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Design technology

Standard level

Paper 1

16 May 2025

Zone A afternoon | Zone B afternoon | Zone C afternoon

45 minutes

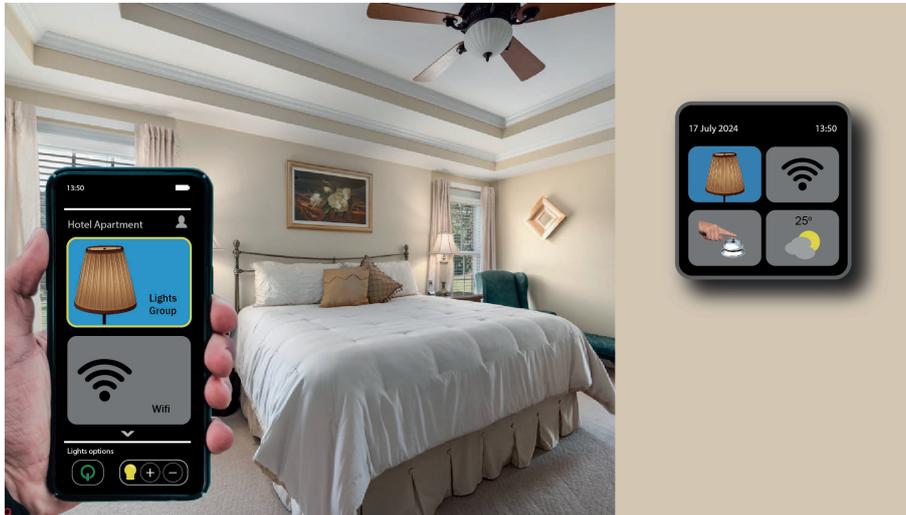
Instructions to candidates

- 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. The user interface in **Figure 1** is designed to be easily understood by the user.

Which part of the human information processing system deals with the user analysing, organising, and making sense of the information received from the user interface?

Figure 1: Smart technology in a hotel room



- A. Sensory process
 - B. Central process
 - C. Motor process
 - D. Input process
2. What best defines clearance in human factors?
- A. The physical space that allows the user to interact with the product
 - B. The distance a product can be extended
 - C. The ability of a product to cater to a wider range of users
 - D. The amount of space required for a product to be aesthetically pleasing
3. How might a designer collect quantitative data in relation to environmental factors?
- A. Interviewing individual perceptions of smell within a space
 - B. Measuring light levels using sensors in a space
 - C. Observing how focus groups perceive different textures within a space
 - D. Analysing how individuals perceive sound frequencies in a space

4. What is a disadvantage of product adjustability instead of a range of sizes?
- A. Does not cater for the 95th percentile
 - B. Increased manufacturing complexity
 - C. Higher inventory costs
 - D. Bad style due to poor product fit.
5. The Tesla Solar Farm is located in Nevada, United States of America, see **Figure 2** for an example of a solar farm. It consists of over 500 000 solar panels.

Figure 2: A Solar Farm



- What is a negative impact of the development of solar farms?
- A. Loss of jobs in installation and manufacturing
 - B. Increased dependence on the utility grid
 - C. Increased use of fossil fuels
 - D. Increased land use conflicts
6. What is an example of a renewable resource?
- A. Coal
 - B. Natural gas
 - C. Wind
 - D. Crude oil

7. Which of the following is a common method used to recover raw materials from the earth's crust?
- A. Extraction
 - B. Recycling
 - C. Harvesting
 - D. Refining
8. The Gent Waste Brick in **Figure 3** is made from 63 % recycled concrete and glass sourced from a local recycling centre. These materials are bound together using lime and calcium carbonate which harden naturally without the need for firing in a furnace.

Figure 3: The Gent Waste Brick



Embodied energy for the Gent Waste Brick is reduced at which stages of the product life cycle?

- I. Pre-production
 - II. Production
 - III. Disposal
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

9. Generative design was used to reduce the weight of a tool whilst ensuring that it retained its structural integrity, see **Figure 4**.

