IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
PROGRAMA DEL DIPLOMA DEL BI

N02/470/H(3)

DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 3

Tuesday 19 November 2002 (morning)

1 hour 15 minutes

Name

Number

INSTRUCTIONS TO CANDIDATES

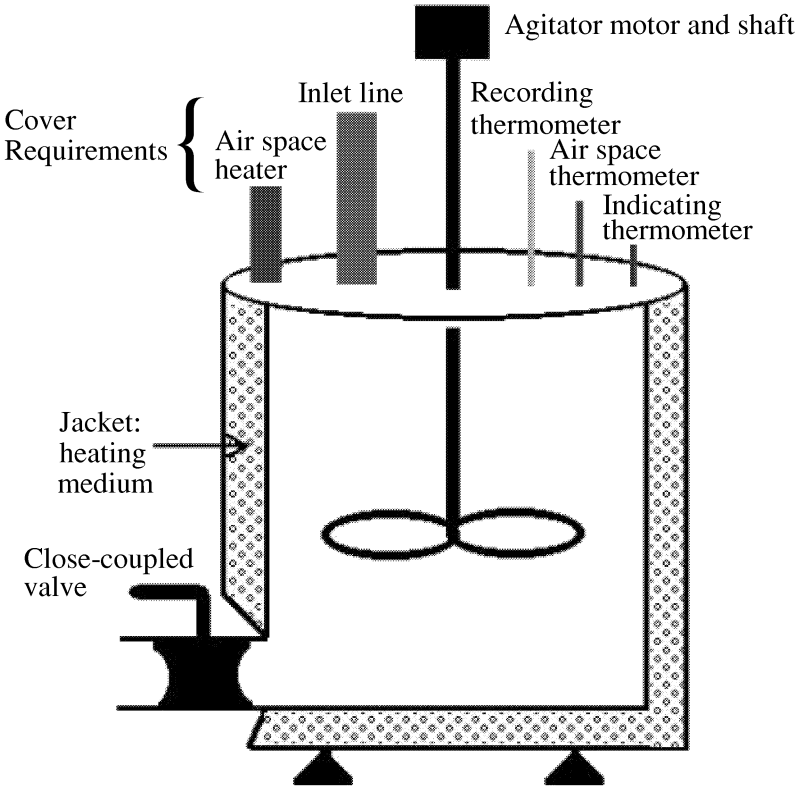
- Write your candidate name and number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all of the questions from two of the Options in the spaces provided. You may continue your answers in a continuation answer booklet, and indicate the number of booklets 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

D1. Raw milk is often infected with disease-causing micro-organisms (pathogens), *e.g.* those causing tuberculosis. Such micro-organisms are heat-sensitive and, whilst they grow well at temperatures between 15 and 45 °C (the temperature danger zone), they are killed at higher temperatures. Raw milk can be pasteurized by heating to and maintaining at 63 °C for not less than 30 minutes in a batch pasteurizer or it can be heated to higher temperatures for much shorter periods of time, *e.g.* 72 °C for 15 seconds.

Batch Pasteurizer



(a) State **one** additional benefit of pasteurizing raw milk, apart from killing pathogenic micro-organisms. *[1]*

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(b) Outline an alternative to batch processing for the pasteurization of the milk. *[2]*

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(This question continues on the following page)

(Question D1 continued)

(c) Suggest why batch pasteurization uses 63 °C for 30 minutes rather than higher temperatures for much shorter times. *[3]*

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D2. Outline how **one** organoleptic property of a food is designed for a particular segment of the market. *[2]*

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D3. (a) Define *shortening*. *[1]*

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(b) Outline how shortening affects the physical properties of biscuits. *[2]*

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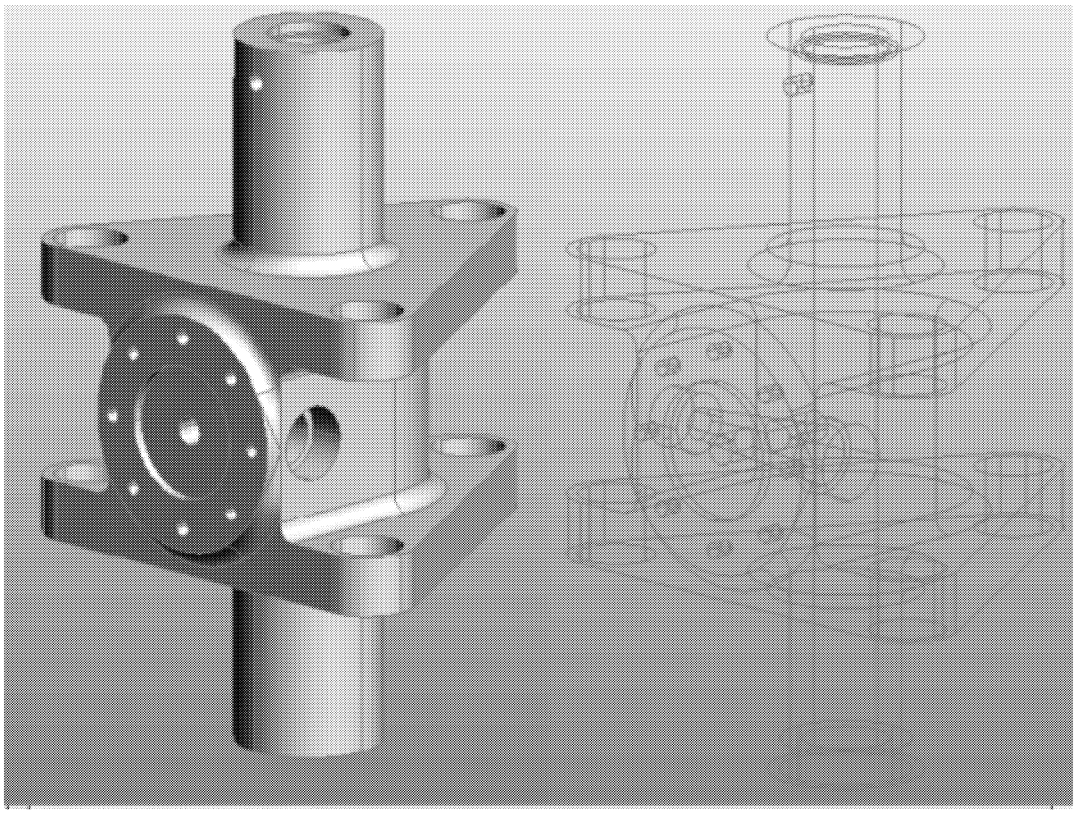
D4. Discuss the issues surrounding the labelling of a food that contains ingredients that have been produced using gene transfer techniques and is to be distributed globally. *[9]*

