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DESIGN TECHNOLOGY
STANDARD LEVEL
PAPER 1

Monday 19 May 2014 (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. What scale of changes relates to incremental design and radical design?

	Incremental design	Radical design
A.	Small changes	Small changes
B.	Small changes	Large changes
C.	Large changes	Small changes
D.	Large changes	Large changes

2. Which model would only be produced at a scale of 1:1?

- A. Prototype
- B. Mock-up
- C. Clay model
- D. Ergonomist

3. Which characterizes the dominant style of thinking at the testing and evaluating the chosen solution stage of the IB design cycle model?

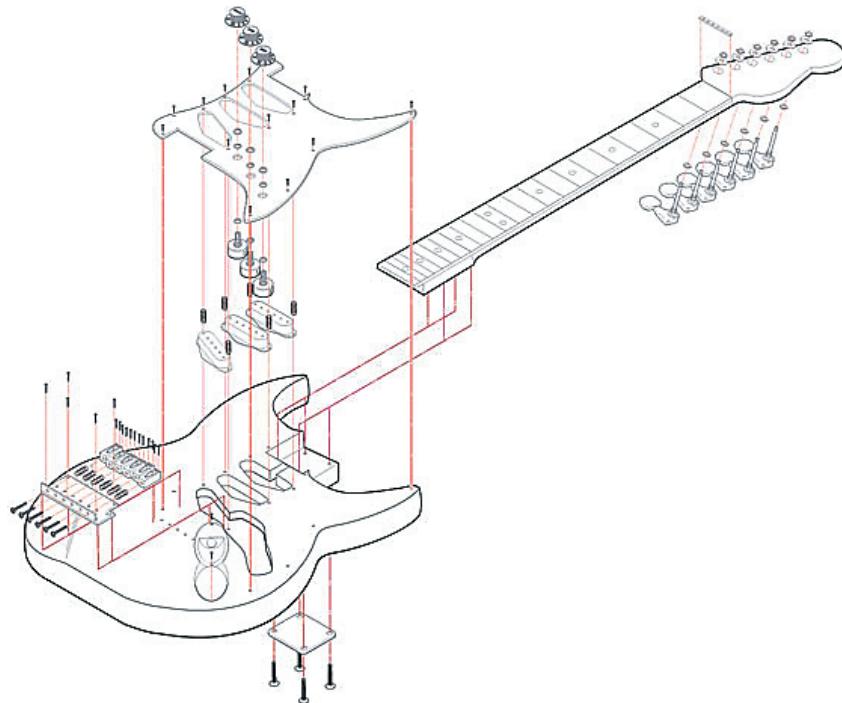
- A. Analytical and problem-focused
- B. Analytical and solution-focused
- C. Conceptual and problem-focused
- D. Conceptual and solution-focused

4. Which model would allow for the evaluation of forces acting on a structure?

- A. Algorithm
- B. Flow chart
- C. Mathematical model
- D. Scale model

5. **Figure 1** shows a drawing of a guitar.

Figure 1: A drawing of a guitar



[Source: Reproduced with permission from tutspplus.com]

What is shown in **Figure 1**?

- A. The component parts of a product and how they fit together
- B. The sequence of assembly of the component parts of a product
- C. The size of the component parts of the product
- D. The detail needed for a production drawing

6. Which combination of product and market relates to the corporate strategy of diversification?

	Product	Market
A.	New	New
B.	New	Existing
C.	Existing	New
D.	Existing	Existing

7. **Figure 2** shows a model of the Apple iPad which was released in March 2012. The release date of the new iPad was brought forward by Apple.

Figure 2: A model of the Apple iPad released in March 2012

Image removed due to copyright reasons
[Source: <http://www.applethat.com>]

What impacts resulted from bringing the release date of the iPad forward?

- I. The product cycle for the iPad was shortened.
 - II. The iPad remained ahead of its competitors.
 - III. The company had to invest heavily in research and development.
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

8. End of life vehicles generate between eight and nine million tonnes of waste in Europe alone. The European Union's End of Life Vehicle Directive is an example of "takeback" legislation.

