



**DESIGN TECHNOLOGY
 STANDARD LEVEL
 PAPER 3**

Thursday 16 November 2000 (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 three 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
	/15	/15	/15
	/15	/15	/15
	/15	/15	/15
NUMBER OF CONTINUATION BOOKLETS USED	TOTAL	TOTAL
	/45	/45	/45

Option A — Raw material to final product

A1. The illustrations show three different cooking pots.



Glass Pot



Stainless Steel Pot



Cast Iron Pot

(a) State **one** advantage of the glass pot compared to the metal pot. [1]

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(b) Compare the cast iron pot with the stainless steel pot for ease of use. [2]

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(c) Handles for cooking pots are made from wood or plastic but rarely from metal. Explain the reason for this. [3]

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A2. Outline **one** example of the use of superconductors. [1]

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A3. Define *seasoning*. [1]

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A4. Draw a diagram to show the cross-sectional structure of plywood. [2]

A5. State the advantage of mycoprotein's ability to be easily formed. [1]

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A6. Compare the characteristics of cotton and nylon fibres with reference to their properties. [4]

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Option B — Products in context

B1. The table below shows an Environmental Assessment matrix which can be used to evaluate the effect of a product on the environment at different stages of its life cycle.

ENVIRONMENTAL ASSESSMENT MATRIX

PRODUCT LIFE CYCLE

ENVIRONMENTAL FIELD	Pre-production	Production	Distribution (including packaging)	Utilisation	Disposal
Water pollution					
Air pollution					
Soil degradation					
Noise					
Consumption of energy					
Consumption of natural resources					
Effects on ecosystems					

(a) State which **two** columns of the product life cycle relate to the consumer. [2]

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(b) In the design of a new washing machine describe the effect on the environment of the following decisions:

(i) using fewer parts at the production stage; [2]

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(ii) designing for less water consumption at the utilisation stage. [2]

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B2. It is predicted that copper resources will run out by the year 2002. However, copper reserves will continue beyond that date. Explain **two** reasons why copper may still be available after the year 2002. [4]

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B3. State **one** disadvantage of using expert appraisal for collecting data. [1]

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B4. Discuss the limitations of using wind as a renewable energy resource. [4]

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Option C — Mechatronics

C1. Figure A and Figure B show two different types of corkscrew. The corkscrew in Figure A works by twisting the corkscrew into the cork and pulling out the cork from the bottle with considerable effort. Corkscrew B is also twisted into the cork but the cork is extracted with less effort by using a lever principle.

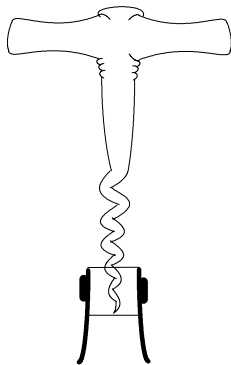


Figure A

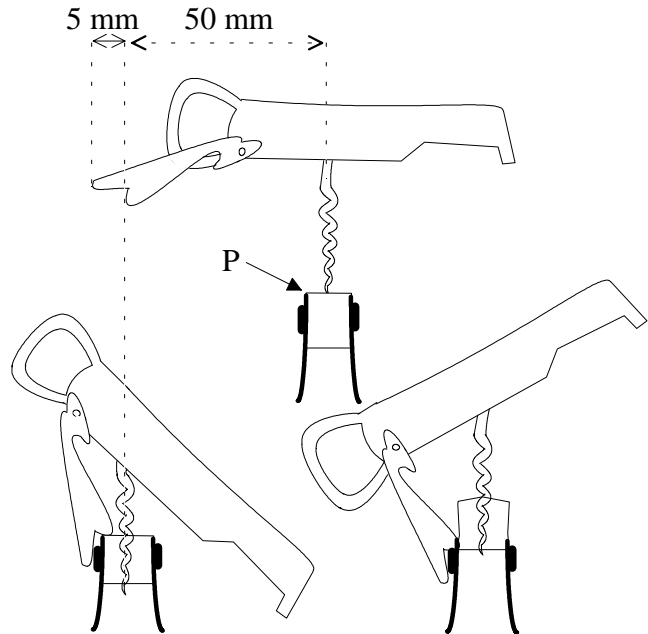


Figure B

(a) State the class of lever used in Corkscrew B. [1]

