INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 2

Name

Number

Tuesday 13 November 2001 (afternoon)
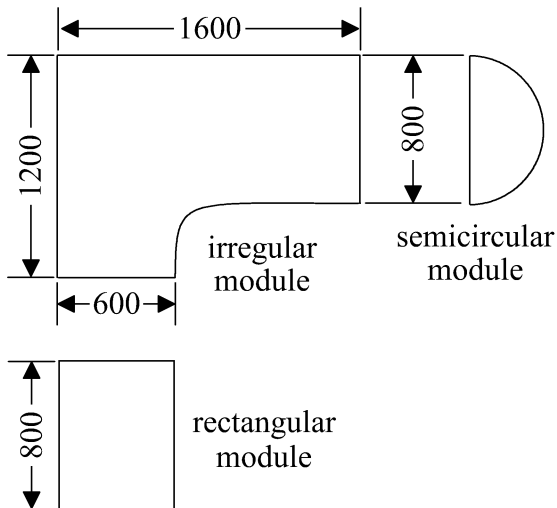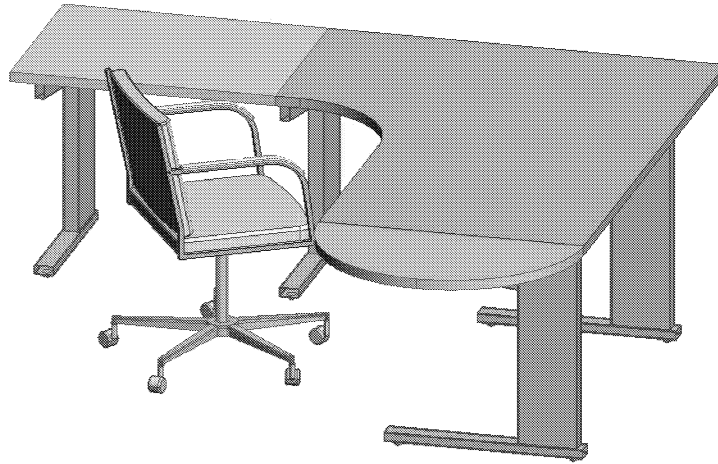
1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Write your candidate name and number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: Answer all of Section A in the spaces provided.
- Section B: Answer one question from Section B. Write 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 number of the Section B question answered in the box below.

QUESTIONS ANSWERED		EXAMINER	TEAM LEADER	IBCA
SECTION A	ALL	/32	/32	/32
SECTION B	. . . .	/20	/20	/20
NUMBER OF CONTINUATION BOOKLETS USED	. . . .	TOTAL /52	TOTAL /52	TOTAL /52

SECTION A

*Candidates must answer **all** questions in the spaces provided.*

1.   Modular office furniture can provide flexible, attractive solutions. Users can choose from a range
      of modules and combine them to provide the personal workspace required.

Support Frame options.

The modules used to create the
L-shaped layout shown in the picture.

All dimensions are mm.

Frame A
Cantilever Style

Frame B
Conventional Style

irregular
module

semicircular
module
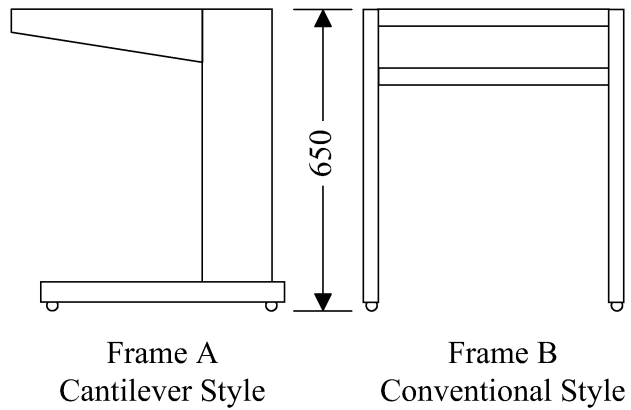
rectangular
module

(This question continues on the following page)

(Question 1 continued)

(a) (i) State the dimension that must be common to all the modules. *[1]*

....

