



**DESIGN TECHNOLOGY  
 HIGHER LEVEL  
 PAPER 3**

Friday 11 May 2001 (morning)

1 hour 15 minutes

Name

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Number

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**INSTRUCTIONS TO CANDIDATES**

- Write your candidate name and number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all of the questions from two of the Options in the spaces provided. You may continue your answers in a continuation answer booklet, and indicate the number of booklets used in the box below. Write your name and candidate number on the front cover of the continuation answer booklets, and attach them to this question paper using the tag provided.
- At the end of the examination, indicate the letters of the Options answered in the boxes below.

OPTIONS ANSWERED		EXAMINER	TEAM LEADER	IBCA
		/20	/20	/20
		/20	/20	/20
NUMBER OF CONTINUATION BOOKLETS USED	.....	TOTAL /40	TOTAL /40	TOTAL /40

**Option D – Food technology**

Approximately eight hours after a party at which a meal of chicken curry, fried rice and salad followed by ice-cream was served, a number of people were taken ill with diarrhoea.

Symptoms	Approximate time to onset of symptoms	Causative Organism	Growth Temperatures °C	Foods in the meal likely to cause the type of poisoning	Mode of Preparation
Upper gastro-intestinal tract symptoms (nausea, vomiting)	1-6 hrs	<i>Staphylococcus aureus</i>	7-45	Chicken curry	- prepared previous day and stored in fridge at 4 °C
Sore throat and respiratory symptoms	12-72 hrs	<i>Streptococcus pyogenes</i>	10-45	Salad Ice-cream	- prepared fresh - frozen
Lower gastro-intestinal tract symptoms (abdominal cramps, diarrhoea)	6-12 hrs	<i>Bacillus cereus</i>	10-49	Fried rice	- rice boiled and stored overnight at 20 °C before frying and serving
Neurological symptoms (visual disturbances, vertigo, tingling)	2 hrs-6 days (usually 12-36 hrs)	<i>Clostridium botulinum</i>	10-50	Chicken curry	- prepared previous day and stored in fridge at 4 °C

[Source: *The Bad Bug Book* <http://vm.cfsan.fda.gov/~mow.app2.html>]

**D1.** (a) What symptoms are associated with *Staphylococcus aureus* food poisoning? [1]

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(b) What is the approximate time to onset of symptoms for *Clostridium botulinum* food poisoning? [1]

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(c) Outline which organism and food is most likely to have caused the illness following the buffet meal. [2]

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(d) Explain how you would modify the preparation of the meal to avoid this problem. [2]

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**Option E – Computer aided design and manufacturing**

The image below shows a commercially available, wide field of view, head-mounted virtual reality display system. It has detachable stereo ear phones. The system can be used to overlay video over the user’s natural field of vision and provide what is called ‘augmented reality’.



[Source: <http://www.vrtech.com/products/nvision/datavisorlcd.asp>]

**E1.** (a) Define *virtual reality*. [1]

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(b) Outline the benefits of virtual reality applications to consumers. [2]

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(c) List **three** ways in which virtual reality helps conserve resources. [3]

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E2. Outline the role of spreadsheets in modelling. [2]

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E3. (a) Define computer integrated manufacture (CIM). [1]

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(b) Outline **one** advantage and **one** disadvantage of CIM to manufacturers. [2]

Advantage: .....

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Disadvantage: .....