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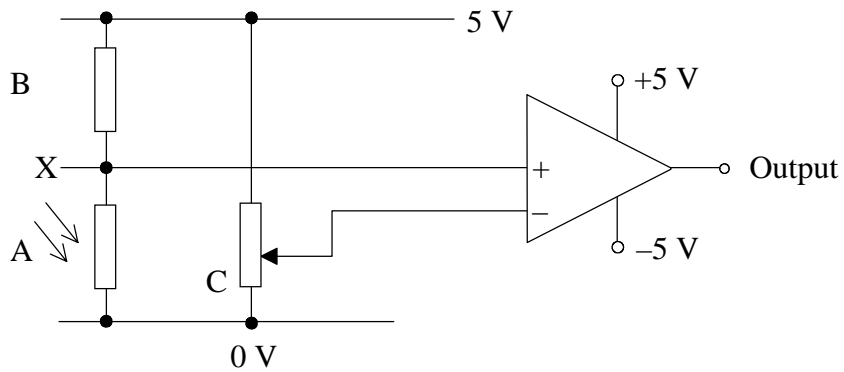
(b) Describe how corkscrew A is a practical application of a linkage. [2]

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(c) In Figure B the friction force that needs to be overcome between the cork and the neck of the bottle is 200 N. Calculate the force required at a point P in order to extract the cork from the bottle. [moment = force × distance] [3]

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C2. The circuit diagram below represents a child's night light which switches itself on when darkness falls.



(a) State the name of component A. [1]

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(b) Explain what happens to the voltage at Point X as the light level changes. [2]

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(c) Outline the purpose of component C. [1]

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C3. State **two** advantages of a chain drive system compared to a belt drive system. [2]

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C4. Explain the effect of underdamping in a servo mechanism. [3]

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Option D – Food technology

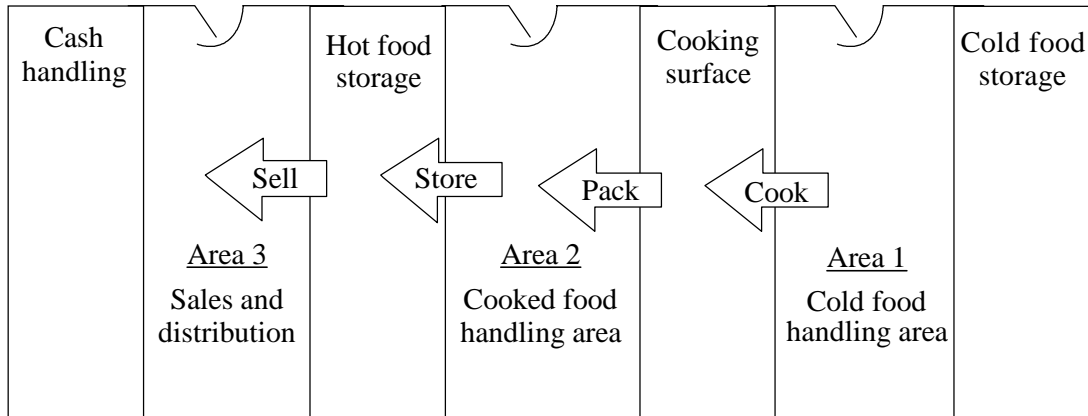
D1. The schematic diagram below shows a typical layout for the food preparation and service area of a fast food restaurant. It is split into three areas:

Area 1 – cold food handling area;

Area 2 – cooked food handling area;

Area 3 – sales and distribution.

Individual members of staff remain in one area throughout their working shift.



The staff in such restaurants tend to be unskilled and are trained to cook the high volume of products for standard times.

