

**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. Study the following table:

**Global Consumption of Renewable Energy 1980-2000**  
(Unit: Millions of Tons of Standard Coal)

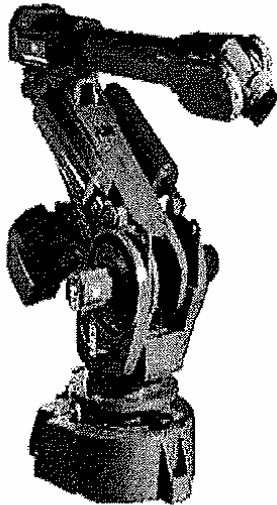
<i>Source of Renewable Energy</i>	<i>Year</i>				
	1980	1985	1990	1995	2000
<b>Biomass</b> (e.g. plants, animals and the materials they produce such as wood and animal droppings)	1,207	1,308	1,465	1,683	1,955
<b>Water power</b>	600	710	850	1,020	1,200
<b>Geothermal power</b>	13	27	52	87	140
<b>Wind power</b>	3	5	17	90	200
<b>Solar power</b>	2	6	20	69	140

Source: 吳熙敬 (主編) 《中國近現代技術史》。北京：科學出版社，2000.

- (a) In terms of quantity of consumption, which form of renewable energy had the greatest increase during the period 1980-2000? Suggest *two* reasons for this phenomenon. (5 marks)
- (b) Which form of renewable energy had the greatest percentage increase in consumption during the period 1980-2000? Suggest *two* reasons for this phenomenon. (5 marks)
- (c) What difficulties may the Hong Kong government face if it intends to develop biomass energy projects? What measures can it take to overcome such difficulties? (10 marks)

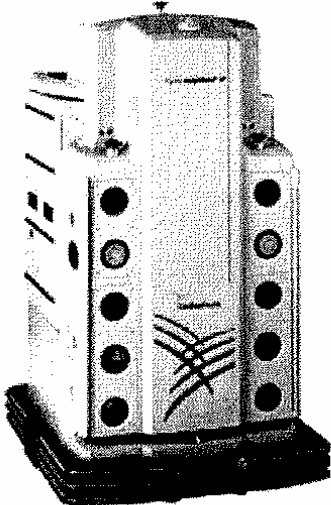
2. Consider Sources A and B:

Source A

	<p><b>IRB6400</b> (2,050 kg, 2.24 m high, with position sensor)</p> <p>This Swedish-made industrial robot works around the clock without significant human input. It builds pickup truck bodies in a General Motors factory where about 300 robots can produce 73 truck bodies an hour - a pace that human beings cannot match. Working surprisingly quietly, these robots are increasingly moving human workers away from exhausting, dangerous, and repetitive tasks to more mentally rewarding jobs.</p>
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Source: Picture: URL: <http://www.wolfhenk.de/Robots/assets/images/IRB6400.jpg>.  
Text: Peter Menzel & Faith D'Aluisio, *Robo sapiens: evolution of a new species*, Cambridge, Mass.: MIT Press, 2000.

Source B

	<p><b>Helpmate</b> (around 1 m high, battery operated, worth US\$100,000 each)</p> <p>This robot works in healthcare facilities across the USA and in several other countries to deliver patients' meal trays to nurses, to transport food, drugs and hospital wastes, and to perform simple patient-care functions such as guiding patients through hospital corridors. When its sensors detect people blocking its way, the robot can steer around them, or politely ask them to stand aside.</p>
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Source: Picture: URL: <http://www.pyxis.com/ProdDetails.aspx?cid=3&pid=64>.  
Text: Peter Menzel & Faith D'Aluisio, *Robo sapiens: evolution of a new species*, Cambridge, Mass.: MIT Press, 2000.

- Describe the possible strengths and weaknesses of each of the robots in Sources A and B in terms of making contributions to humankind. (8 marks)
- Choose **one** of the two robots above, and suggest what functions that are currently technologically possible could be added to improve the robot. (4 marks)
- To what extent do you think the future of humankind depends on the development of robot technology? (Hint: You may consider the areas where robots can or cannot replace human beings in future.) (8 marks)