Which aspect of vehicle design is likely to be enhanced as a result of the End of Life Vehicle Directive?

- I. Design for reuse
 - II. Design for recycling
 - III. Design for repair
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

9. The retail store Marks and Spencer has launched an initiative – ShwopDrop – to encourage people to reduce the volume of obsolete clothing sent to landfill (**Figure 3**). After collection the clothes are sold by the charity Oxfam in their shops.

Figure 3: Joanna Lumley launching an initiative designed to reduce the volume of obsolete clothing sent to landfill



© 1702083a MUST CREDIT PHOTOS BY: Michael Bowles/REX
Shwopping fashion initiative, London, Britain - 26 Apr 2012 Marc Bolland, M&S CEO, and Joanna Lumley OBE M&S transformed a London street to show how it plans to give old clothes a future through its new fashion initiative. M&S filled an entire street in Brick Lane fashion district with the equivalent amount of clothing that we throw into landfill every five minutes - almost 10,000 items.

[Source: ©Michael Bowles/REX. Used with permission.]

Which green design strategy will SchwopDrop promote?

- A. Recondition
- B. Recycle
- C. Repair
- D. Reuse

10. Which type of material is least likely to be able to be recycled economically?

- A. Composite
- B. Glass
- C. Metal
- D. Thermoplastic

11. Which design objective for green products is a major challenge in designing for planned obsolescence?

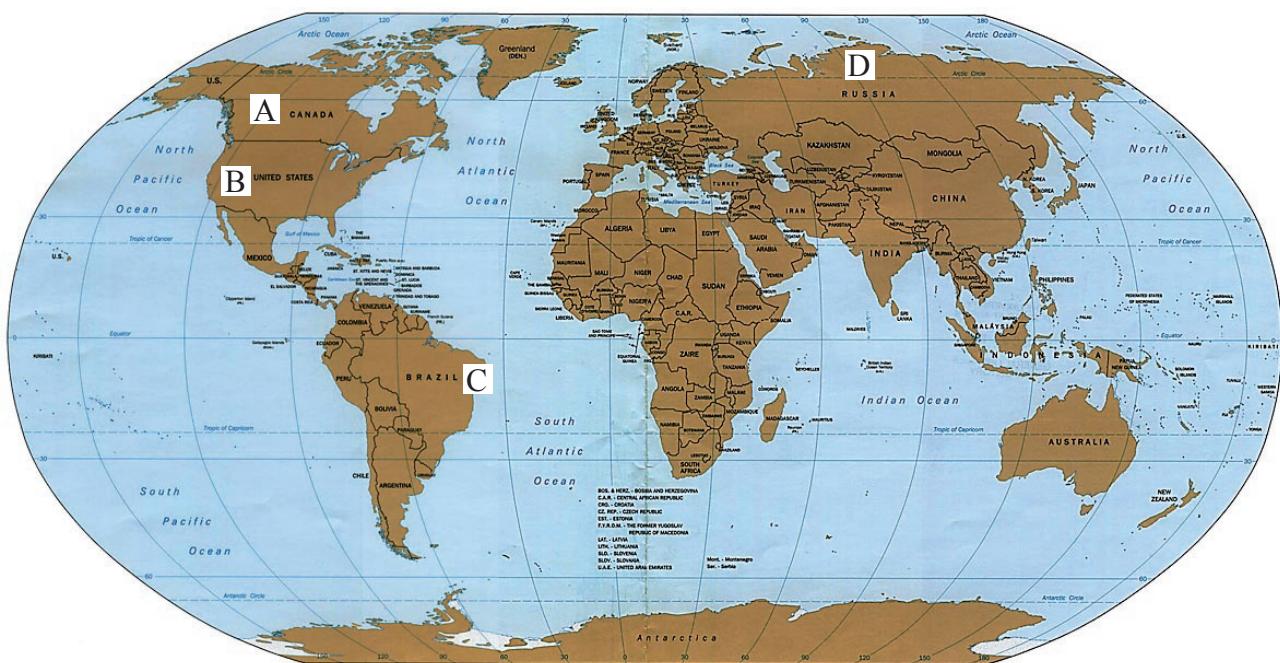
- A. Minimizing damage or pollution from the chosen materials
- B. Ensuring that the instructions encourage efficient and environmentally friendly use
- C. Ensuring that the product functions efficiently for its full life
- D. Taking full account of the effects of the end disposal of the product

