

LIBERAL STUDIES (SCIENCE, TECHNOLOGY & SOCIETY) AS-LEVEL

1.30 pm – 4.00 pm (2½ hours)

This paper must be answered in English

1. This paper consists of **Section 1** and **Section 2**. **Section 1** carries 75% of the module marks, and **Section 2** carries 25%.
2. **Section 1** consists of three questions, *all* of which are to be answered. **Section 2** consists of four questions, of which candidates may attempt any *one*.
3. Each question is worth 25 marks: 20 marks are allocated for content and 5 marks for effective communication.
4. The maximum content marks are indicated in brackets at the end of each question and sub-question. They are a guide to the length of answer required, which may vary from one to several paragraphs.
5. Candidates are reminded that this subject emphasises the ability to present and support points of view in a clear, concise and logical manner, rather than the ability to recite facts.

SECTION 1

Answer *all* the questions in this section.

1. In Hong Kong, breast cancer has surpassed lung cancer as the commonest cancer among females since the early 1990s. It is accounting for almost 20% of all new cancers in females diagnosed in Hong Kong. Therefore, the government has been encouraging women to check the condition of their breasts regularly.

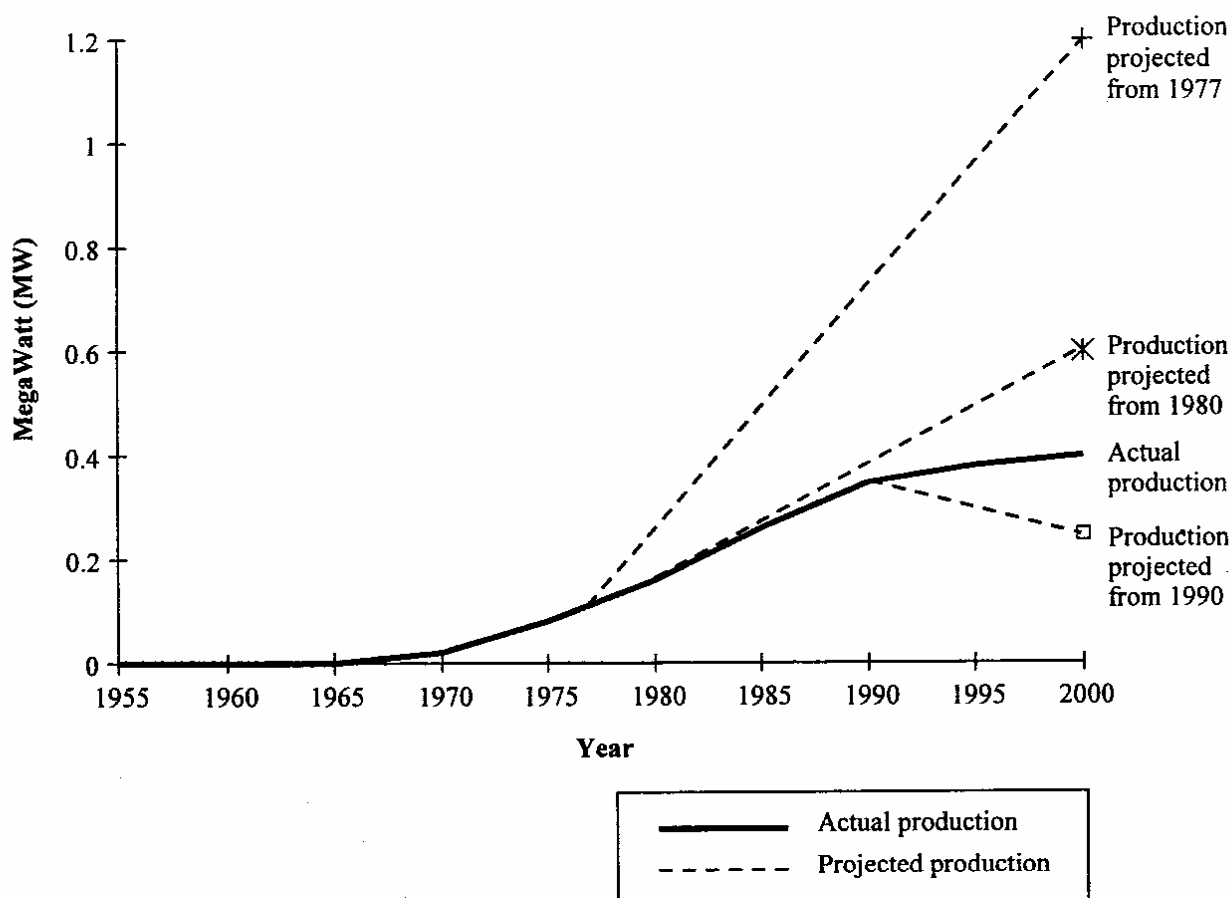
Consider the following statements made by a company offering tests for breast cancer:

