

22076203

**DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 3**

Friday 11 May 2007 (morning)

1 hour 15 minutes

Candidate session number

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INSTRUCTIONS TO CANDIDATES

- Write your session 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 on answer sheets. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.
- At the end of the examination, indicate the letters of the Options answered in the candidate box on your cover sheet and indicate the number of answer sheets used in the appropriate box on your cover sheet.



Option D — Food technology

D1. **Figure D1** shows a range of bread and pastry products. Bread is a staple food widely used around the world, produced domestically and commercially. Sourdough is a type of bread that involves a long fermentation process.

Table D1: Nutrition Facts for Sourdough Bread **Figure D1: A range of bread and pastry products**

Nutrition Facts for Sourdough Bread		
(48g serve)	Amount	% daily intake
Fat	0 g	0
Cholesterol	0 mg	0
Sodium	170 mg	7
Carbohydrate	23 g	8
Fiber	1 g	4
Sugars	1 g	
Protein	1 g	
Vitamin A		0
Calcium		0
Iron		6



[Source: www.scottsbakery.com/]

(a) List the primary **and** secondary processes involved in making bread. [2]

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(b) Outline **one** organoleptic property of bread. [2]

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D2. List **one** macronutrient and **one** micronutrient from the content of the sourdough bread in Table D1. [2]

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D3. Explain **one** other piece of information that could be included on a food label for bread, apart from nutritional information. [3]

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D4. List the **two** main categories of food-transmitted diseases. [2]

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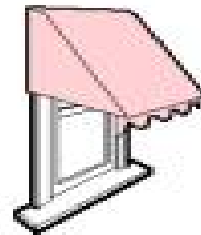


Option E — Computer-aided design, manufacture and production

E1. The computer controlled machine in **Figure E1** is used to cut thermoplastic coated textiles for external window shades. Cutting is done by up to five ultrasound cutters.

Figure E1: CNC cutting machine

Figure E2: External window shade



[Source: www.jentschmann.ch/PAC2000-E.htm]

(a) Describe how CAD and CNC systems work together to produce the CAD/CAM system in Figure E1. [2]

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(b) Discuss **one** advantage of using the CNC machines to cut textiles. [3]

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E2. Compare **one** aspect of CNC cutting with traditional craft cutting. [2]

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E3. Describe how a CNC machine could contribute to a JIT approach to manufacturing. [2]

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E4. Describe the characteristics of fiber optics that enable it to transmit large quantities of information. [2]

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E5. Discuss **two** advantages and **one** disadvantage for countries which host the production units of global manufacturing companies. [9]

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Option F — Invention, innovation and design

F1. **Figure F1** shows a digital camera docked into a picture printer. The pictures can be viewed on the camera and then deleted, saved or printed by docking the camera onto the top of the printer. The printer will produce prints by inkjet rather than using chemicals. Prints can be generated from memory cards or wirelessly from a mobile phone, and the camera battery can be charged when it is docked.

Figure F1: Digital camera and printer



(a) List **two** possible aspects of the camera-printer in Figure F1 which make it attractive for market diffusion. [2]

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(b) Explain **one** reason why the camera-printer in Figure F1 would have been unlikely to have been invented by a lone inventor. [3]

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F2. Outline **one** benefit of being a pioneer in relation to the manufacture of the camera-printer in Figure F1. [2]

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F3. Describe **one** way in which the printing process of the innovative camera-printer in Figure F1 helps safeguard the environment. [2]

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F4. Define *design family* in terms of the camera-printer. [2]

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Option G — Health by design

G1. Small holes in the heart (**Figure G1**) can be treated using a small umbrella like device called a CardioSEAL® (**Figure G2**). The device is folded into a thin tube, inserted in a vein, and moved into the hole in the heart. The device is then pushed out of the tube, allowing the small umbrella to open and cover each side of the hole. The tube is then removed. The fabric in the device is Dacron® and the metal alloy is nitinol (nickel and titanium alloy).

Figure G1: 1. Atrial Wall 2. Opening in the Atrial Wall

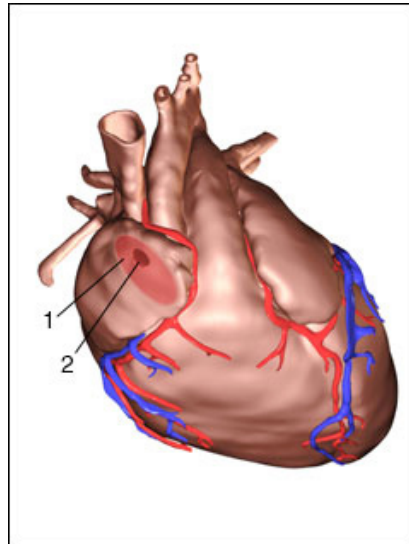
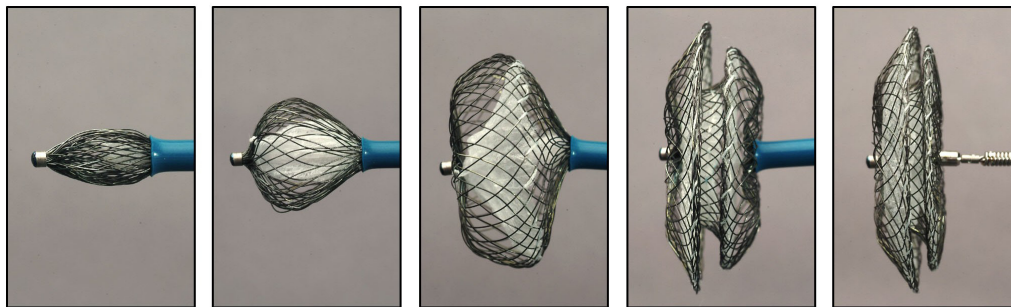