12. Which material group is sub-divided into natural and man-made?

- A. Composites
- B. Ceramics
- C. Metals
- D. Timber

13. Figure 4 shows a map of the world.

Figure 4: A map of the world



[Source: www.lib.utexas.edu. Courtesy of the University of Texas Libraries, The University of Texas at Austin.]

In which region of the world do exotic hardwoods, for example mahogany, grow?

14. What is described as a mixture that contains at least one metal?

- A. Alloy
- B. Atom
- C. Composite
- D. Molecule

15. Figure 5 shows workers at the Hyundai car plant in Beijing lining up pressed metal automobile (car) parts.

Figure 5: Pressed metal automobile (car) parts in the Hyundai car plant in Beijing



[Source: <http://auto.howstuffworks.com>. ©PA. Used with permission.]

What property of the metal allows it to be pressed into the required shape for the automobile parts?

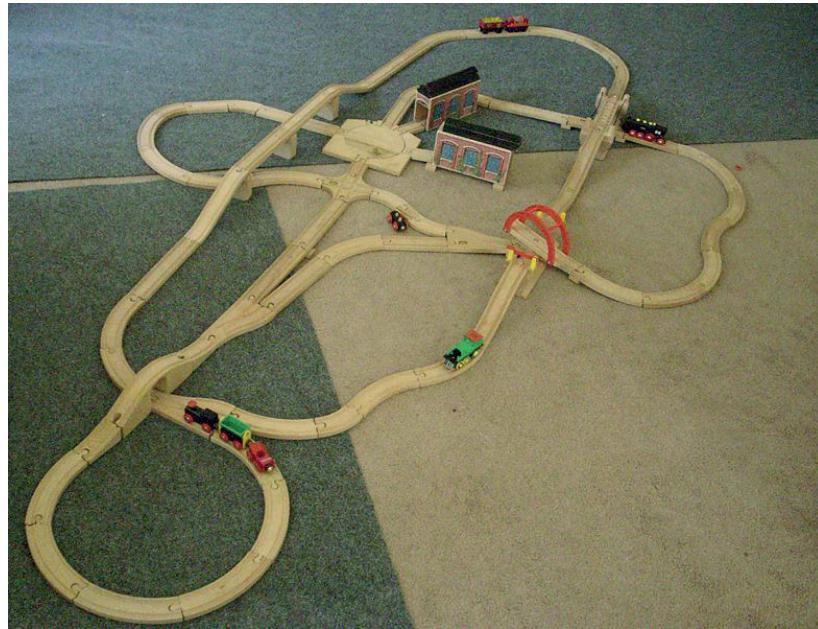
- A. Ductility
- B. Plasticity
- C. Elasticity
- D. Stiffness

16. What is creep in relation to the use of a superalloy?

- A. Physical degradation of the surface of the superalloy
- B. Oxidation of the surface of the superalloy
- C. Discolouration of the superalloy caused by exposure to the environment
- D. Deformation of the superalloy under stress

17. Figure 6 shows a child's wooden train set.

Figure 6: Child's wooden train set



[Source: http://commons.wikimedia.org/wiki/File:783px-Brio_toy_train_track-1-.jpg]

Why would the timber for the train set need to be treated?