....

(ii) Calculate the smallest rectangular floor area into which the L-shaped layout will fit. *[2]*

....

....

(b) (i) State **two** other ergonomic considerations other than anthropometric ones that should be taken into account in the design of the workspace. *[2]*

....

....

(ii) The cost of a plastic laminate top on Frame B is $1750. Identify the options available if the budget is increased to $2000. *[3]*

	Percentage Increase (x %)	
Top Finish	**Frame A**	**Frame B**
Plastic Laminate	+10 %	0 %
Ash Veneer	+22 %	+12 %
Teak Veneer	+19 %	+8.5%
Oak Veneer	+17 %	+7.4 %

....

....

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....

(This question continues on the following page)

Turn over

(Question 1 continued)

(c) (i) Identify **two** criteria that can be used to select between the oak veneer and the plastic laminate. *[2]*
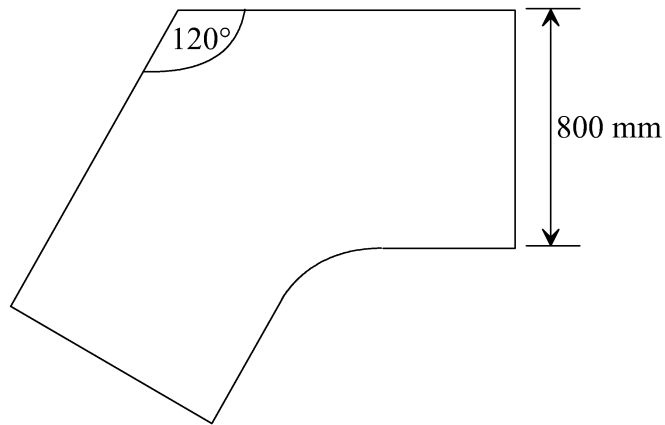
....

....

(ii) Suggest **two** reasons why Frame A is 10 % more expensive than Frame B. *[2]*

....

....

(iii) Explain why the vertical cross-section of the top member of Frame A is non-uniform whilst in Frame B it is uniform. *[3]*

....

....

....

(d)

120°

800 mm

Evaluate the design potential offered by the introduction of this new module into the range. *[3]*

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....
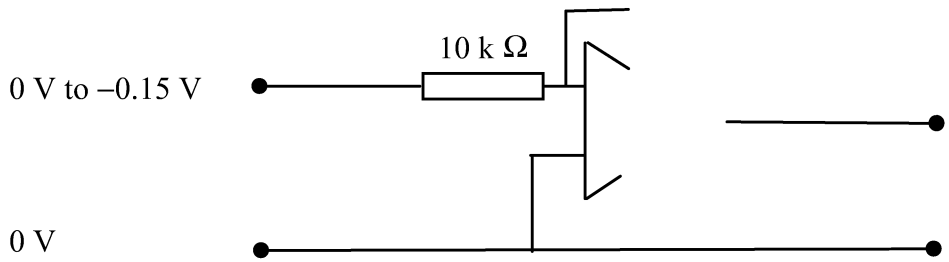
2. A sensor provides an output of 0 V to −0.15 V. An amplifier is required that can provide a switched output of either 0 V to 8.4 V or 0 V to 11.7 V.

(a) Calculate the gain required in each case. *[2]*

. . . .

. . . .

. . . .

(b) Complete the circuit diagram showing all the other necessary components and their values.

10 k Ω

0 V to −0.15 V

0 V *[4]*

3. Glass is used in a variety of situations. State **two** of the major raw materials used to make glass. *[2]*

. . . .

. . . .

4. A company has produced a new product for the mass market. The product is in prototype form.

(a) Outline **two** strategies for evaluating the product. *[2]*

. . . .

. . . .

. . . .

. . . .

(b) Identify **two** reasons for the manufacturer to evaluate the prototype of a product. *[4]*

. . . .

. . . .

. . . .

. . . .

