INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

M01/470/S(2)

DESIGN TECHNOLOGY
STANDARD LEVEL
PAPER 2

Thursday 10 May 2001 (afternoon)

1 hour

Name

Number

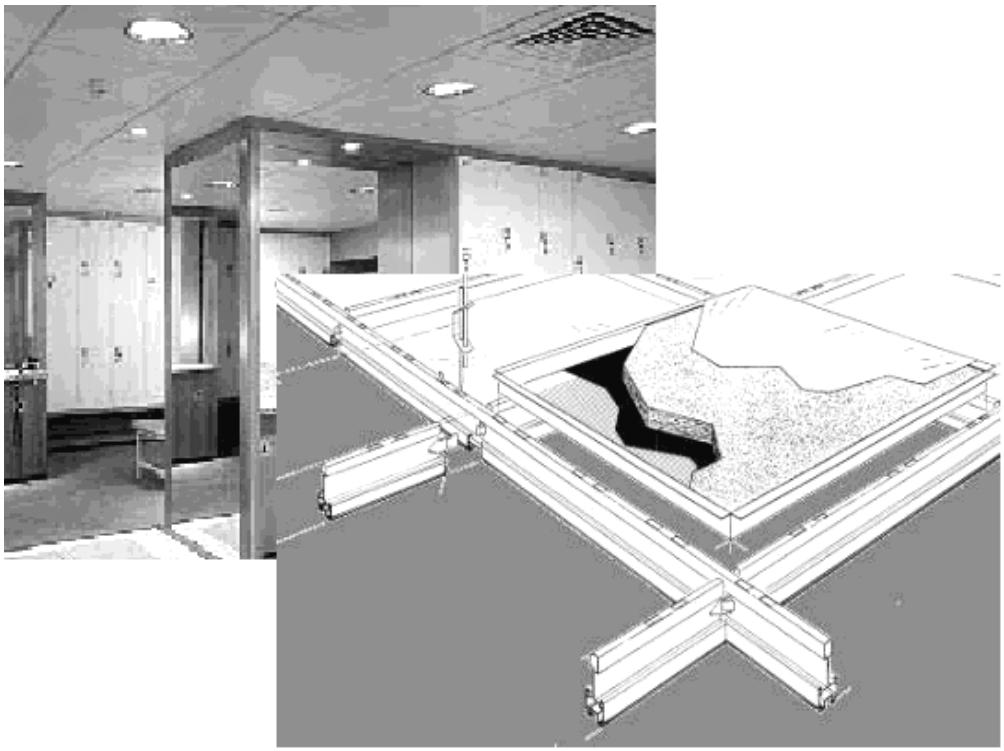
INSTRUCTIONS TO CANDIDATES

- Write your candidate name and number in the boxes above.
- Do not open this examination paper until instructed to do so.
- 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	/20	/20	/20
SECTION B	. . . . .	/20	/20	/20
NUMBER OF CONTINUATION BOOKLETS USED	. . . . .	TOTAL /40	TOTAL /40	TOTAL /40

SECTION A

1. Suspended ceilings are widely used in new buildings and to refurbish older buildings. The suspended ceilings allow easy access to the roof space, provide a decorative feature that is easy to modify, conceal pipes and cables, and reduce noise transmission and reflection.



The aluminium channel is suspended from the roof structure by hangers to form a matrix into which the tiles are fixed. The tiles are 750 mm × 750 mm square and are suspended in the aluminium frame which hangs from the roof support. Combinations of materials can be assembled to achieve the required effect as shown in the table.

Tile No.	Fibre Board mm	Acoustic Fleece mm	Tissue mm	Rockwool mm	Foil mm	Perforated Panel mm	Sound Reduction dB	Mass kg m^{-2}
1	16		0.05	15	0.5		22	2.52
2	18	16	0.05	32	0.9	2.0	40	2.98
3	20		0.05	40	1.0	4.5	44	3.77
4	20		0.05	50	1.2	15.0	46	4.28

(a) (i) Which tile offers the greatest sound reduction? *[1]*

. . . . . .

(ii) Identify a context where sound reduction is an important consideration. *[1]*

. . . . . .

(This question continues on the following page)

(Question 1 continued)

(b) (i) Calculate the area of each tile. *[1]*

. . . . . .

. . . . . .

(ii) Calculate the mass of 25 of tile number 2. *[3]*

. . . . . .

. . . . . .

. . . . . .

(c) Explain **two** factors to be taken into account when specifying tiles for use in the ceiling of a restaurant kitchen. *[4]*

Factor 1: . . . . . .

. . . . . .

. . . . . .

Factor 2: . . . . . .

. . . . . .