Option E – Computer aided design and manufacturing

E1. The photograph below shows a solid model and a wire frame model of a component.



(a) Define *wire frame modelling*. *[1]*

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(b) Outline how wire frame modelling helps communication between the designer and manufacturer. *[2]*

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(c) Discuss the order in which solid models and wire frame models are used by designers. *[3]*

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E2. Outline why NC has not become obsolete in certain applications, *e.g.* in the textile industry. *[2]*

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E3. (a) Define *Just-in-Case* (JIC). *[1]*

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(b) Outline how JIC can help a manufacturer respond to rapid changes in demand. *[2]*

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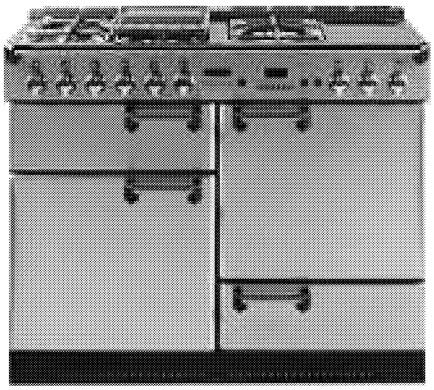
E4. Discuss the advantages and disadvantages of using an expert system to help employees running a 24-hour customer support service. *[9]*

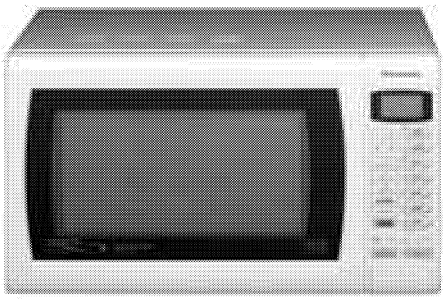
Option F – Invention, innovation and design

F1. The photographs below show two domestic ovens, A and B. Oven A is from a range of traditional style ovens that have essentially remained unchanged from a design perspective for almost 100 years. Oven B is a microwave. Oven A remains on and is never switched off contributing not only to cooking but also to space heating in the home.

Oven A



Oven B



(a) Identify lifestyle factors that favour the selection of Oven A. *[2]*

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(b) Oven B is designed with inbuilt obsolescence. Outline the advantages of obsolescence for the consumer. *[2]*

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(c) Outline why Oven A has not become obsolete. *[2]*

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F2. Identify **two** reasons why safety was a low priority for designers in the early stages of the development of the bicycle. *[2]*

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F3. Explain why re-innovation is an important element of the product cycle for many consumer products. *[3]*

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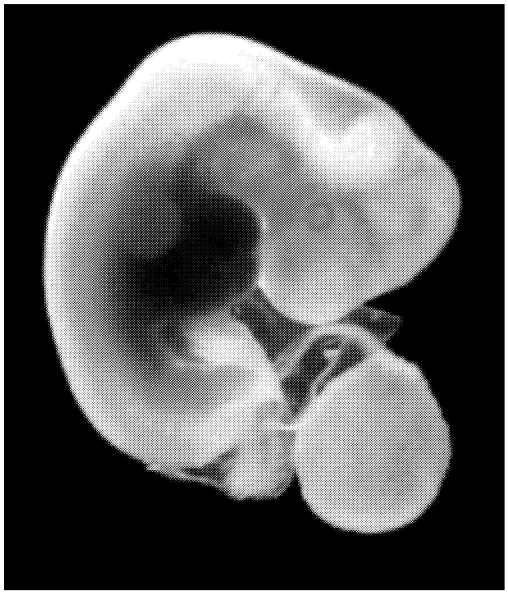
F4. A company is considering the development of a "high tech" consumer product. Discuss **three** barriers to innovation that the company needs to consider. *[9]*

Option G – Health by design

G1. The photograph below shows a 41-day-old embryo. The photograph has been produced with the aid of Magnetic Resonance Imaging (MRI) techniques. MRI can be used to study the normal and abnormal development of an embryo in its mother's womb.



[Source: http://www.sciam.com/1999/0399issue/0399smithbox6.html]

(a) State how electrical pulses are generated in MRI. *[1]*

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(b) Outline why MRI is superior to computer tomography (CT) scanning for studying the developing embryo. *[2]*

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(c) Explain **one** factor to be considered before installing MRI equipment in a hospital. *[3]*

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G2. (a) State **one** disadvantage of using a liquid-in-glass medical thermometer for measuring patients' temperatures. *[1]*

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(b) Outline the operation of a thermistor as a temperature measuring device. *[2]*

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G3. Describe how high refractive index glass has benefited spectacle wearers. *[2]*

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G4. Discuss the implications for motor car designers and manufacturers of international policies focused on lowering air pollution. *[9]*