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Design technology
Standard level
Paper 1

15 May 2026

Zone A afternoon | **Zone B** afternoon | **Zone C** afternoon

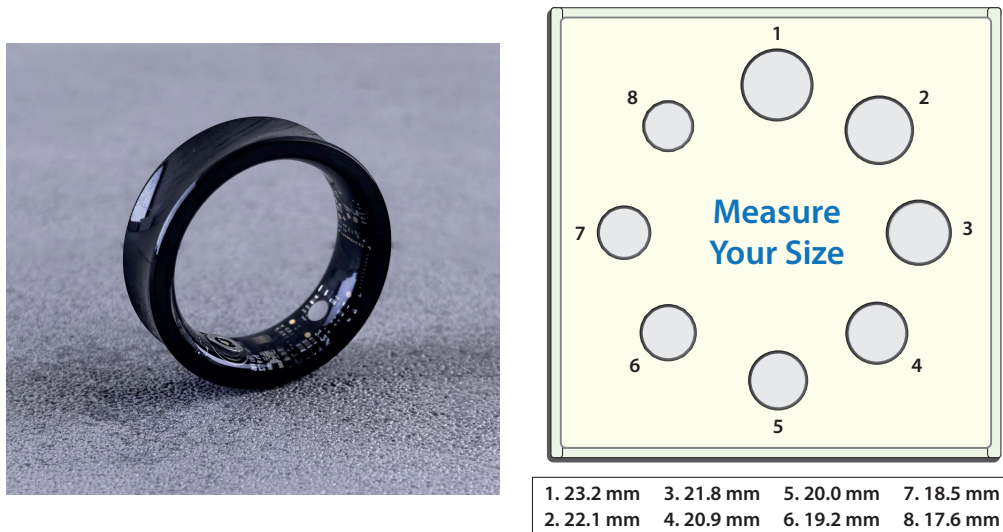
45 minutes

Instructions to students

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- The maximum mark for this examination paper is **[30 marks]**.

1. Smart rings are wearable devices that track health and activity. Before purchasing one, many companies send customers a sizing kit to help choose the correct ring size, see **Figure 1**.

Figure 1: Smart ring sizing kits



Which practice of measuring the human body does this sizing kit rely on to provide standardized size options?

- A. Ergonomics
 - B. Anthropometrics
 - C. Psychological factor data
 - D. Physiological factor data
2. Which physiological factors dictate who is permitted to be seated near to an aircraft door to ensure that exits are functional during an emergency evacuation?
- I. Strength
 - II. Comfort
 - III. Biomechanics
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

3. Some customer satisfaction surveys allow customers to indicate their satisfaction levels using a range of smiley faces instead of traditional rating scales or text-based questions. What type of scale is this?
- A. Nominal
 - B. Ratio
 - C. Increment
 - D. Ordinal
4. As part of the European Union’s Strategy for Plastics in a Circular Economy, aimed at reducing waste and promoting sustainable alternatives, new rules require beverage caps to remain attached to their cartons after opening. This feature, known as a “tethered cap,” helps prevent plastic litter. Packaging company Omnopack has responded by redesigning its cartons to keep the cap connected, see **Figure 2**.

Figure 2: Omnopack beverage packaging



Which design objective for green products does the tethered cap address?

- A. Minimising the number of different materials used in a product
- B. Increased efficiency in the use of materials and resources
- C. Increasing efficiency in the use of energy
- D. Reducing or negating environmental damage or pollution from the materials selected

5. Which of the following strategies is considered an end-of-pipe solution for reducing industrial air pollution?
- A. Installing scrubbers in factory chimneys
 - B. Switching to renewable energy sources
 - C. Designing products with fewer toxic materials
 - D. Using biodegradable packaging
6. Dyson is a British appliances brand that sells refurbished products directly through its website. The products are stripped down, thoroughly cleaned, and have their batteries and consumable components replaced before being resold at a reduced price. What is this process known as?
- A. Repairing
 - B. Reconditioning
 - C. Recycling
 - D. Re-engineering
7. What is the most common individual energy generation system?
- A. Domestic wind turbines
 - B. Hydroelectric systems
 - C. Biomass boilers
 - D. Solar panels