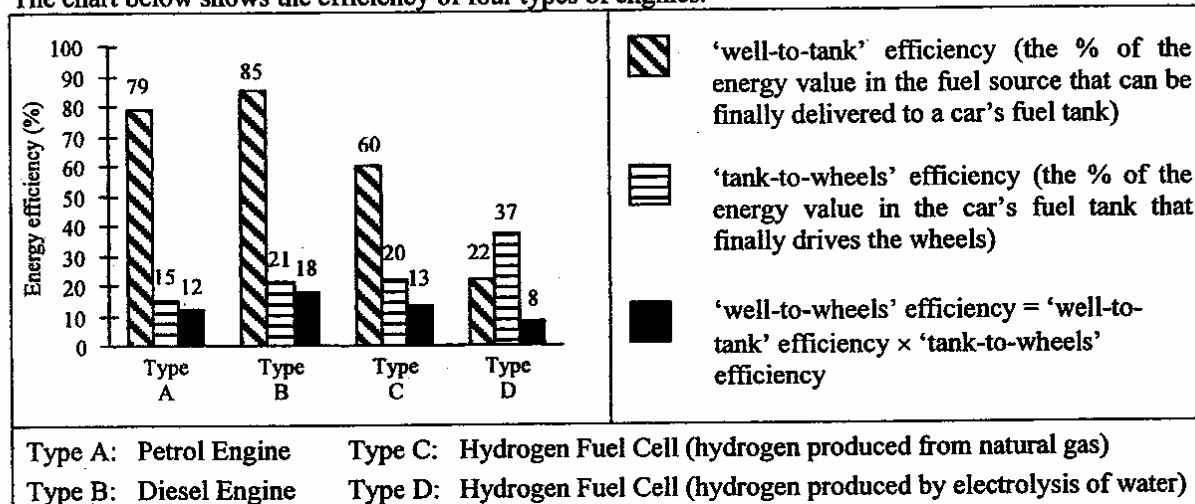
3. Consider Sources A, B and C below regarding the efficiency and cleanliness of hydrogen fuel cells:

#### Source A

- Most cars today use petrol engines. Recently some car companies have been developing cars driven only by electric motors powered by hydrogen fuel cells.
- Hydrogen does not exist by itself in nature. It can be produced by cracking natural gas or by the electrolysis of water.
- Hydrogen production is somewhat wasteful and dirty, but once produced, hydrogen fuel is both efficient and clean.

#### Source B

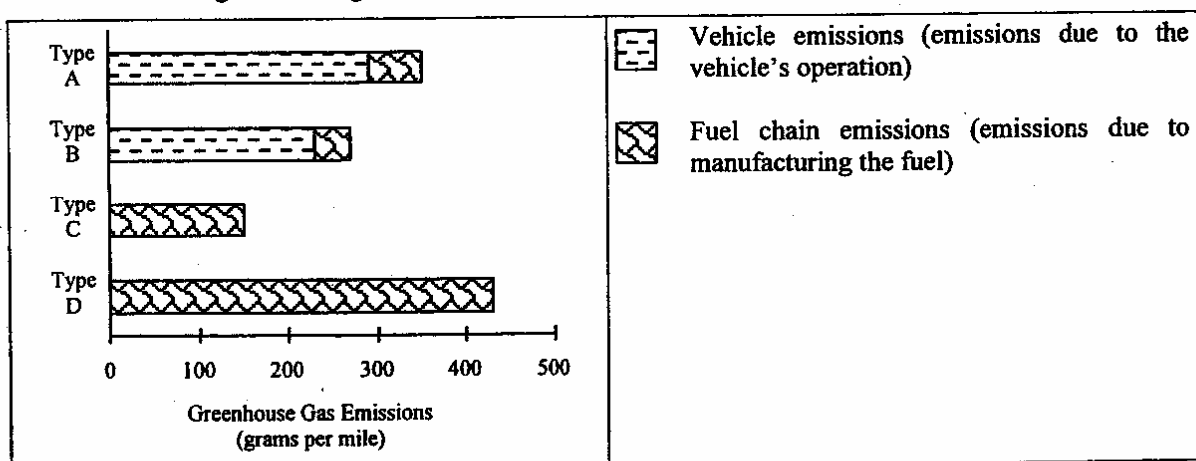
The chart below shows the efficiency of four types of engines.



Source: *Scientific American*, Vol. 290, No.5, May 2004.

#### Source C

The chart below shows the cleanliness of the same types of engines mentioned in Source B in terms of their emissions of greenhouse gases.



Source: *Scientific American*, Vol. 290, No.5, May 2004.

- (a) "Hydrogen fuel is better than petrol in terms of both efficiency and cleanliness." Discuss how far this statement is true in the light of Sources A, B and C. (10 marks)
- (b) "Hydrogen is the fuel for tomorrow, and the government should subsidise the development of hydrogen fuel and its application." Comment on this view in the light of Sources A, B and C. (10 marks)

## SECTION 2

Answer *one* question from this section.

4. Consider the following extract, which is related to data gathered from an on-line survey conducted in May 2004 by a youth organisation in Hong Kong on its website, regarding young people's participation in on-line games.