SECTION B

*Answer **one** question. Up to three additional marks are available for the construction of your answer. Write your answers in a continuation answer booklet. 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.*

5. The child's toy car shown is powered by a DC electric motor revolving at $9000 \text{ rev min}^{-1}$. The toy must travel 15 m at a speed of 15 m min^{-1}. The wheels are 33 mm in diameter. $[\pi = 3.14, \text{ circumference} = \pi d]$.

    (a)   (i)   Define *Velocity Ratio* (VR).   *[1]*

            (ii)   Calculate how many times a wheel must turn to cover the required distance of 15 m in one minute and state the required velocity ratio.   *[4]*

    (b)   Describe **two** different methods of transferring the drive from the motor to the wheels to produce the required speed. Use drawings to help the descriptions.   *[4]*

    (c)   Design a drive system for the model car so that it can be driven forwards and reversed.   *[8]*

6. 'Energy is an expensive commodity for the manufacturer, the user and the eventual disposer of any product.'

    (a)   (i)   List **two** uses of energy by the manufacturer of domestic appliances.   *[2]*

            (ii)   Outline **three** ways in which energy considerations can influence the design of a vacuum cleaner.   *[3]*

    (b)   Suggest **two** ways in which the siting of a manufacturing plant can influence the energy uses of a manufacturer.   *[4]*

    (c)   Discuss the design considerations that would be necessary to maximise the life of a product and minimise energy use throughout the whole product cycle.   *[8]*

7. In crowded urban areas the need to control the parking of cars and other vehicles is very important.
    Much of this work is now done by automatic systems. The diagram shows a proposed entry and exit
    system to be used for a car park in a shopping complex.
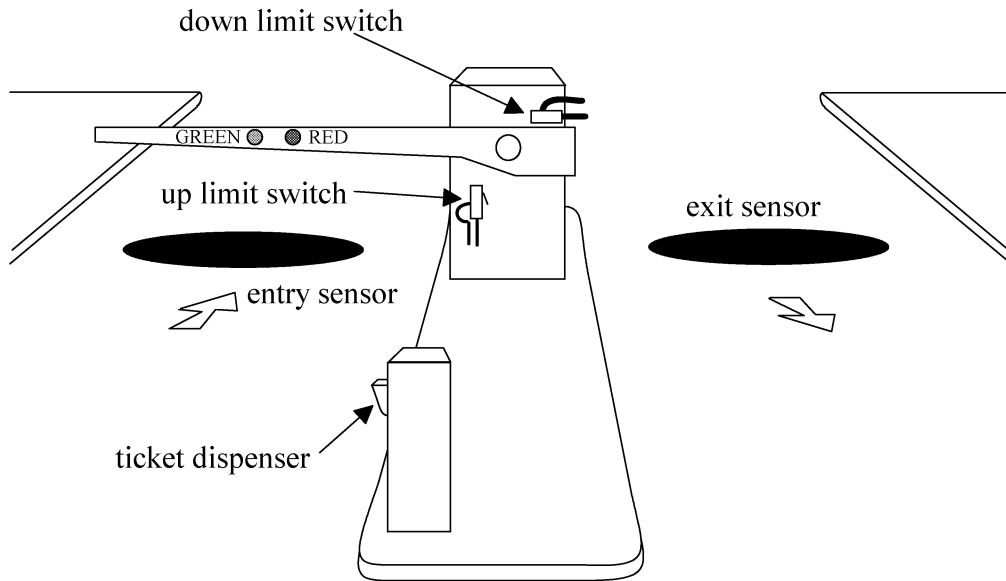
The system has INPUT and OUTPUT aspects as follows:

Inputs	Ticket Dispenser Limit switches for the barrier Entry sensor Exit sensor
Outputs	Barrier UP Barrier DOWN Green light (spaces available) Red light (car park full)

(a) Draw the circuit symbol for the motor.   [1]

(b) (i) List **two** criteria for the selection of the entry/exit sensors.   [2]

    (ii) Identify a suitable sensor to meet the criteria listed.   [1]

(c) Describe **two** safety considerations that need to be included in the specification for the entry system.   [4]

(d) Design a logic circuit to control the entry of cars to include safety considerations.   [9]