. Which one of the following is a type of kinetic energy? [1]
   - Mechanical
   - Sound
   - Chemical
   - Nuclear

2. Name three simple methods of storing energy that can be found in most homes or in a design and technology workshop? [3]
   **Answers may include:**
   - Elastic band – tension
   - Balloon – compression
   - Spring – Tension or compression depending on the type of spring
   - Battery – electrical energy
   - Spray can – compression
   Accept any alternative of merit

3. Explain the difference between potential and kinetic energy, giving one example for each. [4]
   - Potential energy is stored energy – Chemical, mechanical, nuclear, gravitational.
   - Kinetic energy is energy in motion – movement, electricity, heat, sound, light.
   Accept specific examples as well as general the examples listed.

4. Describe how flywheels can be used to store surplus energy and smooth erratic energy generation from some renewable sources. [6]
   During times of low demand on the National Grid surplus energy is used [1] to rotate the flywheels to a very high speed [1]. As they rotate in a near frictionless environment they maintain their momentum [1]. When demand increases, the momentum is used [1] to drive a generator [1] supplying energy back to the National Grid [1]. This has a smoothing affect helping to avoid peaks and troughs in supply [1]. It also helps to level out erratic production from some renewables such as solar and wind power [1].
5. Describe the use of energy storage systems, including kinetic pumped storage systems, to use surplus energy to help smooth peak supply and balance the demand on the National Grid.

You may use a diagram to aid your answer. [4]

Kinetic pumped energy storage using hydroelectric dams and/or reservoir systems [1] can be used to store water [1] which is pumped up during low demand times [1] and released during peak times [1].

Large banks of batteries and/or large flow batteries are charged during low demand [1] and used or ‘discharged’ to top up the National Grid during peak demand [1].

6. Standard alkaline battery cells are 1.5V.

(a) State the voltage of a rechargeable cell. [1]

1.2V.

(b) How many rechargeable cells would be required in a 12V battery? [1]

12 / 1.2V = 10.

Total 20 marks