- A. To harden it
- B. To colour it
- C. To seal the grain
- D. To toughen it

18. Which bonds in a plastic are weak bonds?

- A. The bonds within the linear chain of a thermoset
- B. The bonds within the linear chain of a thermoplastic
- C. The bonds between the linear chains of a thermoset
- D. The bonds between the linear chains of a thermoplastic

19. What type of composite material is used in the sensor of an airbag in a car?

- A. Shape memory alloy
- B. Magneto-rheostatic
- C. Electro-rheostatic
- D. Piezoelectric

20. Which material cannot be used for casting?

- A. Metals
- B. Plastics
- C. Timber
- D. Ceramics

21. Ferrari is famous for its high performance sports cars which are produced to individual customer specifications (**Figure 7**). **Figure 8** shows a worker with a hand tool on the Ferrari assembly line.

Figure 7: A new Ferrari high performance sports car



Figure 8: The Ferrari assembly line



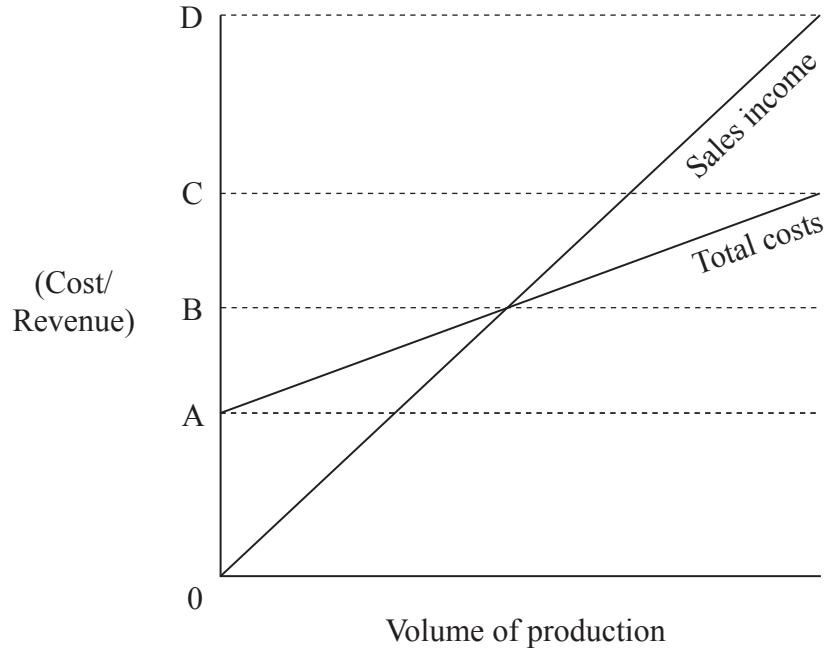
[Source: Images reproduced with permission from Ferrari.]

Which production systems are used to create the Ferrari car?

- I. Mechanization
 - II. Automation
 - III. Mass customization
-
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

22. Figure 9 shows a graph of total costs and volume of production.

Figure 9: Graph of total costs and volume of production



[Source: © International Baccalaureate Organization 2014]

Which of the following represents the variable costs at the “break-even point”?

- A. A
- B. B–A
- C. C–B
- D. D–C

23. Which combination of type of demand for a product would match the adoption of just-in-time (JIT) and just-in-case (JIC) production by a manufacturer?

	JIT	JIC
A.	Steady	Steady
B.	Steady	Variable
C.	Variable	Steady
D.	Variable	Variable

24. Which types of data would be used for comfort and room temperature?

	Comfort	Room temperature
A.	Qualitative data	Qualitative data
B.	Qualitative data	Quantitative data
C.	Quantitative data	Qualitative data
D.	Quantitative data	Quantitative data

25. **Figure 10** shows the Earpod headphones designed for the Apple iPhone 5. As part of the design development for the earphones, Apple invited over 600 people to test different designs while running on treadmills.

Figure 10: Apple iPhone 5 Earpod headphones

Image removed due to copyright reasons
[Source: <http://tinyurl.com/m5m997w>]

Which evaluation strategy was used in the development phase for the Apple iPhone 5 Earpod headphones?