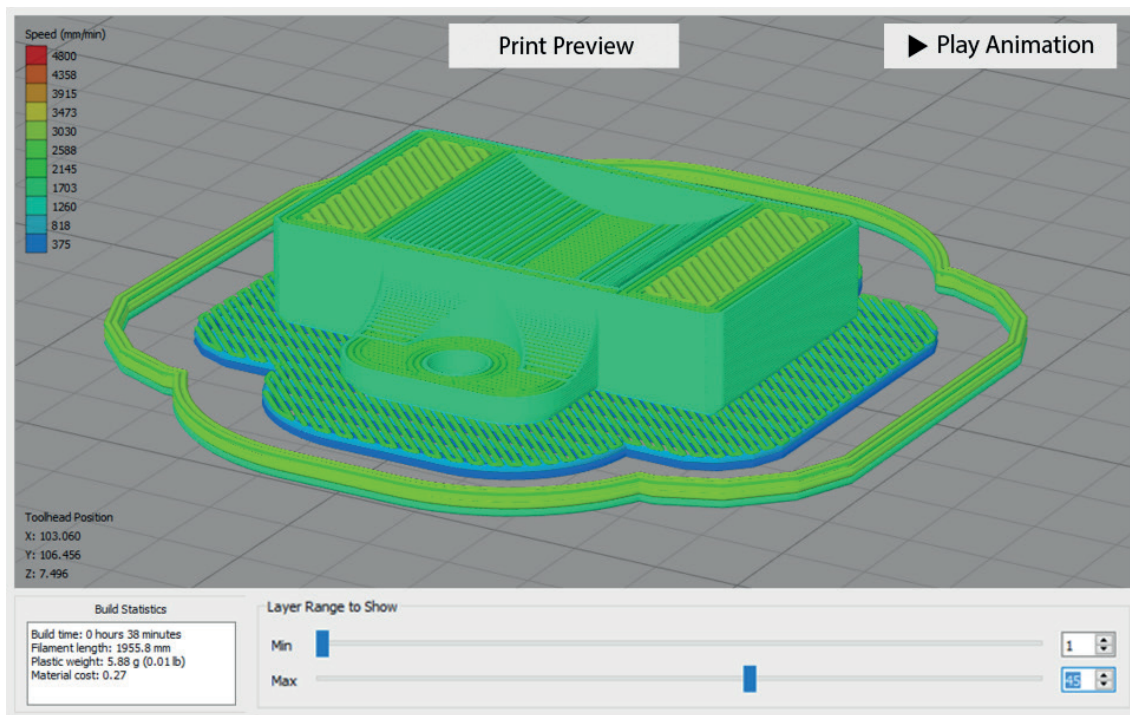
8. BMW's Car2Car project is developing innovative dismantling and intelligent sorting methods to improve the recovery of aluminium, glass, steel, copper, and plastic from end-of-life vehicles. The goal is to increase the percentage of recycled materials used in new vehicle production to 50 %.

What waste mitigation strategy is BMW applying in the Car2Car project?

- A. Re-use
 - B. Recycling
 - C. Reconditioning
 - D. Repairing
9. Which stage of the life cycle analysis (LCA) of a disposable 500 ml plastic water bottle is considered the most environmentally damaging?
- A. Pre-production and Production
 - B. Packaging and Distribution
 - C. Utilization
 - D. End-of-life disposal

10. 3D printing companies allow designers to view an accelerated digital animation showing how their model will be built layer by layer (**Figure 3**).