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2. Explain why stiffness is an important property of materials used for the wing of a glider (an aeroplane without an engine). *[2]*

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3. (a) Outline the difference between an analogue and a digital signal. *[2]*

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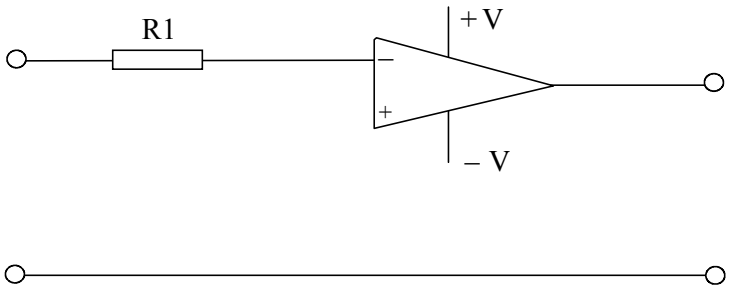
(b) A movement sensor produces a voltage of 0 V to –50 mV. An amplifier is required to take the signal and produce an output of 0 V to 1.35 V.

Complete the following op-amp circuit to fulfil the specification given showing all necessary components and their values $(R1 = 10\ k\Omega)$. *[4]*



4. State **two** advantages of mechanising a production process. *[2]*

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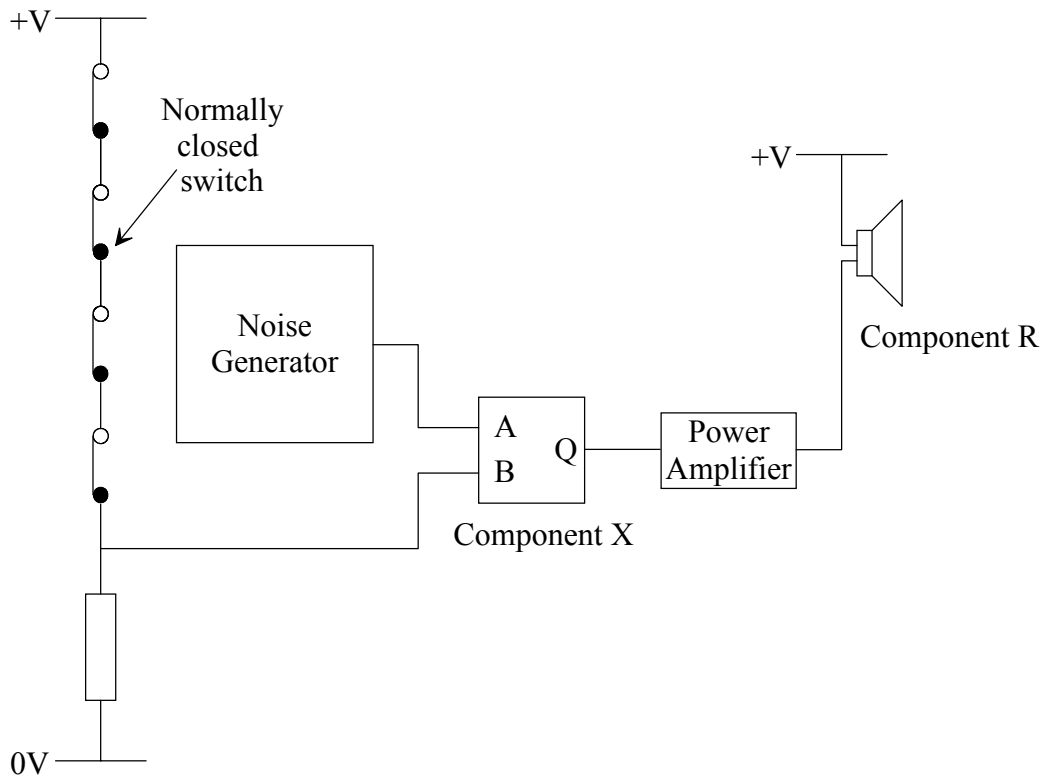
SECTION B

*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 designer's sketch shows an idea for part of a security system in a designer clothes shop, installed to prevent theft of the clothes.



