PART A: MULTIPLE CHOICE (10 MARKS)

Choose the best response in each case and place your answer in the appropriate space on your answer sheet.

1. In explaining matter & energy, it is true that:
   (a) matter is made of atoms and molecules that are constantly in motion.
   (b) as objects become hotter, their particles move faster.
   (c) thermal energy transfers from one part of an object to another by means of collisions.
   (d) all of the above.

2. A power rating of 1.0 kW is equal to:
   (a) 1000 W (b) 1.0 kJ/s
   (c) 1.0×10^3 J/s (d) all of these

3. If a 100 W light bulb consumes 500 J of electrical energy in a time interval Δt, then in the same time interval, a 200 W light bulb consumes:
   (a) 500 J (b) 1000 J
   (c) 2000 J (d) none of these

4. If the overall efficiency of a technology is 41% and the energy input of the technology is 8.0 MJ, then the useful output energy is:
   (a) 7.6 MJ (b) 6.8 MJ
   (c) 3.3 MJ (d) 2.6 MJ

5. In a magazine ad you read of 3 devices and the types of energy they convert. Which one of the pairs is <u>not</u> correct?
   (a) photovoltaic cell light energy
   (b) piezoelectric cell pressure
   (c) alternator sound energy

6. What form of energy from uranium is used to generate the electrical energy at the Pickering generating station?
   (a) chemical energy (b) electrical energy
   (c) nuclear energy (d) mechanical energy

7. What form of energy from coal is used to generate the electricity in a coal burning generating station?
   (a) chemical energy (b) electrical energy
   (c) nuclear energy (d) mechanical energy

8. Of the following choices, the renewable energy resource most suitable for development in Prince Edward County is:
   (a) wind energy (b) hydraulic energy
   (c) geothermal energy (d) tidal energy

9. Which of the following is <u>not</u> a way to store the energy from wind?
   (a) As chemical energy in storage batteries.
   (b) As nuclear energy in the form of uranium.
   (c) As gravitational energy in raised water.
   (d) As chemical energy in the form of hydrogen.

10. An example of cogeneration is:
    (a) operating a nuclear generating plant located beside a natural gas generating plant.
    (b) operating two fossil fuel generating plants side by side.
    (c) operating a windmill generator beside an active solar heating system.
    (d) heating a manufacturing building located beside a fossil fuel generating plant.

PART B: MATCH (5 MARKS)

Match the definition from the 1st column to the best term in the 2nd column and place the matching letter in the appropriate space on your answer sheet.

1. The transfer of energy from a warmer body or region to a cooler one.
2. A mixture of hydrocarbons and other substances.
3. The process of designing and building a structure to use the Sun's energy effectively at all times of the year.
4. A device that uses evaporation and condensation to heat a home in winter and cool it in summer.
5. Type of energy resource that cannot be replaced within a human lifetime.

A) active solar heating
B) bitumen
C) fuel cell
D) heat
E) heat pump
F) non-renewable resource
G) passive solar heating
H) power
I) renewable resource
J) temperature

SPH3U-3 ENERGY & SOCIETY: ENERGY & EFFICIENCY QUIZ#2

PART A: MULTIPLE CHOICE (10 MARKS)

1	2	3	4	5	6	7	8	9	10

PART B: MATCH (5 MARKS)

1	2	3	4	5

PART C: SHORT ANSWER (15 MARKS)

Answer the following questions in the space provided.

{2} 1. State which method of heat transfer:

(a) works when particles circulate in a path (a) _____

(b) travels at the speed of light (b) _____

{4} 2. List 2 renewable and nonrenewable sources of energy.

	NONRENEWABLE ENERGY RESOURCE	RENEWABLE ENERGY RESOURCE
①		
②		

{3} 3. Complete the following chart.

	Power (P)	Energy Transformed (ΔE)	Time Interval (Δt)
(a)		55 J	2.5 s
(b)	24 W	3.3×10^4 J	
(c)	25 W		24 min

{6} 4. Complete the following chart.

	Efficiency	Energy Output (E_{out})	Energy Input (E_{in})	% of E_{in} Wasted
(a)		4.5 J	30 J	
(b)		66 kJ		23%
(c)	0.75		2.8×10^3 J	

PART D: PROBLEMS (20 MARKS)

Answer the following questions on a separate sheet of paper. You may use the back of this sheet if you wish.

1. A hospital volunteer pushes a patient in a wheelchair (total mass of both is 62 kg) up a ramp with a force of magnitude 88 N parallel to the ramp. The ramp itself is 8.5 m long, and it is 1.2 m higher at the top than at the bottom.

{1} (a) Draw a diagram of the situation.

{3} (b) Calculate the input work done by the volunteer in pushing the patient up the ramp.

{3} (c) Calculate the output work accomplished by raising the patient to the higher level.

{3} (d) Determine the efficiency of the ramp.

{2} (e) What factors explain the high efficiency in this case?

{3} 2. A heater delivers 0.070 MJ of energy to 4.5 kg of liquid, changing its temperature from 32°C to 52°C. Find the liquid's specific heat capacity.

{5} 3. A 300 g piece of iron ($c = 4.5 \times 10^2$ J/kg°C) at 450°C is submerged in 200 g of water ($c = 4.18 \times 10^3$ J/kg°C) at 10°C to be cooled. Determine the final temperature of the iron and the water. (Assume two significant digits.)