Figure 3: 3D model print preview



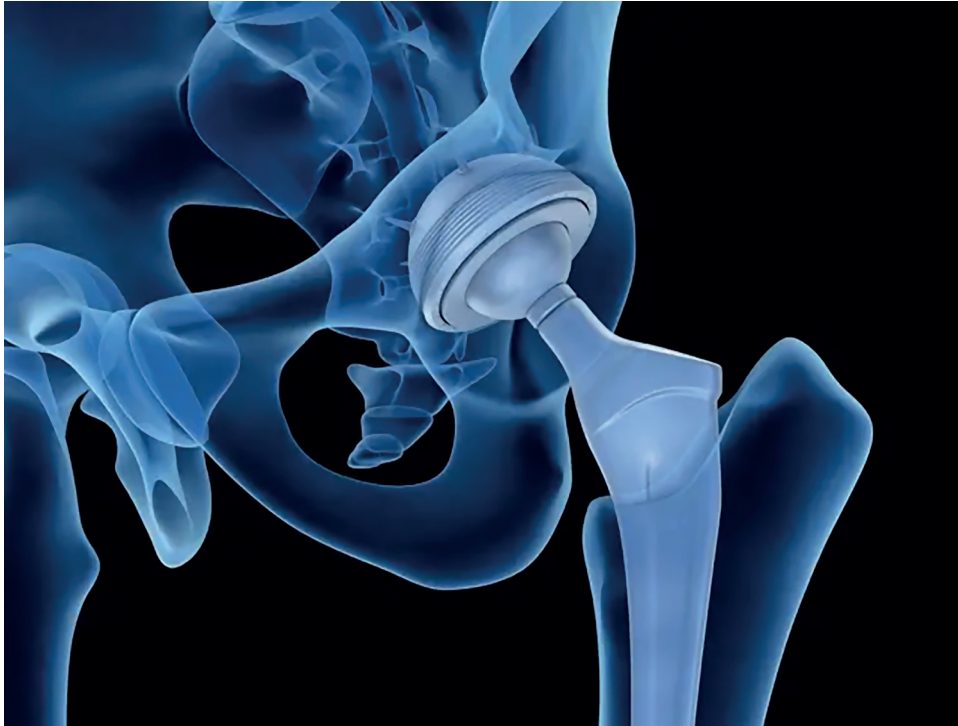
Why do designers preview the printing process before starting the actual build?

- A. To make the printing process faster
 - B. To save on material costs by avoiding errors
 - C. To ensure the final product is aesthetically pleasing
 - D. To reduce the environmental impact of printing
11. In what scenario would a 5:1 scale drawing be particularly useful for a product designer?
- A. When providing a more detailed and larger view of small components
 - B. When trying to reduce the size of the final product
 - C. When designing a product for quick assembly
 - D. When focusing on the aesthetics of the product rather than functionality

- 12.** At Castrol's testing facility, engines are fitted with sensors to collect real-time performance data under extreme conditions. What design approach is being used to gather this data from a working system?
- A. High fidelity modelling
 - B. Instrumented modelling
 - C. Finite element analysis (FEA)
 - D. Aesthetic modelling
- 13.** How does bottom-up modelling benefit the product design process?
- A. Designers understand the overall design before they design individual parts
 - B. By facilitating early-stage aesthetic enhancements
 - C. By allowing designers to refine the overall product concept first
 - D. By enabling the use of standardized and reusable components

14. Scientists at Japan's Tohoku university have made a breakthrough with metal implants, creating a material with flexibility and strain recovery to endure longer durations in the human body, **see Figure 4**. The implants are made of a combination of cobalt, chromium, aluminium and silicon.

Figure 4: Simulation of a metal hip joint implant



[Source: Alex Mit / Shutterstock.]

Which type of material is known for its excellent mechanical strength, resistance to thermal creep (a slow deformation under heat and stress), good surface stability, and resistance to corrosion?