Figure 4: Handheld plier tool

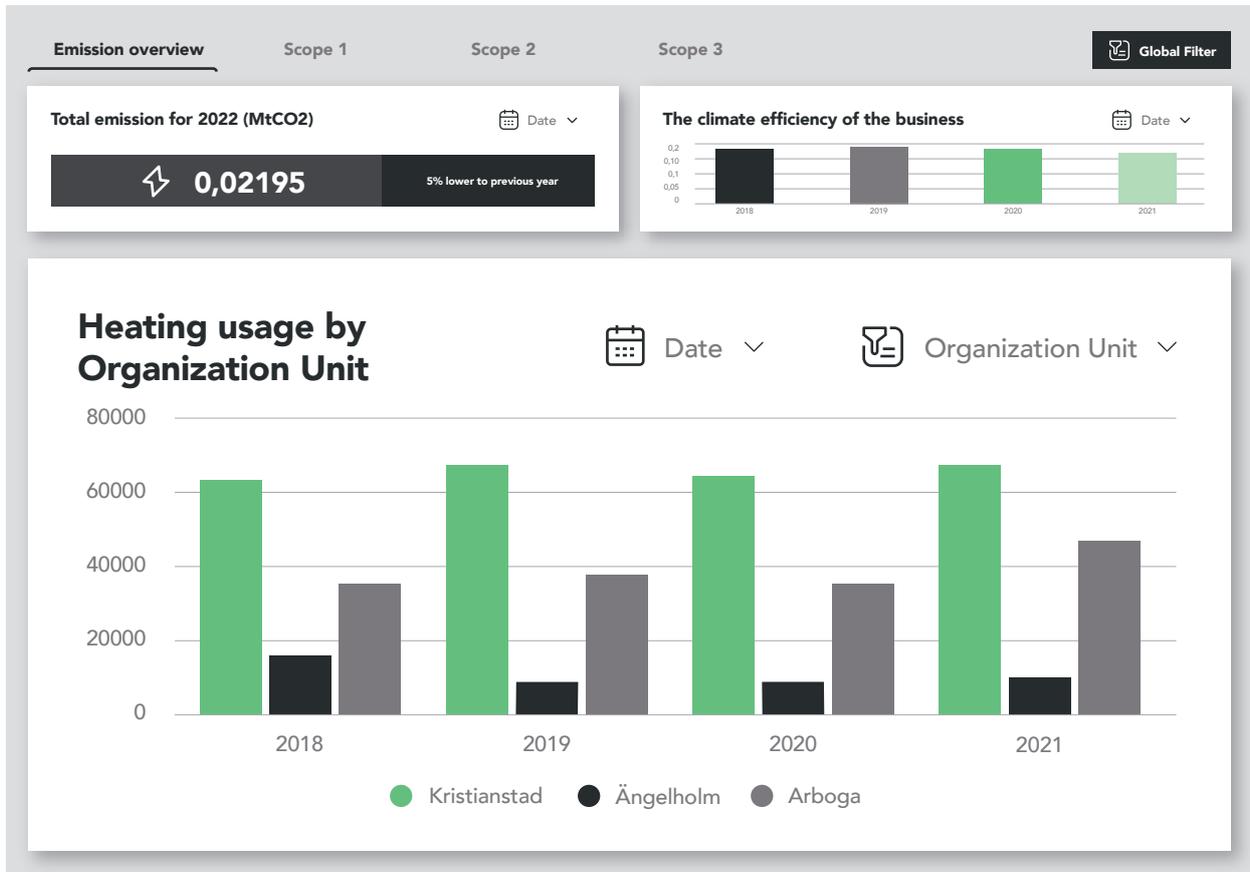


Which waste mitigation strategy is promoted through generative artificial intelligence design (Gen AI)?

- A. Dematerialization
- B. Re-use
- C. Circular economy
- D. Re-engineering

10.