- A. It has been reported that every American woman has a 12% risk of developing breast cancer in her lifetime, and the risk for women with a family history of breast cancer is even higher.
- B. The causes of breast cancer are as yet unknown, but certain risk factors may put a person at higher risk of developing it. Such risk factors include: a person's age, personal health history, diet, and genetic factors. Only 5-10% of the women who develop breast cancer have genetic factors as the cause of their disease.
- C. In recent years, the genes that are involved in breast cancer have been identified as BRCA1 and BRCA2.
- D. Women who develop a mutation* in either of the two genes have a significantly higher risk of developing breast cancer.
- E. Breast cancer cannot be cured except by surgical removal of the affected tissues.
- F. Our company offers a blood test to determine whether a woman carries a mutated BRCA1 or BRCA2 gene at a cost of approximately HK\$10,000.

* mutation: a sudden change in the chemical or physical structure of a gene, which may lead to development of cancer

With reference to the above statements, explain whether you think it is worthwhile for a woman in her twenties to have the blood test offered by the company. (20 marks)

2. Consider the following graph, which shows the actual production of nuclear power in the period 1955-2000 and its year-2000 production as projected in 1977, 1980, and 1990:



Source: *World Nuclear Industry Handbooks*.

- (a) Describe the changes in the three projections of nuclear power production as shown on the graph and suggest reasons for the changes. (8 marks)
- (b) Comment on the changes that you described in (a) in relation to long-term planning for nuclear technology and discuss how your comments can benefit developers of other new technologies in their long-term planning. (12 marks)

3. Consider the following table related to various means of transport in Hong Kong:

	Year First Operated	Fleet	Route Coverage	Adult Fare (HK\$) and Approximate No. of Passengers per day	Remarks
Peak Tram	1888	2 cars, pulled by steel cable	a 1.4 km line running between Central and the Peak, with 4 stops, climbing 373 m	\$20 10,000 passengers, mainly sightseers	has not had an accident since commencement
Star Ferry	1888	developed from 4 single-deck vessels into 12 double-deck vessels, with air-conditioned upper deck cabin	between Hung Hom and Wanchai, Hung Hom and Central, Central and Tsim Sha Tsui	\$1.70 - \$5.30 72,000 passengers	introduced the first diesel-engined ferry in 1933
Tram	1904	164 trams, including 2 tourist trams	6 routes in northern part of Hong Kong Island, with a total length of 16 km	\$2 240,000 passengers	the world's only fully double-decked tram fleet
KCR East Rail	1910	444 train cars	domestic services with 13 stations from Hung Hom to Lo Wu; intercity services to Beijing, Shanghai and Guangzhou	Standard Class: \$3.5 - \$9; \$20 - \$33 for journeys to Lo Wu 800,000 passengers	electrification and double-tracking began in 1973 and completed in 1983; network supported by feeder buses
KMB	1933	106 single-deckers in 1933, 4,430 buses in October 2003, mostly double-deckers	327 bus routes in Kowloon and the New Territories and 61 cross-harbour routes	\$1.2 - \$38 3,110,000 passengers	uses a computerised system to monitor operations and efficiency
MTR	1979	140 train cars in 1979, 1,050 train cars in 2002	an 88-km railway network with 49 stations, of which 13 are interchange stations providing transfer between the 6 lines	\$4 - \$26; \$60 - \$100 for Airport Express 2,300,000 passengers	operates with automatic control and protection systems

- (a) (i) Which means of transport shown in the table above do you think would be the first to cease operations? Explain your answer. (6 marks)
- (ii) Why does that means of transport still exist in Hong Kong? (6 marks)
- (b) Select *one* of the means of transport shown in the table and explain how it could be improved with modern technology. (8 marks)

SECTION 2

Answer *one* question from this section.

