



**DESIGN TECHNOLOGY
 STANDARD LEVEL
 PAPER 2**

Wednesday 15 November 2000 (afternoon)

1 hour

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.
- Section A: Answer all of Section A in the spaces provided.
- Section B: Answer one question from Section B. You may use the lined pages at the end of this paper or 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 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

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

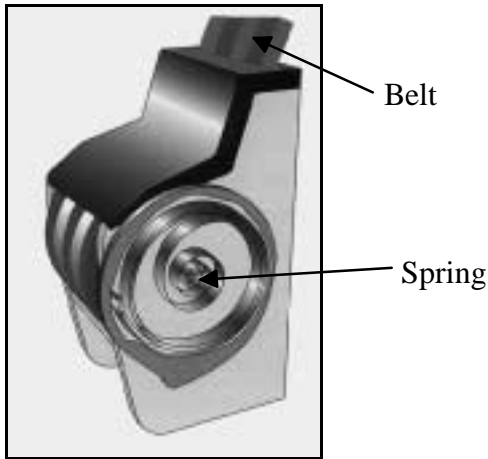


Figure 1: Wide coil spring in recoil mechanism inside housing at fixed end of seat belt

Figure 2: Seat belt in use.

- The figures above show a wide coil spring being used in a car seat belt recoil mechanism. The spring is a strip of steel wound in a coil. When attached to a fixed point and pulled it exerts a restoring force which is able to rewind the seat belt.

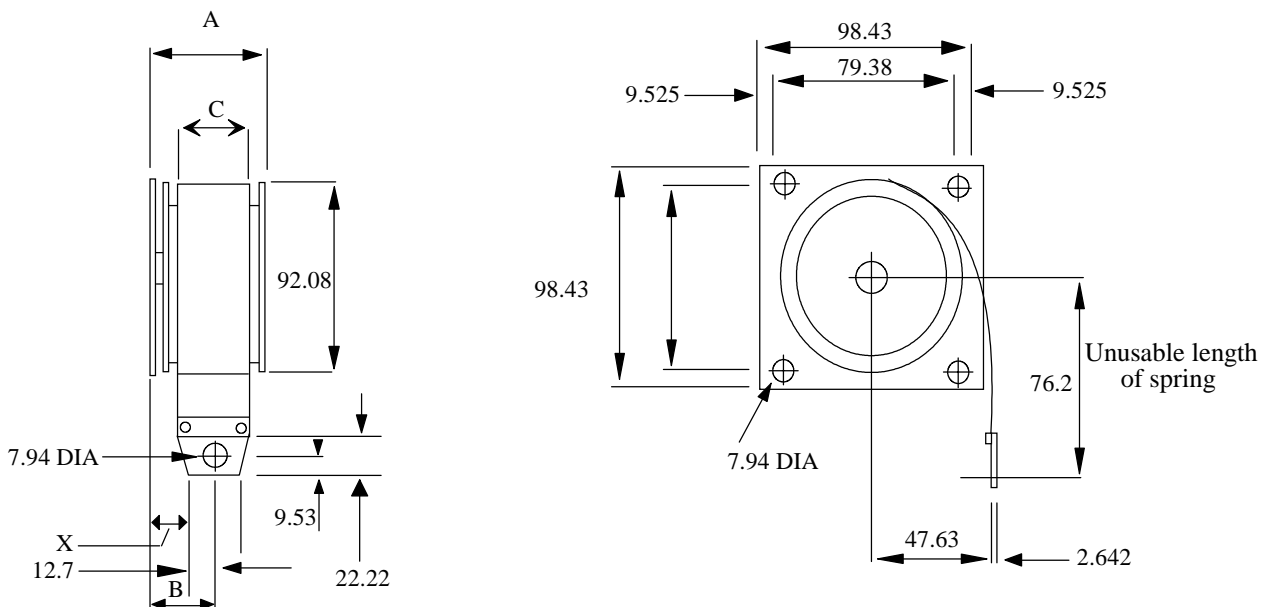


Figure 3: Orthographic drawing of a similar type of spring (Please Note: All dimensions are in mm)

(This question continues on the following page)

(Question 1 continued)

The spring show in Figure 1 is made in a number of sizes to suit various requirements. The table below shows some data for four different size springs.

Spring	A mm	B mm	C mm	Load supported by spring N	Maximum length of spring mm
1	35.81	20.57	28.4	10.0	915
2	48.51	26.92	38.1	20.7	1118
3	61.21	33.27	50.8	32.3	1321
4	61.21	33.27	50.8	93.5	2235

(a) (i) State the diameter of the fixing holes for mounting the unit to the car body. [1]

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(ii) State the distance between the fixing holes. [1]

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(iii) Calculate the distance marked X on the drawing for spring 3 (show your working). [3]

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(b) Calculate the usable length of spring 2 for a constant force. [2]

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(c) The seat belt has to last for the lifetime of the car. Explain **two** aspects of the design specification for the product which are essential for its continuing success as a safety device. [4]