- A. Alloy
 - B. Smart material
 - C. Super alloy
 - D. Shape-memory metal
15. Which of the following is an advantage of mass production?
- A. Increased customization options for individual products
 - B. Reduced unit costs due to economies of scale
 - C. Faster adaptation to market changes
 - D. Lower initial investment in machinery and equipment

- 16.** Which of the following is an important moral concern regarding the increased use of automation in industries?
- A. The potential for increased product quality
 - B. The reduction in production costs
 - C. The displacement of workers leading to unemployment
 - D. The improvement in manufacturing efficiency
- 17.** Which of the following is a design approach focused on ensuring products can be easily taken apart for recycling or repair?
- A. Design for materials
 - B. Design for process
 - C. Design for assembly
 - D. Design for disassembly
- 18.** Which of the following best describes batch production?
- A. Producing items one at a time, each tailored to individual specifications
 - B. Manufacturing products in predetermined groups or quantities, allowing for some customization
 - C. Customizing mass-produced items based on customer demand and preferences
 - D. Continuously producing large quantities of identical products without interruption
- 19.** Which of the following is likely to be manufactured using pultrusion?
- A. Concrete bricks
 - B. Fibre-reinforced plastic profiles
 - C. Metal automobile parts
 - D. Glass bottles

20. Which of the following materials is well-known for its use in beverage bottles due to its strength, rigidity, and excellent barrier properties?
- A. Polypropylene (PP)
 - B. High Impact Polystyrene (HIPS)
 - C. Acrylonitrile Butadiene Styrene (ABS)
 - D. Polyethylene Terephthalate (PET)
21. The Emira sports car vehicle, see **Figure 5**, manufactured by the automotive company Lotus comes with two engine options: a 4 Cylinder AMG engine or a V6 Toyota engine.

Figure 5: The Lotus Emira sports car



Which type of innovation strategy is this an example of?

- A. Architectural innovation
- B. Modular innovation
- C. Configurational innovation
- D. Radical innovation

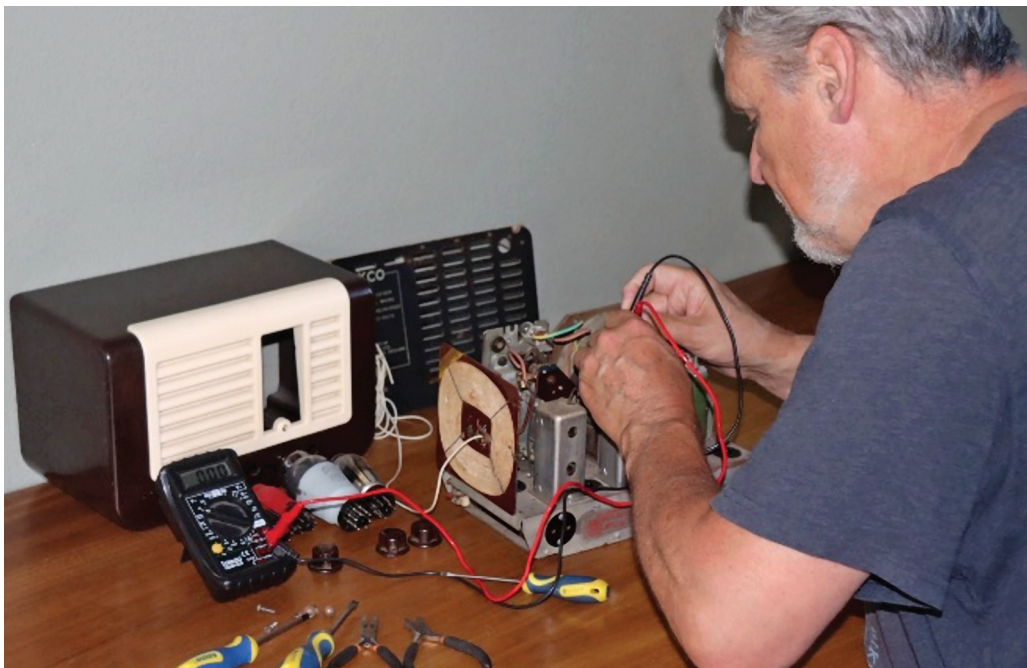
- 22.** Which of the following is a common reason for a technology to be shelved?
- A. The technology has no practical applications
 - B. The market demand for the technology is not sufficient
 - C. The technology is too simple and easily replicated
 - D. The technology has already been patented by another company
- 23.** What term describes the use of a concept from one domain to inspire a solution in another domain?
- A. Technology transfer
 - B. Adaptation
 - C. Analogy
 - D. Act of insight

24. Some designers, like Han Bex, repurpose vintage radios such as the 1936 Murphy Model A30C (**Figure 6**) by installing Bluetooth modules and converting them into functional speakers (**Figure 7**).