4. Mary believes that substances dissolve faster in hot water than in cold water. To verify this, she prepares two cups of water. One is hot and the other is cold. Then she puts a spoonful of sugar into each of the two cups. She observes that the sugar in hot water dissolves faster than that in cold water.

- (a) Discuss whether Mary's experiment can be seen as an example of the scientific method. (10 marks)
- (b) How can Mary's experiment be improved to satisfy the requirements of a scientific investigation? Explain your answer. (10 marks)

5. Assume that the following statements are true:

- A. We can inexpensively sequence the complete genetic information of any person.

B. The genetic information of millions of people can be conveniently stored in and retrieved from computers.

C. Criminals can hardly avoid leaving some of their genetic material behind when they commit crimes.

D. With the newest technology, the chance is less than one in a million for the genetic material of one person to be mistaken for that of another person.

Do you think that the government should keep a record of the genetic information of every person so that people who have committed crimes can be traced effectively by police forces? Explain your answer.

(20 marks)

6. Nowadays more and more young people commit Internet crimes. Consider the following three cases:

Case 1

A Secondary Five student set up a website to offer free downloading of Japanese songs, stories about movie stars, and information on Japanese drama series. Visitors to the website could place orders via email if they were interested in buying certain Japanese drama series. The student would then deliver the drama series either by mail or in person, after payment was confirmed.

Case 2

A university student prides himself on being a 'super-hacker'. Once he hacked into four fellow students' computers to look at their homework. He was discovered and was made to withdraw from his studies. Probably out of resentment, he stole the password of another student through the Internet, and lodged a withdrawal application via email in that student's name. He also changed that student's address and telephone number, so that the university could not contact the victim to confirm the withdrawal.

Case 3

On April Fool's Day in 2003, using the name of a news website, a 14-year-old student spread via email information that Hong Kong had been declared a SARS-infected port. The news immediately stirred up panic in the community, which rapidly bought up food and daily necessities.

- (a) In the three cases above, which student do you think has committed the most serious Internet crime? Explain your choice. (10 marks)
- (b) Discuss why some young people commit Internet crimes. (5 marks)
- (c) Suggest ways to prevent young people from committing Internet crimes. (5 marks)

7. In October 2003, China successfully launched its first manned spacecraft Shenzhou-V. Consider the following comments on the launch:

Comment A

President Hu Jintao: "This is an honour for our great motherland, an indicator for the initial victory of the country's first manned space flight and for a historic step taken by the Chinese people in their endeavour to reach the peak of the world's science and technology."

Source: URL: http://english.people.com.cn/200310/15/eng20031015_126054.shtml.

Comment B

A Japanese government spokesman: "We once again realise that China has considerable technological might. It is good if it is used for peaceful purposes. What matters is whether there is an intention of military use. We must see to it that this is not an era for that."

Source: URL: http://www.ptd.net/webnews/wed/ab/Qchina-space-japan.RxTZ_DOg.html.

Comment C

A local China critic: "Millions of people in China are still earning less than US\$1 per day. Some RMB18 billion (US\$2.17 billion) has been spent on China's manned space flight programme. Such a huge amount of money will have a much better effect if it is used in social and economic development."

Comment D

China's commander and chief designer of the space application system: "Each launch of the Shenzhou spaceships has yielded a wealth of scientific information and led to the development of a series of new techniques and methods. The many experiments conducted aboard Shenzhou spaceships have provided important data crucial to future studies in life science and material industry."

Source: URL: http://english.peopledaily.com.cn/200310/21/eng20031021_126500.shtml.

Upon the successful launch of Shenzhou-V, China announced a plan to launch another manned spacecraft within two years, which would cost about RMB1 billion. The Shenzhou-VI mission is not intended to involve space walking or docking, but the spaceship will probably carry more astronauts. In the light of the comments above, discuss whether it is worthwhile implementing such a plan. (20 marks)

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