(a) Outline **one** reason why the specifications for the food products must be extremely well standardised. [2]

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(b) Identify **two** aspects of the design specification of a burger which must be standardised. [2]

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The range of products available is extremely limited.

(c) Describe **one** advantage and **one** disadvantage for regular users of the fast food restaurant. [2]

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D2. Explain **one** way in which the processing method used for making bread affects its organoleptic properties. [2]

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D3. Define *food additive*. [1]

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D4. Outline food irradiation. [2]

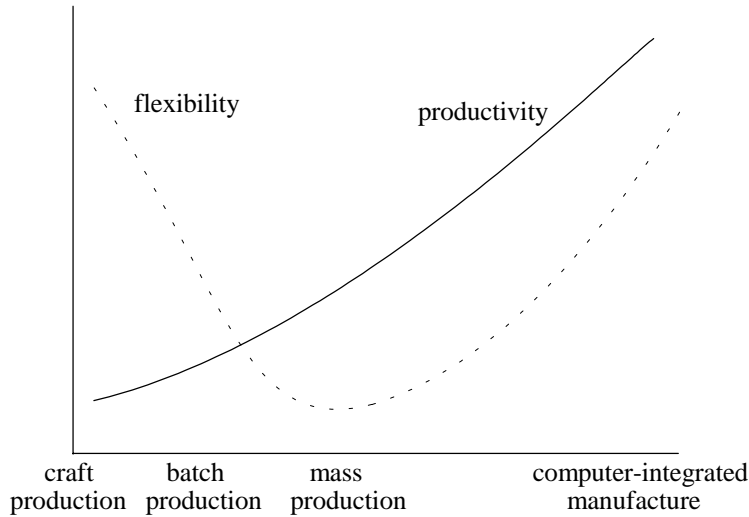
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D5. Outline **four** aspects of a design specification for the packaging of a microwaveable cook-chill product. [4]

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Option E — Computer aided design and manufacturing

E1. The graph below shows the relationship between productivity and flexibility of manufacturing in a range of production systems.



(a) State the production process that has the best combination of flexibility and productivity. [1]

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(b) Suggest **one** reason why for both mass production and batch production flexibility is on the decrease and productivity is on the increase. [2]

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(c) Explain **one** reason why computer-integrated manufacturing is much more flexible than mass production. [2]

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E2. Outline **one** impact of CAD/CAM on the workforce in a factory. *[2]*

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E3. Describe **one** advantage and **one** disadvantage of CAD/CAM for consumers. *[4]*

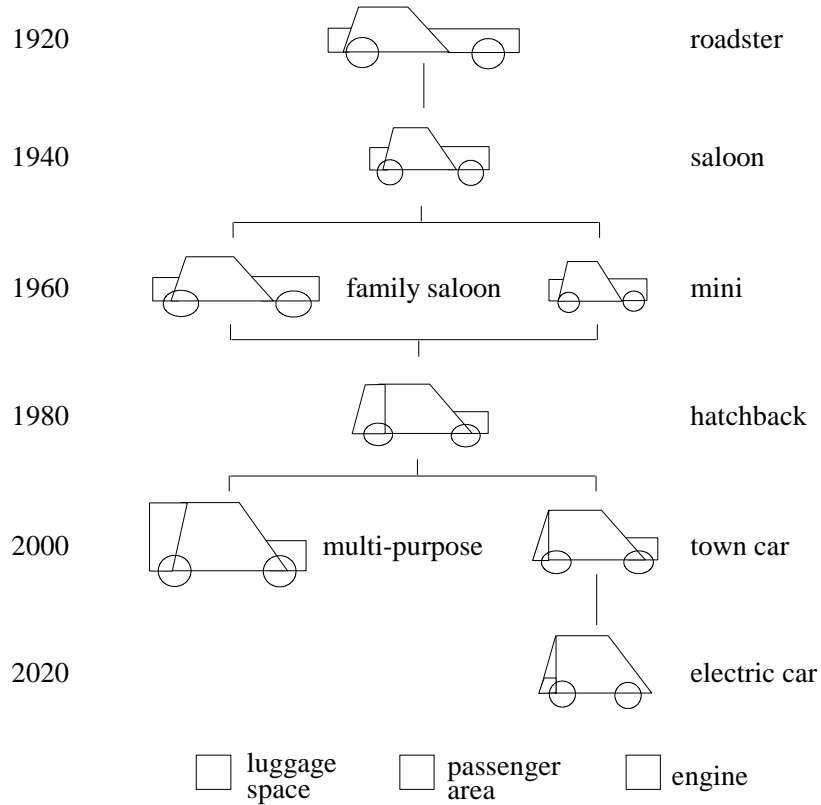
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E4. Compare solid modelling with wire frame modelling in CAD. *[4]*