The interview attracted 367 respondents, of which 66% were male and 34% were female, and 95% were aged from 10 to 29. On average, the respondents had played on-line games for almost 3 years. In the previous year, slightly fewer than half of them had participated in paid on-line games, and slightly more than half participated only in free on-line games. On average, respondents who participated in paid on-line games played 4 hours a day on 5.7 days a week (i.e. 22.8 hours a week), and paid \$138 a month for playing the games.

Source: URL: <http://www.breakthrough.org.hk/ir/researchlog.htm>.

- (a) In the light of the extract, analyse the possible effects of on-line games on the life of the young people responding to the interview. (10 marks)
- (b) Apart from offering entertainment, what *beneficial* uses may on-line games have? Explain your answer. (10 marks)

5. Consider the following passage:

In 2004, the SpaceShipOne vehicle won a competition to send a non-government, three-person craft into space twice within two weeks.

Sir Richard Branson, the boss of the British Virgin Group, announced an agreement with the team behind the SpaceShipOne vehicle to take tourists into space. The spaceship will take five passengers each time. The first flight should occur in 2007. Each passenger will be charged around HK\$1,620,000 for a trip which will take three hours, including three minutes of weightlessness and a seat with a spectacular view. They will receive three days' pre-flight training. It is estimated that three thousand people worldwide would like to take such a trip.

The new service will be called 'Virgin Galactic'. The total investment will be about HK\$840,000,000. Five bigger versions of SpaceShipOne will be built in five years. "Virgin Galactic will be run as a business, but a business with the sole purpose of making space travel more and more affordable," Branson said. "Those privileged space pioneers who can afford to take our flights will not only have the most awesome experience of their lives, but will also bring the dream of space travel for many millions closer to reality."

Source: Adapted from URL: [http://abcnews.go.com/wire/Business/ap20040927\\_1828.html](http://abcnews.go.com/wire/Business/ap20040927_1828.html).

Discuss the merits and demerits of developing space tourism in the light of the Virgin Galactic project and the common justifications (e.g. advancement of human knowledge) and criticisms (e.g. inappropriate use of valuable global resources) for space exploration. (20 marks)

6. Consider Sources A and B:

**Source A**

In 1991 Mr Tang suffered injuries in an accident. Since then he has been able to move his head only slightly and other parts of his body are paralysed. Every day, round the clock, he has to lie in his bed and needs help in eating and drinking, for hygiene, and to turn his body. In 2004 he wrote a letter to the SAR Chief Executive by tapping on a computer keyboard with a chopstick held in his mouth. He asked the SAR Chief Executive to consider legalising euthanasia.

In 2004 the Jockey Club Rehabilitation Engineering Centre (REC) of the Hong Kong Polytechnic University designed a 'Reflective Lens Input System' for Mr Tang. The system, with a computer screen which Mr Tang can see, allows him to operate the computer by controlling the cursor with a reflective point stuck to the tip of his nose. With this device, Mr Tang no longer needs to hold a chopstick in his mouth to tap the computer keyboard in order to write.

**Source B**

In 1995 Christopher Reeve, who played the title character in the 'Superman' movie series, fell from a horse and was injured. He was paralysed from the neck down. He died in 2004. He had been a strong advocate of stem cell research, which may in future enable people suffering from spinal cord injury to walk again.

Comment on how far advanced technology can help solve or reduce the problems encountered by people suffering from spinal cord injuries. (Hint: You may refer to the advanced technologies mentioned in Sources A and B or other technologies you can think of.) (20 marks)

7. When an American psychology professor was asked to name 'the most influential invention in the past 2,000 years', he suggested television. The extract below is a summary of his views.

Changes in mating patterns can affect the subsequent evolutionary course of entire species. Television has changed people's criteria for choosing their life's partners. It has increased the importance of physical appearance. The importance attached to physical appearance has heightened the intensity of same-sex competition for mates, particularly among women. Women's exposure, through television, to attractive female models lowers their self-esteem. Men's exposure to attractive female models decreases the commitment they feel towards their regular partner. The skyrocketing rates of eating disorders in America, spreading to European countries, may come from same-sex competition caused by the increasing importance people place on personal appearance.

Source: John Brockman (ed.), *The Greatest Inventions of the Past 2,000 Years*, London: Weidenfeld & Nicolson, 2000.

- (a) With reference to your own observations and experiences, how far do you think the professor's description of the influences of television also fits the present Hong Kong society? (10 marks)
- (b) To what extent do you agree to the professor's arguments concerning television as the most influential invention of the past 2,000 years? Explain your answer. (10 marks)

**END OF PAPER**