Figure 5: Carbon emission monitoring software



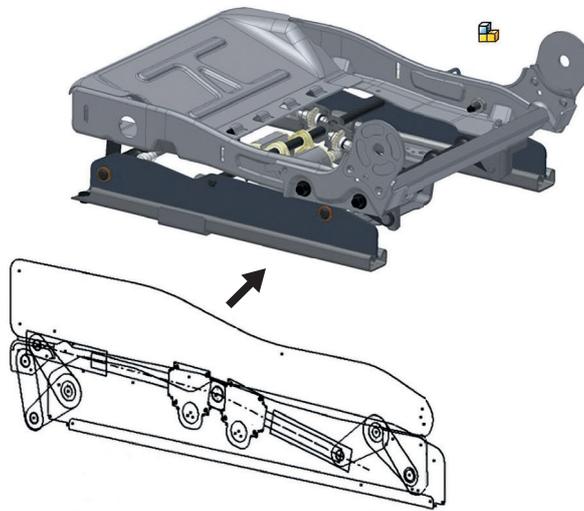
Why do companies choose to monitor and quantify their carbon emissions?

- I. Comply with legislation
 - II. Reduce costs
 - III. Improve their reputation
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

- 11. Which of the following best describes the purpose of end-of-pipe technologies in pollution control?
 - A. To prevent the creation of pollutants during the production process
 - B. To reduce pollutants from waste streams at the end of the production process
 - C. To promote the use of sustainable materials during the production process
 - D. To comply with regulations without reducing pollution at the end of the production process

- 12. **Figure 6** shows a form of 3D computer-aided-design (CAD) modelling where the design originated as a concept and evolved into a complete product.

Figure 6: 3D CAD model



[Source: Image courtesy of Autodesk, Inc. © 2025 Autodesk, Inc. All rights reserved.]

What is this form of CAD modelling called?

- A. Surface modelling
- B. Solid modelling
- C. Top-down modelling
- D. Animation

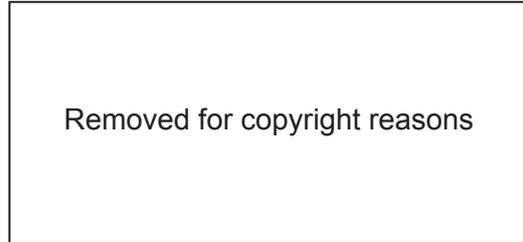
- 13.** Which of the following can visually communicate conceptual modelling?
- I. Graphical modelling
 - II. Physical modelling
 - III. Computer-aided design (CAD) modelling
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
- 14.** What is the purpose of an assembly drawing?
- A. To show three different views of a product
 - B. To show how components fit together to make a whole
 - C. To guide the production of a product
 - D. To provide details about a single component only
- 15.** Physical models can be embedded with component parts. What are these types of models called?
- A. Prototypes
 - B. Data models
 - C. Instrumented models
 - D. Quantitative models

16. The Rolex Submariner watch in **Figure 7** is an example of an enhanced classic design. A new type of ceramic with high hardness was chosen for the production of the watch bezel, the part encircling the watch glass, see **Figure 8**.

Figure 7: The Rolex Submariner Watch



Figure 8: The Rolex Submariner Watch Bezel



What describes the property of high hardness?

- A. Resists scratching
 - B. Resists cracking
 - C. Resists deformation
 - D. Resists moisture
17. What is the purpose of tempering metals?
- A. To modify aesthetic characteristics
 - B. To modify physical properties
 - C. To modify chemical properties
 - D. To modify mechanical properties

18. Polyvinyl chloride (PVC) is often used as a material for pipes.

What is an environmental concern of PVC?

- I. It cannot be recycled easily
- II. It releases hazardous toxins when incinerated
- III. It can introduce harmful chemicals into the soil

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

19. To manufacture textiles which process converts fibres into yarn?

- A. Weaving
- B. Knitting
- C. Felting
- D. Spinning

20. Which of the following describes mass customization?

- A. Producing large quantities of identical products
- B. Creating a single, unique product for a specific requirement of a user
- C. High volume production with options for users to change aspects of the product
- D. Producing goods in a continuous, uninterrupted flow

- 21.** The designers of the Forest Office used large columns of tree logs placed along a grid to create a nature inspired office space. The logs had to be stripped of their bark and seasoned before use.

What is the purpose of seasoning?

- A. To remove moisture
 - B. To improve aesthetics
 - C. To create a smooth surface
 - D. To increase strength-to-weight ratio
- 22.** Buildings in countries which experience earthquakes often contain windows made from tempered glass.

What feature of tempered glass improves its safety?

- A. High toughness
- B. Contains a layer of plastic
- C. High density
- D. Breaks into small round pieces

23. Japanese design studio, Nendo, developed a drink can with two angled pull tabs, see **Figure 9**. The tabs are designed to control the level of foam produced when opening the can.

