2e Année gr. 1

groupe 1

ISARA – 2009-2010 – 2nd year students – teacher: Mrs. Knight

English Examination Paper – January 2010 – Tuesday groups

Answer all the questions.

Question 1. Read the text below, summarize it in a paragraph of 100 words and express your opinion on the topic dealt with in at least 100 words. Make sure you use topic sentences in all your paragraphs. (40 minutes).

marks: 40

Science and technology — The Economist October 3rd 2009

Quantum mechanics

Schrödinger's virus

An old thought experiment may soon be realised

ONE of the most famous unperformed experiments in science is Schrödinger's cat. In 1935 Erwin Schrödinger (pictured below), who was one of the pioneers of quantum mechanics, imagined putting a cat, a flask of Prussic acid, a radioactive atom, a Geiger counter, an electric relay and a hammer in a sealed box. If the atom decays, the Geiger counter detects the radiation and sends a signal that trips the relay, which releases the hammer, which smashes the flask and poisons the cat.

The point of the experiment is that radioactive decay is a quantum process. The chance of the atom decaying in any given period is known. Whether it has actually decayed (and thus whether the cat is alive or dead) is not—at least until the box is opened. The animal exists, in the argot of the subject, in a "superposition" in which it is both alive and dead at the same time.

Schrödinger's intention was to illuminate the paradoxes of the quantum world. But superposition (the existence of a thing in two or more quantum states simultaneously) is real and is, for example, the basis of quantum computing. A pair of researchers at the Max Planck Institute for Quantum Optics in Garching, Germany, now propose to do what Schrödinger could not, and put a living organism into a state of quantum superposition.

The organism Ignacio Cirac and Oriol Romero-Isart have in mind is the flu virus. Pedants might object that viruses are not truly alive, but that is a philosophical rather than a naturalistic argument, for they have genes and are capable of reproduction—a capability they lose if they are damaged. The reason for choosing a virus is that it is small. Actual superposition (as opposed to the cat-in-a-box sort) is easiest with small objects, for which there are fewer pathways along which the superposition can break down. Physicists have already put photons, electrons, atoms and even entire molecules into such a state and measured the outcome. In the view of Dr Cirac and Dr Romero-Isart, a virus is just a particularly large molecule, so existing techniques should work on it.

The other thing that helps maintain superposition is low temperature. The less something jiggles about because of heat-induced vibration, the longer it can remain superposed. Dr Cirac and Dr Romero-Isart therefore propose putting the virus inside a microscopic cavity and cooling it down to its state of lowest energy (ground state, in physics parlance) using a piece of apparatus known as a laser trap. This ingenious technique—which won its inventors, one of whom was Steven Chu, now America's energy secretary, a Nobel prize—works by bombarding an object with laser light at a frequency just below that which it would readily absorb and re-emit if it were stationary. This slows down the movement, and hence the temperature, of its atoms to a fraction of a degree above absolute zero.

But what about the other eight lives?

Once that is done, another laser pulse will jostle the virus from its ground state into an excited state, just as a single atom is excited by moving one of its electrons from a lower to a higher orbital. By properly applying this pulse, Dr Cirac believes it will be possible to leave the virus in a superposition of the ground and excited states.

For that to work, however, the virus will need to have certain physical properties. It will have to be an insulator and to be transparent to the relevant laser light. And it will have to be able to survive in a vacuum. Such viruses do exist. The influenza virus is one example. Its resilience is legendary. It can survive exposure to a vacuum, and it seems to be an insulator—which is why the researchers have chosen it. And if the experiment works on a virus, they hope to move on to something that is indisputably alive: a tardigrade.

Tardigrades are tiny but resilient arthropods. They can survive in vacuums and at very low temperatures. And, although the difference between ground state and an excited state is not quite the difference between life and death, Schrödinger would no doubt have been amused that his 70-year-old *jeu d'esprit* has provoked such an earnest following.

Question II. Write a letter to a manager of a restaurant asking for information about a possibility to organize your parents' 25th wedding anniversary there. Follow a suitable format. (15 minutes).

marks: 10

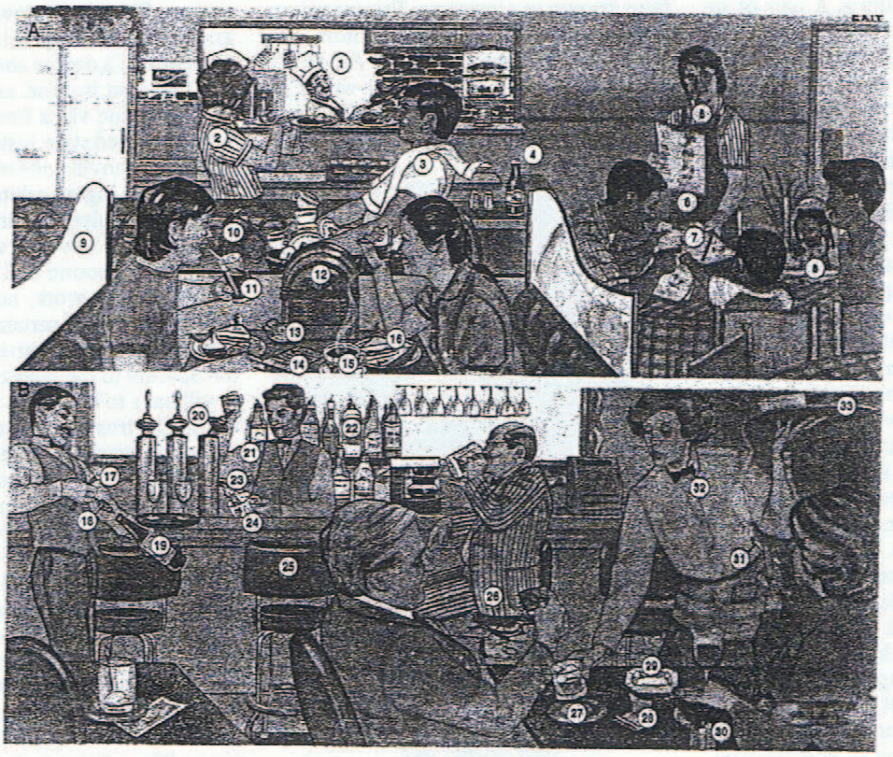
Question III. Explain in English or use in your own sentences the following words and phrases/ (15 minutes).

1. to fin
2. kidneys
3. a shrimp
4. to peel
5. a stage
6. these shoes suit Susan very well
7. savory food
8. actually
9. poaching
10. chills

marks: 10

Question IV. In 10-15 sentences describe a picture below. (15 minutes).

marks: 15



Question V: Grammar (35 minutes)

1. Write 3/5 sentences about what is happening in the world at the moment.
2. Write 3/5 sentences about your interests.
3. Write a short conversation between two friends telling each other about their last summer holidays.
4. Write 3/5 sentences about what you have seen or done recently.
5. Write 3/5 sentences about the plans for your next birthday celebration.
6. Write 3/5 sentences about things that started in the past in your home town, village or community and continue now.

Attention – 3 sentences are for group 4 and 5 sentences are for group 1.

marks: 25

Total marks: 100

GOOD LUCK!!!!!