



Concours Nationaux d'Entrée aux Cycles de Formation d'Ingénieurs
Session 2009

Concours Toutes Options
Epreuve d'Anglais

Date : Lundi 01 Juin 2009 Heure : 15 H Durée : 2 H Nbre pages : 08
Barème : Part I :30, Part II: 30, Part III: 20

IMPORTANT:

1. L'épreuve d'anglais comporte deux séries de feuilles :

- Les énoncés s'étalant sur 4 pages que les candidats sont appelés à garder
- Les feuilles réservées aux réponses (Answer sheets) s'étalant sur 4 pages, lesquelles doivent être rendues à la fin de l'épreuve aux professeurs surveillants

2. Il sera tenu compte de la présentation, (l'écriture au crayon n'étant pas permise)

Reading passage :

1. U.S. federal investments in basic research transformed life and commerce in the 20th century. They sent us to the Moon and beyond, revolutionized communications, helped to feed the planet, reinvented work processes, and drove the remarkable economic growth of the post-1950s era in the United States. These advances and more grew out of the convergence between engineering and the early 20th-century discoveries in the physical sciences. The United States can anticipate comparable world-changing innovations in the 21st century if education and research funding strategies are adapted to capitalize on new opportunities emerging at the convergence of the life sciences with the physical sciences and engineering.
2. This next convergence follows from the elucidation of the structure of DNA in the 1950s and from subsequent fundamental discoveries in molecular and cellular biology. These discoveries created a revolution in the life sciences and drove the development of recombinant DNA technology and the launch of the biotechnology industry. By the mid-1980s, the explosion of data from genomics and proteomics brought about a second revolution, further accelerating life science innovation.
3. These revolutions sowed the seeds of a third revolution that links the life sciences with engineering and the physical sciences in powerful new ways. Many of molecular biology's founders came from the physical sciences, bringing to biology new analytical strategies and technologies. With the evolution of data- and technology-based biology, biologists worked increasingly closely with mathematicians, engineers, and physical scientists. However, too often the relationship focused simply on developing new tools, with engineers serving more as service providers rather than as true collaborators, separately developing analytical technologies or computational strategies for analyzing data. With the demands for analyzing increasingly large data sets in genomics, understanding the complex network of molecular interactions in cells, and increasing resolution and accuracy in measuring and manipulating molecular and cellular events, what began as a relationship of convenience has become a flourishing

partnership that now is rapidly advancing life science discoveries toward practical uses for society.

4. At the Massachusetts Institute of Technology (MIT), a third of the almost 400 engineering faculty engage the life sciences in their research. In many fields, the research frontiers are populated by biologists, engineers, computational scientists, and chemists. MIT's new Koch Institute for Integrative Cancer Research includes biologists, chemists, and engineers working together to develop new strategies for cancer diagnosis, treatment, and prevention. Here and elsewhere, labs are, for instance, engineering nanoparticles to transport cancer-fighting agents selectively to tumor cells, thus minimizing injury to healthy tissue. Approaches like this could become a clinical reality within a decade. The evolving third revolution has, not surprisingly, produced a new academic discipline. The field is burgeoning: in 1996, U.S. universities awarded only 220 Ph.D.s in bioengineering and biomedical engineering; in 2006, that figure soared to 525.
5. Today, this convergence is spawning new discoveries and applications in areas from biomedicine to environmental science to energy technology. Accelerating these innovations will require many changes, from how we teach to how we fund research. Science and engineering students need a broad, more integrated education, so that they can work fluently across disciplines. We must also find more effective ways to evaluate and fund interdisciplinary research in the United States, including specifically promoting interdisciplinary work in the National Institutes of Health's (NIH's) programs for young investigators. Finally, we need to change the way in which grants are awarded and administered: It's needlessly difficult to secure funding for research that involves multiple investigators, departments, or institutions. Above all, The authorities and the public must be convinced that funding research that cuts across the life, physical, and engineering sciences is a vital investment in human health, environmental well-being, and economic prosperity.

Abridged from *SCIENCE*, VOL 323, 27 February 2009

PART I: Comprehension Questions (30 marks)

I- This passage focuses on: (Choose the right alternative and write it on the answer sheet):

- A. The contribution of physical sciences to the advances in engineering.
- B. The impact of life sciences on bioengineering and biomedical engineering.
- C. Opportunities offered by the convergence of life sciences with engineering and physical sciences.

II- Fill in the table on the answer sheet with information from the text.

III- Complete the following statement with information from the text.

Scientific discoveries and breakthroughs are likely to be made within the current century provided that... in order to...

VI- Say whether the following statements are TRUE or FALSE and justify from the text:

- a) Thanks to engineering in nanoparticles, it will soon be possible to treat cancer cells without causing any harm to the surrounding cells.
- b) Research work in bioengineering and biomedical engineering has more than doubled within a decade.

V- Partnership between engineers and scientists working in life sciences is prompted by three main considerations. What are they?

VI- What characterizes academic research at MIT in scientific fields in general, and life sciences in particular?

VII- Choose the best alternative and write it on the answer sheet

As biology evolved,

- a) it has grown more independent from other disciplines.
- b) it has grown more reliant on other fields.
- c) it has grown more academically- oriented.