(a) Describe how the security system works. *[2]*

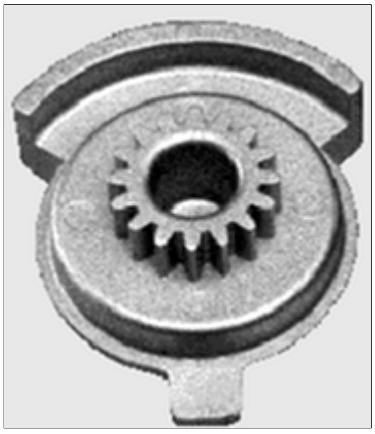
(b) (i) State the component labelled component R. *[1]*

(ii) Identify the logic gate required at component X and draw its truth table. *[3]*

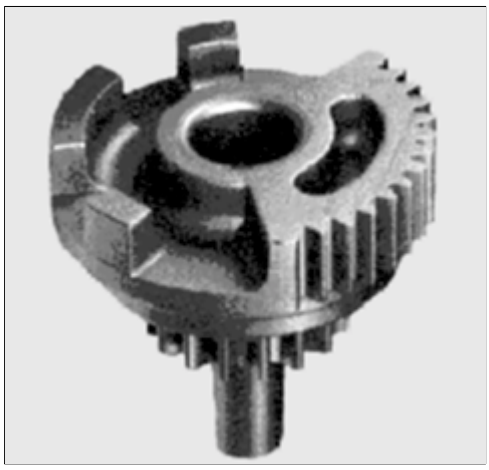
(c) Draw a system block diagram to show where each part of the designer's sketch fits. *[3]*

(d) Discuss the responsibility of the designer in making the security system acceptable to both the shopkeeper and shoppers. *[8]*

6.

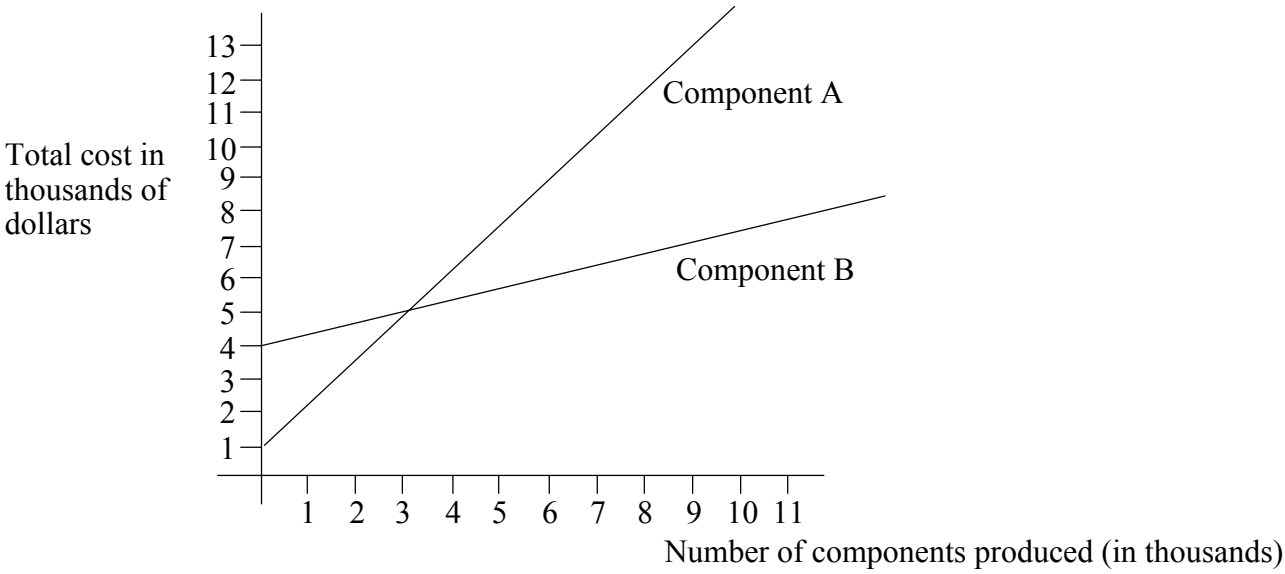


Component A



Component B

Components A and B perform the same function in a domestic sewing machine. Component A needs six manufacturing stages involving wasting, shaping, de-greasing and plating. Component B is made by a new process by moulding and heating, two operations in all. Component B is less durable than component A but meets the design specification.



(a) (i) Define ‘moulding’. *[1]*

(ii) List **two** materials that can be shaped by moulding. *[2]*

(b) (i) Outline the influence of the designer on the product life cycle. *[2]*

(ii) Outline the benefits to the manufacturer of Component B. *[4]*

(c) Explain the implications of the graph for the sewing machine manufacturer. *[8]*

7.

A product designer has been asked to produce a new soft drink bottle. The designer has to work with the clients to determine the brief and with bottle manufacturers to produce the required solution.

(a) (i) Define 'modelling'. *[1]*

(ii) Outline how symbolic modelling could be used in this situation. *[2]*

(b) (i) List **three** pieces of information the designer could get from a physical model. *[3]*

(ii) Explain **one** advantage of solid modelling over CAD. *[3]*

(c) Outline the use of CAD in the design of the bottle and in conveying information to the client. *[8]*