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Option F – Invention, innovation and design

F1. The figure represents a technique of evolutionary forecasting which looks at the broad historical development of a product in relation to major patterns of change (not small details).



Source: Open University

(a) State the pattern of change for engine size of cars between 1920 and 2020. [1]

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(b) Outline **one** reason why manufacturers developed different sized cars from 1960 onwards. [2]

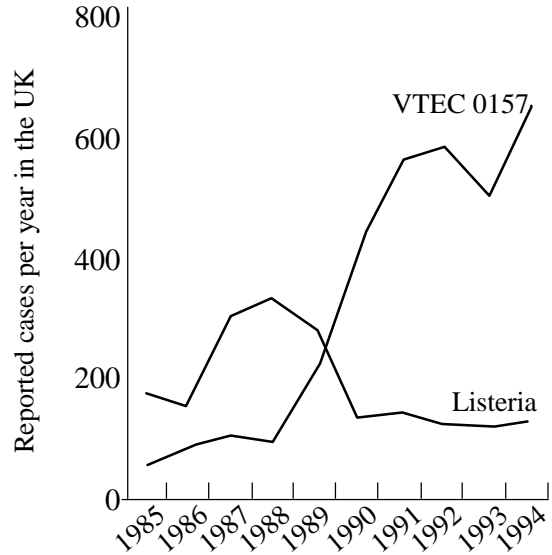
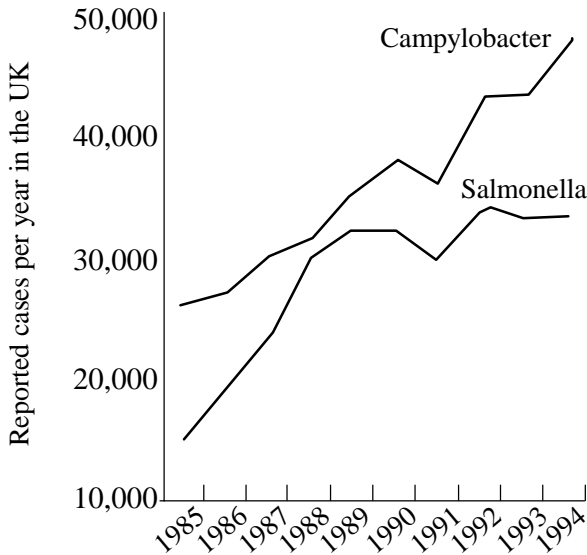
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(c) Suggest **three** reasons why electric cars may develop from the town car by the year 2020. [3]

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Option G — Health by Design

G1. The two graphs represent changing patterns of four types of food poisoning in a developed country.



(a) State the year of the highest number of *Listeria* cases. [1]

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(b) Outline why it is not feasible to use one graph to present the data. [1]

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(c) Explain what is unusual about the pattern for *Listeria*. [2]

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(d) VTEC is a type of *Escherichia coli* bacteria contracted from undercooked meat products. Suggest a change in lifestyle which might account for the pattern on the graph. [2]

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G2. Define *tomography*. [1]

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G3. Describe the difference between cosmetic and plastic surgery. [2]

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G4. Describe the influence of planned obsolescence on the design of contact lenses. [2]

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G5. For diabetic testing, explain **two** difficulties resulting from patients having to send samples to laboratories. [4]

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