VIII- Which recommendations are given to speed up future scientific and technological innovations in the U.S.A?

IX- What do the following words (underlined in the text) refer to?

- a) these revolutions (§ 3)
- b) the relationship (§ 3)
- c) here (§ 4)
- d) this convergence (§ 5)

X- Find in the text words or phrases which have the closest meaning to:

- 1. caused (§ 2)
- 2. precision (§ 3)
- 3. grew considerably (§ 4)
- 4. most importantly (§ 5)

PART II: Language (30 marks)

1. Choose the right alternative:

Fears over global hunger are back, and [1] (*who / which/ what*) makes them reappear are not only volatile commodity prices, but also job losses and plunging incomes [2](*through/ around/ into*) the world. If current economic conditions continue through the new year, 200 million workers, mostly in developing countries, will be pushed into [3] (*the/ Ø/ a*) poverty by the loss of jobs or lowered wages. The world is now facing a global job crisis, and, by proxy, a potential food crisis. [4] (*Even though/ Despite/ Besides*) agricultural commodity prices are down from their peak last summer, hunger is likely to increase this year in sub-Saharan Africa, which has the world's harshest labor market and highest hunger levels, [5] (*as well as/ either/ both*) in the Caribbean and parts of Central Asia. At a global food security summit, U.N. and government officials blamed worsening unemployment and dramatically decreasing remittances from abroad. [6] (*Otherwise/ However/ What's more*), as economies deteriorate, poorer countries are [7] (*much/ less/ little*) likely to continue subsidizing food prices for their own populations. The International Monetary Fund predicts that emerging market GDP (Gross Domestic Product) growth [8] (*must/ had better/ may*) fall to 2% in 2009 from 3% last year. That's problematic, [9] (*yet/ so that/ because*) food prices are likely to begin soaring again toward the end of this year or early next. Agricultural goods, [10] (*unlike/ in spite of/ besides*) other commodities, are still more expensive now than they were 12 months ago, before the first food crisis began.

2. Supply the correct tense and verb form:

The Earth's orbit [1] (**get**) crowded. The past few years [2] (**witness**) huge growth in the number of satellites. Unfortunately, wherever civilization ventures it [3] (**leave**) a trail of rubbish. Of the 18,000 tracked objects travelling around the Earth that are larger than 10 cm (4 inches), only about 900 are active satellites. The rest [4] (**be**) debris –everything from fragments of paint to entire dead satellites and bits of old rockets. That is quite enough trash, without needlessly [5] (**create**) vastly more of the stuff by smashing up satellites. Yet the destruction of the Chinese Fengyun-1C in an anti-satellite missile, which [6] (**test**) in 2007, [7] (**account**) for more than a quarter of all catalogued objects in low-Earth orbit. Space junk is dangerous. Anything larger than a fleck of paint [8] (**pose**) a hazard to the useful working satellites that surround the Earth, and on which the world increasingly depends for communications, broadcasting and surveillance. Space waste is not biodegradable. You cannot sweep it up. Instead, it [9] (**stay**) in orbit for decades, or even centuries, before it eventually [10] (**fall**) to earth and burns up.

3. Use the right form of the word given between parentheses:

Of all the scientific breakthroughs of the late twentieth century, undoubtedly the one that proved most [1] (**controversy**) was the cloning of Dolly the sheep in Scotland in 1997. More than twenty years had gone by since the first successful 'in vitro' [2] (**fertile**) and transfer at the [3] (**embryo**) stage that led to the birth of 'Baby Louise'. Despite the benefits that genetic engineering might offer, many people had doubts about the reproduction of humans by other than natural means and the potential dangers of unscrupulous individuals learning the techniques and applying them for profit. [4] (**Physics**) had received similar reactions when they first succeeded in splitting the atom. People feared that this development would lead to the creation of nuclear weapons which would [5] (**threat**) humanity. They were not wrong. The Second World War ended with the use of these terrible weapons of mass destruction.

4. While keeping the same meaning, rewrite the following sentences as indicated on the answer sheet.

1. Efforts to secure sustainable economic growth in Sub-Saharan Africa have not achieved any significant results.
2. Unless we use a method that is proven at a wide scale, our results will not be credible.
3. There has been a world energy crisis because renewable sources of energy have not been sufficiently developed.
4. People do not read as much as they used to many years ago.
5. Our new assembly line is fully automated. It is also cost-effective.

PART III: Translation & Writing (20 marks)

A - Translate the following into English : (5 marks)

Au cours des dernières années, une plus grande convergence des différentes branches de la science et de la technologie a commencé à prendre forme. Cette approche risque de modifier profondément notre rapport au monde. C'est ainsi que des applications de plus en plus innovatrices vont voir le jour, annonçant une nouvelle révolution scientifique et technologique avec des conséquences considérables sur l'environnement, la santé et la vie en société.

B - Write about the following topic in approximately 15 lines : (15 marks)

New information and communications technologies are said to have brought in our lives as much comfort and convenience as stress and complexity. What is your opinion? Use specific reasons and examples to support your answer.