# Exam Questions Answers NI

**1. a)** Kinetic energy and gravitational potential energy. *(2 marks)*

**b) i)** Input **kinetic** energy of wind → Useful output **electrical** energy *(2 marks)*

**ii)** Wind energy is in almost limitless supply because it is replaced so quickly by nature. *(1 mark)*

**iii)** Other renewables are wave energy and solar energy. *(2 marks)*

**c)** Gravitational potential energy → Kinetic energy → Electrical output energy
stored in upper lake in moving water from the power station *(3 marks)*

**2.** Advantage: tidal energy has low running costs (but huge set-up costs).
Disadvantage: while the tides (unlike wind and waves) are predictable, they vary from day to day and month to month. This makes them unsuitable for producing a constant daily amount of electrical energy. *(2 marks)*

**3. a) i)** Oil is a non-renewable fuel because it is not being replaced by nature. *(2 marks)*

**ii)** Wind energy is renewable because it is in almost limitless supply because it is replaced so quickly by nature. *(2 marks)*

**iii)** Non-renewable resources, such as coal, oil and gas are generally more reliable than renewable energy sources like wind, waves and solar energy. *(1 mark)*

**b) i)** GPE lost per second = mgh = 100 000 000 x 10 x 50 = 50 000 000 000 J/s or $5 \times 10^{10}$ J/s *(3 marks)*

**ii)** Maximum power output = (0.8 / 100) x 50 000 000 000 = 400 000 000 W *(3 marks)*

**iii)** The water flowing over the falls comes from rainfall. Rainfall occurs as part of the water cycle in which water in the oceans is evaporated by the sun, rises and condenses to form clouds. The clouds are driven by the wind over land and the water falls as precipitation to form rivers and lakes. Some of this water passes over the falls. *(2 marks)*

**c) i)** useful power output = efficiency x electrical power input = 0.6 x 500 = 300 W *(3 marks)*

**ii)** 300 J *(1 mark)*

**iii)** power = force in rope x distance moved per second
300 = 1200 x distance moved per second
constant speed of vehicle = distance moved per second = 300 ÷ 1200 = 0.25 m/s *(3 marks)*

**4. a)** work = force x distance = 8000N x 1.8m = 14 400J *(3 marks)*

**b)** $\text{time} = \frac{\text{work}}{\text{power}} = \frac{26000}{5200} = 5\text{s}$ *(3 marks)*

**c)** $\text{power input} = \frac{\text{useful power output}}{\text{efficiency}} = \frac{5200}{0.26} = 20\,000\text{ W} = 20\text{ kW}$ *(3 marks)*

**5.** work = force x distance = 550N x 3m = 1650J *(3 marks)*

**6.** **a)** work = force x distance = 24 000N x 40m = 960 000J = 960kJ *(3 marks)*

**b)** $\text{power} = \frac{\text{work}}{\text{time}} = \frac{960}{20} = 48\text{kW}$ *(3 marks)*

**c)** $\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}} = \frac{960}{1200} = 0.8$ *(3 marks)*

**d)**

| **Energy** | **Increases/decreases/ unchanged** |
|---|---|
| Potential energy of the top tramcar | DECREASES |
| Kinetic energy of the top tramcar | UNCHANGED |
| Kinetic energy of the bottom tramcar | UNCHANGED |
| Potential energy of the bottom tramcar | INCREASES |
| Heat energy | INCREASES |

*(5 marks)*

**7.**

| **Quantity** | **Increases** | **Decreases** | **Constant** |
|---|---|---|---|
| Speed of ball | | ✓ | |
| Potential energy of ball | ✓ | | |
| Total energy of ball | | | ✓ |
| Kinetic energy of ball | | ✓ | |

*(4 marks)*