Figure 9: Nendo drink can



What is the primary driver for the invention of the drinks can?

- A. To express creativity
 - B. Desire to make money
 - C. Scientific curiosity
 - D. Constructive discontent
24. User-Centred Design teams use AI Chatbots to explore unfamiliar aspects of innovation to improve understanding of the market needs of the products they are designing for.

AI chatbots are an example of...

- A. Disruptive innovation
- B. Modular innovation
- C. Sustaining innovation
- D. Architectural innovation

25. The four stages of the product life cycle are launch, growth, maturity and decline. How does planned obsolescence impact the product life cycle?
- A. Sales are decreased
 - B. The product life cycle is extended
 - C. The product life cycle is shortened
 - D. Costs are increased
26. The adhesive bandage, trademarked as BAND-AID® by Johnson & Johnson, has been a part of medicine cabinets and first aid kits since 1924, see **Figure 10**.

Figure 10: Band Aid (Plaster)



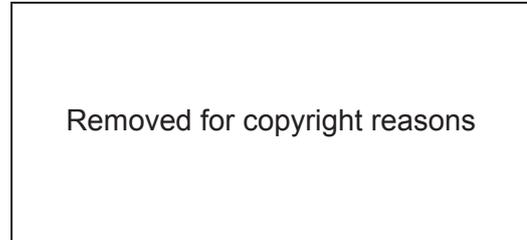
Which combination of characteristics contributed to the BAND-AID® becoming known as a classic design?

A.	Dominant design	Culture
B.	Status	Culture
C.	Dominant design	Ubiquitous
D.	Image	Mass production

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

The Doona™ multipurpose infant car seat stroller (or pushchair) combination, see **Figure 11** known as ‘Doona’ is advertised to convert from seat to stroller in seconds.

Figure 11: The Doona™ infant car seat stroller (or pushchair) combination



The manufacturers fully automated in-house testing facility continuously conducted over 20 different tests on the Doona™ prototypes to ensure safety and durability.

27. What type of modelling was most likely used?

- A. Scale models
- B. Virtual prototypes
- C. Instrumented models
- D. Statistical modelling

Figure 12: The Doona™ infant car seat stroller (or pushchair) features



- 28.** What anthropometric data would have been considered when designing the handle's adjustability range for users of the Doona™ infant car seat stroller (or pushchair) (see **Figure 12**)?
- I. User height
 - II. User arm length
 - III. User chest width
- A. I and II only
 - B. I and III only
 - C. II, and III only
 - D. I, II and III
- 29.** The Doona™ infant car seat stroller (or pushchair) is multipurpose. One safety feature of the car seat is the strong base made from fibre reinforced polymers. What plastic processing method would most likely have been used to manufacture it?
- A. Laminating
 - B. Pultrusion
 - C. Moulding
 - D. Casting

30. The Doona™ infant car seat stroller (or pushchair) handle is made from tubular aluminium. Which mechanical properties of aluminium make it suitable for this purpose?
- I. Stiffness
 - II. High strength
 - III. High ductility
- 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:** Photo by Curtis Adams: www.pexels.com/photo/a-bedroom-interior-12700517/.
Photo by Hammad Khalid: www.pexels.com/photo/close-up-photo-of-mobile-phone-1786433/.
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Photo by Gerd Altmann from Pixabay. www.pixabay.com/photos/bell-sign-on-registration-reception-2899920/.
- Figure 2:** Photo by Kelly: www.pexels.com/photo/a-solar-farm-in-the-desert-9229394/.
- Figure 3:** Image credits: Bart van Leuven
- Brick credits:
Clients – Design Museum Gent; Sogent
Architects – Carmody Groarke; ATAMA; RE-ST
Material Development – BC materials (+ Localworks Studio in concept stage)
Material Production – BC materials
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- Figure 10:** Poike, 2021. *Medical healthcare worker...* [image online] Available at: www.gettyimages.co.uk/detail/photo/medical-healthcare-worker-putting-bandage-on-the-royalty-free-image/1337420269?phrase=Band+aid+plaster&adppopup=true [Accessed 11 July 2024].