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2. (a) State a manufacturing technique which can be used to shape a material in its liquid form. [1]

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(b) Explain why many new materials have novel properties. [2]

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3. Explain the relevance of one-off production to the injection moulding of a plastic product. [2]

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

(b) Explain how a car and its driver is an example of a closed loop system. [3]

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SECTION B

Answer **one** question. Up to three additional marks are available for the construction of your answer. You may use the lined pages at the end of this paper or continue 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. (a) (i) Define the product cycle. [1]
- (ii) Outline the role of the designer in the product cycle. [3]
- (b) The designer is working for a volume car manufacturer. Outline **two** ways in which capital costs act as a design constraint. [4]
- (c) Discuss how designers can influence the environmental impact of the motor car. [9]
6. A department store has produced the following design brief: -

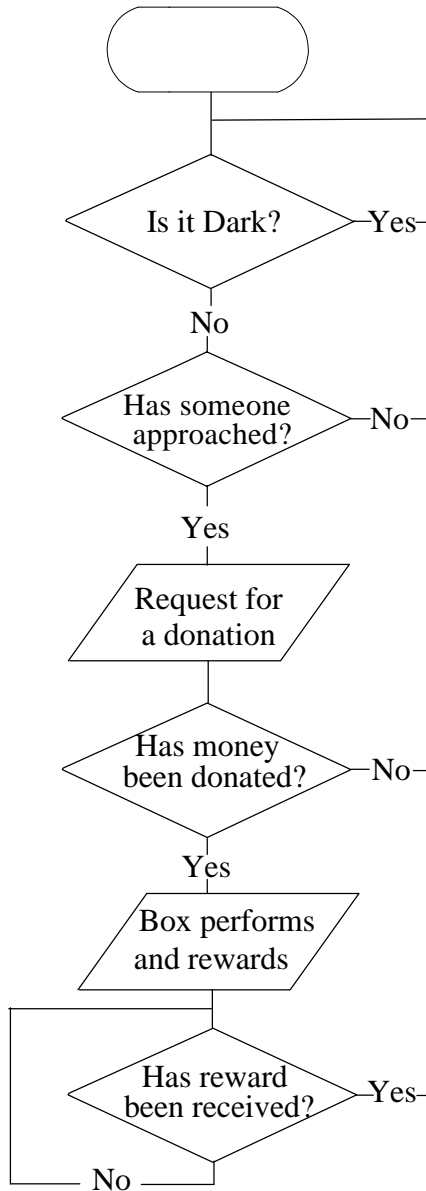
“Busy parents want to be able to provide a celebration party for their children without a great deal of work on their part. We would like designers to produce a ‘Party-in-a-Box’ including all the necessary toys, games and food to cater for a party of six children aged from five to eight years of age.”



- (a) List **two** ergonomic specifications for the box. [2]
- (b) Outline **two** suitable strategies for gaining market research information. [4]
- (c) The design team has produced a range of design ideas. Explain **one** appropriate technique to communicate these ideas to the client. [3]
- (d) The consumer requires value for money and the manufacturer needs a cost-effective solution. Discuss the role of the designer in resolving these conflicting issues. [8]

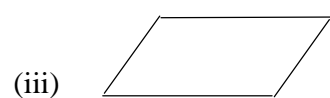
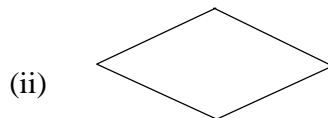
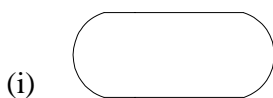
7. An international aid charity collects money by putting collecting boxes in public places. Interactive boxes that provide a reward in the form of a sweet (candy) are more effective. Such boxes only work in daylight. When the box is approached it asks for a donation. When money is placed in the box it performs and then delivers a reward.

The operation is described in the flow chart below.



- (a) State the meaning of each of the following symbols.

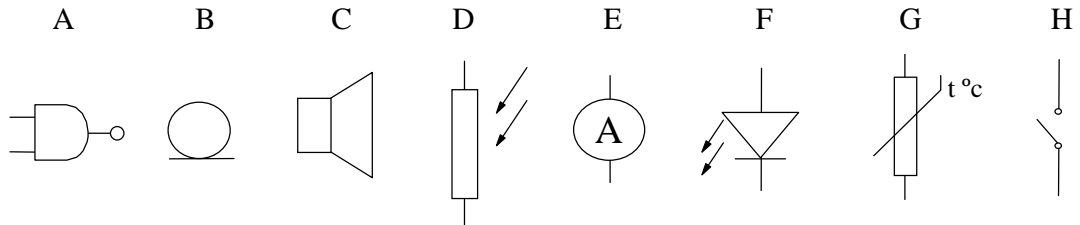
[3]



(This question continues on the following page)

(Question 7 continued)

- (b) Choose **two** components from the chart below and outline how they could be used in the design. [2]



- (c) Outline **two** ways in which the designer can make the interactive collecting box appealing to young children. [4]
- (d) Design a logic circuit that will fulfil the requirements of the flow chart. [8]
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