Figure G2: The sequence of the device being pushed out of the tube



(a) Define *biocompatibility*. [1]

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(b) State **one** material commonly used for implants in the human body. [1]

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(This question continues on the following page)



(Question G1 continued)

- (c) Explain how the material used in the CardioSEAL® would have been tested for use as an implant. [3]

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- G2. Describe how spectacle wearers have benefited from the development of high refractive index glass. [2]

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- G3. Identify **one** way user-centred design plays a role in the development of wheelchairs. [2]

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- G4. Describe **one** reason why money spent on preventing Repetitive Strain Injury is a sound investment. [2]

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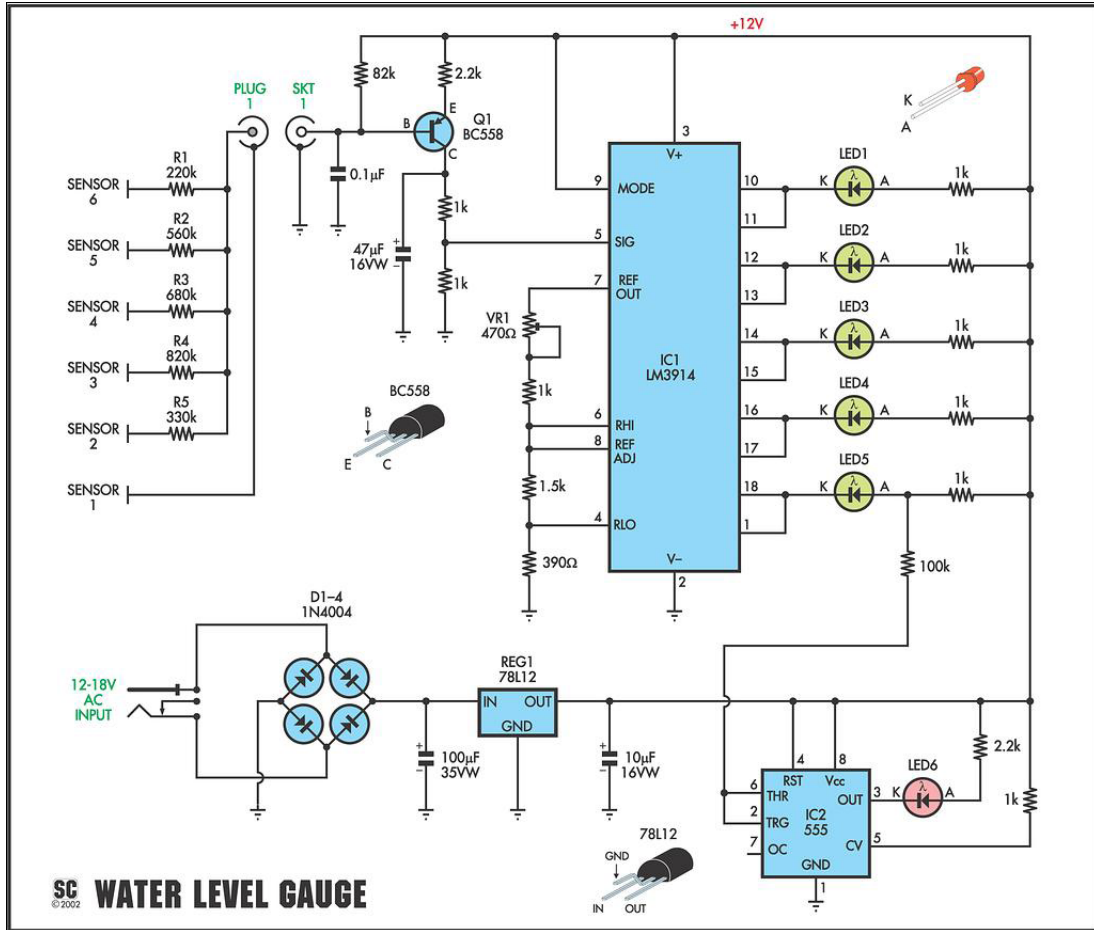
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Option H — Electronic products

H1. Figure H1 shows an electrical circuit for a domestic product.

Figure H1



(a) State the regulated power supplied to the circuit in Figure H1. [1]

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(b) Describe the function of the sub system associated with the IC2-555. [2]

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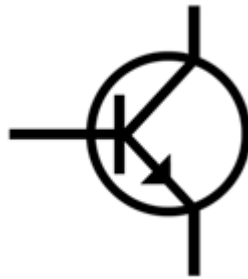


H2. The LM3914 is an integrated circuit that senses analogue voltage levels. Explain how the circuit in Figure H1 functions. [3]

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H3. Annotate the diagram in Figure H2 to indicate the base, emitter, and the collector. [3]

Figure H2



H4. Identify **one** benefit of transmitting information digitally rather than transmitting information using an analogue system. [2]

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