- A. User research
 - B. User trial
 - C. Field trial
 - D. Expert appraisal
26. What would have the **least** influence on consumer evaluation of a product?
- A. Consumer associations
 - B. Government legislation
 - C. The media
 - D. Education

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

Levi's have developed a programme called Levi's Curve ID. It offers "jeans built around shape, not size" to help women find a pair of jeans that fits well. Following research on over 65 000 women, Jill Guenza, global head of women's design at Levi's, explained: "... 80 per cent of women around the world fall into three distinct body shapes". Levi's Curve ID provides an online programme asking three questions (Figure 11) to identify the fit required – slight curve, demi curve or bold curve. Customers can order jeans online either directly from Levi's or indirectly from other online retailers from a range of standard styles, colours, waist sizes and lengths.

Figure 11: Levi's three-step fit finder

The figure consists of three vertically stacked sections, each with a title, a series of mannequin illustrations, and a navigation bar at the bottom.

STEP 1. WAIST
Tell me about your curve, from waist to hip...

LEVI'S CURVE ID FIT FINDER

1 WAIST 2 SEAT 3 FIT ISSUES 4 YOUR CURVE

Illustrations:

- STRAIGHT:** Mannequin with a straight waist and hips. Description: "I have very little curves and am pretty straight from waist to hip."
- SOME CURVE:** Mannequin with a slight curve. Description: "I have some curves and there's some definition from my waist to hip."
- CURVY:** Mannequin with a bold curve. Description: "I am curvy and have a defined waist and round hips."

STEP 2. SEAT
So how would you describe your seat?

LEVI'S CURVE ID FIT FINDER

1 WAIST 2 SEAT 3 FIT ISSUES 4 YOUR CURVE

Illustrations:

- FLAT:** Mannequin with a flat seat. Description: "My seat is pretty flat."
- AVERAGE:** Mannequin with an average seat, highlighted with a yellow border and a checked checkbox. Description: "My seat is average."
- FULL:** Mannequin with a full seat. Description: "My seat is full."

STEP 3. FIT ISSUES
Do you have any of these issues when jeans fit your hips and thighs?

LEVI'S CURVE ID FIT FINDER

1 WAIST 2 SEAT 3 FIT ISSUES 4 YOUR CURVE

Illustrations:

- WAIST IS TOO TIGHT:** Mannequin showing a tight waistband. Description: "When jeans fit my thighs, the waistband cuts in and gives me muffin top." Options: NOT AN ISSUE, SOMETIMES AN ISSUE, ALWAYS AN ISSUE.
- GAPS IN THE BACK:** Mannequin showing gaps in the back of the jeans. Description: "I usually tighten my jeans with a belt so that they lay flat against my back." Options: NOT AN ISSUE, SOMETIMES AN ISSUE, ALWAYS AN ISSUE.
- NOT ENOUGH COVERAGE:** Mannequin showing jeans that don't cover enough of the backside. Description: "Jeans don't cover enough of my backside." Options: NOT AN ISSUE, SOMETIMES AN ISSUE, ALWAYS AN ISSUE.

[Source: www.levistrauss.com. Used with permission.]

27. What is likely to increase perceptions of value for money for consumers purchasing Curve ID jeans?
- A. Better design
 - B. Better fit
 - C. More choice
 - D. Cheaper product
28. Which aspect of developing the Curve ID system as part of its pioneering corporate strategy would be reduced through the extensive market research undertaken by Levi Strauss & Co.?
- A. System development costs
 - B. Profit margin
 - C. Risk
 - D. Design team
29. What would have been the major challenge for Levi Strauss & Co. in deciding what range of standard curves, waist sizes and lengths to offer?
- A. Lack of data
 - B. Lack of global standards for clothes sizes
 - C. Consumer perceptions of their shape and size
 - D. Global marketplace

30. Why would Levi Strauss & Co.'s Curve ID system **not** be considered as an example of mass customization?

- I. Jeans are produced in a range of standard styles, colours, waist sizes and lengths.
 - II. Jeans are not customized to meet the requirements of a specific customer order.
 - III. Jeans are produced using just-in-time (JIT) rather than just-in-case (JIC).
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
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