I Vocabulary (20 points)

Choose an answer that best reflects the meaning of the underlined word in each sentence.

1. Can you unravel the mystery?
   a. disentangle b. discover c. study
2. The ubiquitous Sing was on hand during the interview.
   a. beautiful b. depressed c. omnipresent
3. There was a tantalizing suggestion always present in his mind that something was eluding him.
   a. fantastic but not realistic b. enticing but out of reach c. beautiful but useless
4. Most efforts to evaluate different biofuel crops have focused on their merits for reducing greenhouse-gas emissions or fossil fuel use.
   a. appraise b. understand c. investigate
5. Not all biofuels are beneficial when their full environmental impacts are assessed.
   a. harmful b. advantageous c. economical
6. New observations of the Mars-bound Asteroid 2007 WD5 have allowed astronomers to refine their predictions for the space rock's position during its red planet rendezvous on Jan. 30, 2008.
   a. a prearranged meting b. a timely explosion c. a scheduled game
7. This comes after Warner Brothers decided to go exclusively with Sony's Blu-ray format.
   a. decisively b. only c. conclusively
8. For the first time, scientists have proof in human subjects that a derivative of an ingredient in red wine combats some symptoms of aging.
   a. a red grape b. an element in a mixture c. a full bodied wine
9. The results partially answer skeptics who expressed doubts about the impact of resveratol in humans after mouse studies showed longevity gains.
   a. someone who hates b. someone who loves c. someone who doubts
10. With Pluto demoted from planetary status, Mercury is now recognized as the smallest planet in the solar system.
   a. reduce in status b. enhance in status c. change in status

II Reading Comprehension (40 points)

The following paragraphs are excerpts from an article published in Science **314**, 238 (2006) by D. Clery.

In November (2006), politicians representing more than half the world's population will sign an agreement that fires the starting pistol for the International Thermonuclear Experimental

(背面仍有題目,請繼續作答)

Reactor (ITER). Although first mooted in 1985, ITER has so far existed only on paper. The governments of China, the European Union (E.U.), India, Japan, South Korea, Russia, and the United States are now ready to hand over a $6 billion check for ITER's construction, followed by a similarly sized one for 20 years' operation. Then it is up to an international team of scientists and engineers to show that the thing will work.

If it does, the rewards could be huge. With the global population due to climb from 6.5 billion to 8.1 billion by 2030 and the economies of China, India, and others hungry for power, many new generating plants will have to be built. The choices are stark: Burn more coal, with the inevitable impact on climate; build new nuclear fission plants and deal with the radioactive waste and risk of terrorism; or try alternative sources such as solar power, although this option remains expensive and lacks efficiency.

But there is an outside bet: fusion. If it can be built, a fusion power station would emit no greenhouse gases and produce little radioactive waste, it cannot explode in a runaway reaction, and its fuel is found in seawater in virtually limitless quantities. Such a plant, unlike alternative sources, would produce the steady, reliable base-load power that cities need. And the economics are astounding: A 1-gigawatt coal-fired plant burns about 10,000 tonnes of coal per day, whereas a 1-gigawatt fusion plant would need roughly 1 kilogram of deuterium-tritium fuel.

We're not even close yet, however. Indeed, skeptics joke that "Fusion is the power of the future and always will be." The sun is a gigantic fusion reactor, but recreating the conditions here on Earth in which atomic nuclei collide with such force that they fuse together has proved fiendishly difficult. A few dozen examples of the currently favored reactor design--a doughnut-shaped vessel known as a tokamak--have been built since the 1950s, but only a handful have managed to get fusion in their plasma. In 1997, the Joint European Torus (JET) in Abingdon, U.K., the biggest existing tokamak, managed to produce 16 megawatts, but that was only 65% of the power used to keep the reaction running.

By studying those earlier reactors, plasma physicists have derived scaling laws that predict that a bigger tokamak (ITER is twice the size of JET in linear dimensions) would overcome many of the problems. But ITER is not a prototype power plant; it is an experiment designed to finally decide whether taming the sun's energy to generate electricity is even viable. ITER aims to produce 500 megawatts of power, 10 times the amount needed to keep it running. But a moneymaking energy utility would need several times that amount, and it would have to keep on doing it steadily for years without a break.

ITER needs to show such performance is at least possible. But it faces many challenges: Scientists and engineers need to find a lining for its inner walls that can withstand the intense heat; they must tame the plasma instabilities that plague existing reactors; and they must find a way to run the reactor in a steady state rather than the short pulses of existing reactors. ITER must do all of this and, for the first time, maintain the plasma temperature with heat from the fusion reaction itself rather than an external source.

After you have read previous paragraphs, please answer the following questions in simple words:

11. How many countries, counting E.U. as one, are involved in ITER project?
12. What is the global population expected to be in 2030?
13. Would a fusion power plant emit greenhouse gases?
14. How many kg of deuterium-tritium fuel a day would a fusion power plant need to generate one gigawatt power?
15. How many MW of power did JET manage to produce?
16. How much power does ITER aim to produce?
17. How much power does ITER need to keep it running?
18. Can ITER make money by selling the power it produces and buying the power it needs at the same price?
19. How does ITER maintain the plasma temperature?
20. Is the size of ITER larger than that of JET?

III Essay (40 points)

Please write a short essay (about 100 words) in English on what you hope to accomplish in graduate school study.