Figure 6: The 1936 Murphy Model A30C radio



Figure 7: Han Bex installing a Bluetooth module in an EKCO U29 1946 Bakelite Radio



(This question continues on the following page)

(Question 24 continued)

Despite their technological obsolescence, what concept of classic design ensures that even the casings of these old radios remain popular?

- A. Omnipresence
- B. Mass production
- C. Status and culture
- D. Dominant design

25. Why might a classic design continue to be popular despite newer alternatives with better functions?

- A. Its emotional appeal
- B. It is cheaper to produce
- C. It offers superior technical performance
- D. It is more environmentally friendly

26. What is a potential consequence of misunderstanding the way the original product was built when applying retro-styling?

- A. The product may become too expensive to produce
- B. The product may fail to capture the essence that made the original popular
- C. The product may become too technologically advanced
- D. The product may appeal only to niche markets

Questions 27–30 relate to the following case study. Please read the case study carefully and answer the questions.

Homa has created a new performance running shoe called the CIRC360, see **Figure 8**. This shoe features a 3D-printed sole, which is designed specifically for an individual user. The sole provides tailored cushioning and support based on scans of the user’s foot combined with anthropometric data.

The midsole lattice structure enhances movement and forward propulsion. The upper part of the shoe is made using Primegreen, a recycled polyester material developed by Homa. At the end of its life, the shoe can be returned to Homa for recycling. The company repurposes materials from old shoes to manufacture new ones, supporting more sustainable product cycles.

Figure 8: Homa CIRC360 3D-printed shoe



[Source: © Yan Zabolotnyi | Dreamstime.com.]

- 27.** The Homa CIRC360 shoe is custom-designed using 3D scans of the user’s feet. Computer-aided design (CAD) software is used to adapt a base model of the shoe, allowing the sole to be tailored for individualized support and cushioning.

Why does Homa design the CIRC360 shoes to match the user’s feet?

- A. To ensure maximum comfort for the user when using the shoes
- B. To create a unique product for the user that no one else can use
- C. To create a fully recyclable product
- D. To create a highly fashionable product users will pay more for

- 28.** The Homa CIRC360 meets the requirements of take-back legislation, which means they take back the shoes at the end of their life.

Which of the following waste mitigation strategies applies to the Homa CIRC360 shoes?

- A. Recondition
 - B. Re-engineer
 - C. Repair
 - D. Recycle
- 29.** Which of the following properties of polyester (PET) makes it ideal for a 3D printing process?
- A. High toughness
 - B. Softens when heated above 220°C
 - C. High durability
 - D. Resistance to cutting
- 30.** Which aspects of a design specification must be considered to ensure compatibility with 3D printing as a manufacturing method?
- I. Price constraints
 - II. Manufacturing requirements
 - III. Materials requirements
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
-

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References:

- Figure 1:** Andrey Matveev / Pexels.
- Figure 2:** Tony Webster. https://commons.wikimedia.org/wiki/File:Plastic_Water_Bottle_with_Attached_Cap_in_Europe_%2853926999150%29.jpg. Licensed under CC BY 2.0 <https://creativecommons.org/licenses/by/2.0/deed.en>. Source adapted.
- Figure 3:** Weppigu. <https://commons.wikimedia.org/wiki/File:SlicerView.png>. Licensed under CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0/deed.en>. Source adapted.
- Figure 4:** Alex Mit / Shutterstock.
- Figure 5:** With permission from Lotus Cars Limited.
- Figure 6:** Han Bex, 2024. 1936 Murphy Model A30C.
- Figure 7:** Han Bex, 2024. Installing a Bluetooth module in an EKCO U29 1946 Bakelite radio.
- Figure 8:** © Yan Zabolotnyi | Dreamstime.com.