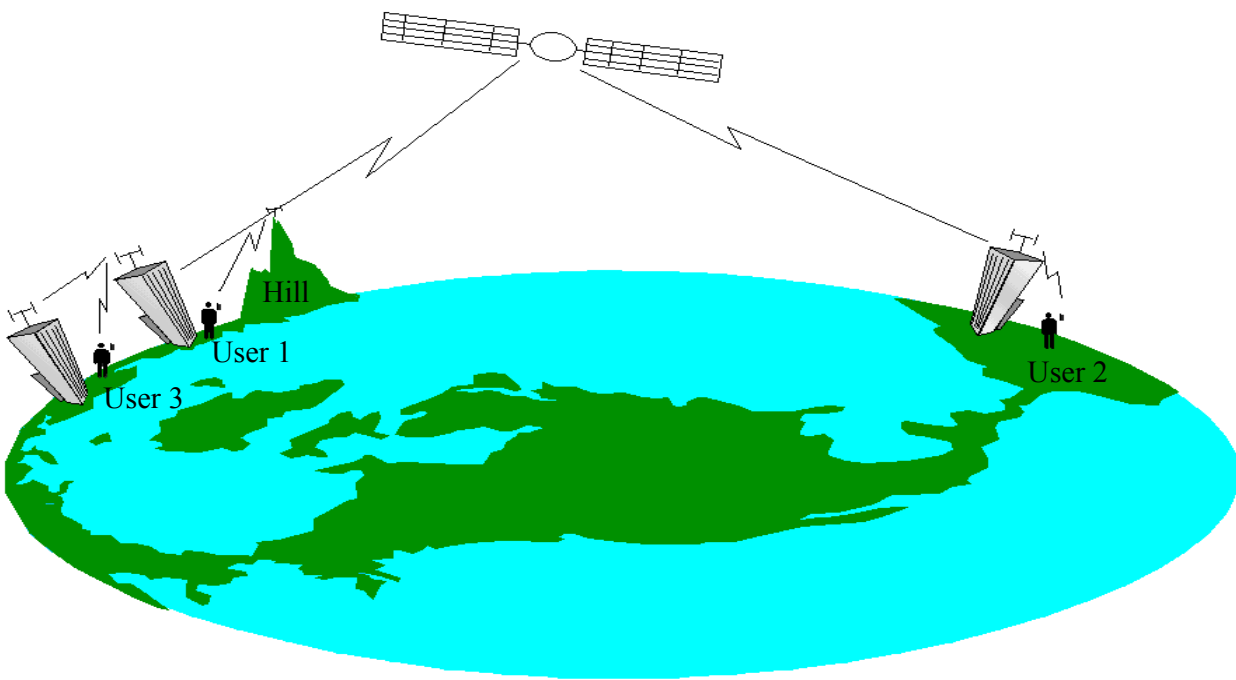
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E4. A kitchen furniture manufacturing company is carrying out cutting techniques on a material. This process results in the generation of an airborne dust which is hazardous to health. The manufacturer is considering the introduction of robots. Discuss the impacts of using industrial robots on the company. [9]

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**Option F – Invention, innovation and design**

In August 1999 two major satellite phone companies went bankrupt despite one company having launched 66 satellites and both companies having invested billions of dollars in the development. The satellite phone companies had underestimated the rapid expansion of land-based mobile phone systems. By the time the satellite systems were operational cell phone towers had been built along highways and on the top of buildings around the world. Compared with cell phones, handsets for satellite phones require larger power packs so the handsets are much more bulky, they are much more expensive to buy and the wavelengths they use mean that the phones do not work unless they have line-of-sight connection with the orbiting satellites.



**F1.** (a) State why user 3’s satellite phone does not work. [1]

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(b) Outline why there will never be world-wide coverage by cell phones. [2]

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(c) State **one** application where a satellite phone system would be an appropriate solution. [1]

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(d) Explain the impact of socio-economic need on the failure of the satellite phone. [2]

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**F2.** Outline how gears have been important in the development of the bicycle. [2]

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**F3. (a)** Define *invention*. [1]

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**(b)** Draw a simple model to describe the innovation process. [2]

**F4.** Discuss how lifestyle issues have influenced the development of the oven. [9]

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**Option G – Health by design**

Figure 1 shows a cross-section through a human eye. Figure 2 illustrates an optical defect. Figure 3 shows two lenses, A and B.

Figure 1

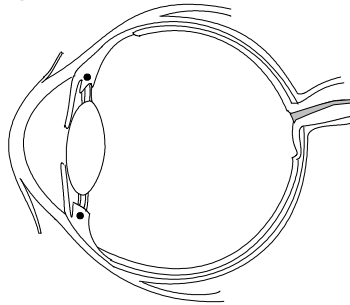


Figure 2

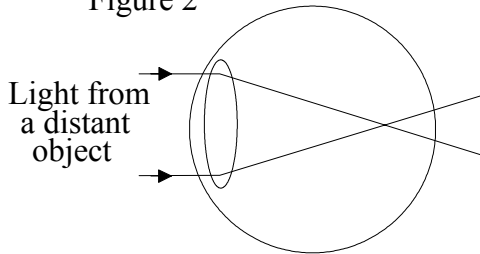
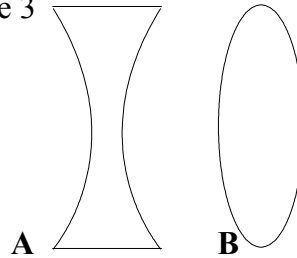


Figure 3



**G1.** (a) Identify the optical defect illustrated in Figure 2. [1]

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(b) Which of the lenses shown in figure 3 would be used to correct the optical defect illustrated in Figure 2? [1]

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(c) Outline how the lens corrects the optical defect. [2]

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(d) Explain how high refractive index glass benefits spectacle wearers. [2]

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**G2.** Outline **one** way in which Magnetic Resonance Imaging (MRI) is superior to Computer Tomography (CT) scanning. [2]

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**G3.** State **one** disadvantage of a metal/glass hypodermic syringe and needle. [1]

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**G4.** Outline how water can be made safe for human consumption. [2]

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**G5.** Evaluate the catalytic converter as a means of reducing pollution. [9]

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