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**DESIGN TECHNOLOGY  
STANDARD LEVEL  
PAPER 1**

Monday 18 November 2013 (afternoon)

45 minutes

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**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. When would a designer be most likely to take account of critical safety standards relating to the design of a new product?

	<b>Development of the design specification</b>	<b>Development of the design brief</b>
A.	No	No
B.	No	Yes
C.	Yes	No
D.	Yes	Yes

2. What is **not** true of an algorithm?

- A. It is used in problem-solving.
- B. It comprises a sequence of steps.
- C. It helps to communicate complex processes.
- D. It uses symbols to represent processes pictorially.

3. Which ideas-generating technique uses a two-dimensional matrix to explore design problems?

- A. Attribute listing
- B. Brainstorming
- C. Constructive discontent
- D. Morphological synthesis

4. Which model would be **most** appropriate in the communication of the design concept for a new shopping centre to the local community?
- A. Perspective drawing
  - B. Isometric drawing
  - C. Mathematical model
  - D. Physical model
5. What is the dominant form of thinking at the generation of ideas stage of the design cycle?

	<b>Convergent thinking</b>	<b>Divergent thinking</b>
A.	No	No
B.	No	Yes
C.	Yes	No
D.	Yes	Yes

6. **Figure 1** shows a Nokia ASHA 302 phone. It is designed for business users and features a QWERTY keyboard.

**Figure 1: The Nokia ASHA 302 mobile phone with QWERTY keyboard**



[Source: <http://www.nokia.com/gb-en/phones/phone/302/>, used with permission.]

The QWERTY keyboard used on the Nokia ASHA 302 mobile phone is an example of

- A. dominant design.
  - B. imitative design.
  - C. robust design.
  - D. design family.
7. Which green design objective is most important for consideration in developing the design brief for a refrigerator in relation to “take back” legislation?
- A. The chosen materials
  - B. The user instructions
  - C. The packaging
  - D. Safety

8. In using data from a life cycle analysis for the redesign of a washing machine, which environmental consideration is likely to be the most important?
- A. Soil pollution and degradation
  - B. Noise
  - C. Water
  - D. Air contamination
9. What is the major advantage of organizing the result of a life cycle analysis into an environmental impact assessment matrix?
- A. It identifies the responsibilities of the designer.
  - B. It identifies design conflicts for resolution.
  - C. It identifies the most significant environmental impacts.
  - D. It identifies the priorities for redesign.
10. Which design strategy would be most likely to facilitate the repair of a product?
- A. Design for assembly
  - B. Design for disassembly
  - C. Design for materials
  - D. Design for process

11. **Figure 2** shows the design of the European Union (EU) energy label for washing machines which is used in all 27 EU member states.

**Figure 2: EU energy label for a washing machine**



[Source: www.newenergylabel.com]

What are benefits of the design of the EU energy label for consumers?

- I. It overcomes potential language barriers in the EU marketplace.
  - II. It allows easy comparison with competitor products.
  - III. It identifies disposal options at the end-of-life.
- A. I and II only
  - B. I and III only
  - C. II and III only
  - D. I, II and III

12. A company rebuilds car engines for resale. This is an example of
- A. repair.
  - B. reconditioning.
  - C. reuse.
  - D. recycle.
13. What is defined as a mixture that contains at least one metal?
- A. Atom
  - B. Molecule
  - C. Composite
  - D. Alloy
14. Which characteristic of mahogany makes it particularly appealing as a material for the production of furniture?
- A. It is readily available.
  - B. Its colour.
  - C. It is low cost.
  - D. It is sustainable.

15. **Figure 3** shows some green peppers on a market stall.

**Figure 3: Green peppers on a market stall**



[Source: © International Baccalaureate Organization 2014]

Which aesthetic characteristic is particularly important in selecting fruit and vegetables from a market stall?

- A. Appearance
  - B. Taste
  - C. Smell
  - D. Texture
16. What is a characteristic of a magneto-rheostatic material?

	<b>Magnetic field off</b>	<b>Magnetic field on</b>
A.	Fluid	Fluid
B.	Fluid	Solid
C.	Solid	Fluid
D.	Solid	Solid

17. **Figure 4** shows a hardwood floor. Hardwood floors can be finished with a range of finishes, for example, lacquer.

**Figure 4: A hardwood floor**



[Source: [www.howdens.com](http://www.howdens.com). Used with permission.]

What is a disadvantage of using lacquer for finishing the hardwood floor?

- A. Durability
- B. Low maintenance
- C. Prone to scratching
- D. Shiny appearance

18. Which plastic is an example of a thermosetting plastic?
- A. Polyvinyl chloride
  - B. Polyurethane
  - C. Polypropene
  - D. Polyethene
19. A blacksmith makes a horseshoe by hammering iron which has been heated in a furnace (**Figure 5**). Once the final shape of the horseshoe is achieved it is cooled by dipping in a bath of cold water – a process called quench hardening.

**Figure 5: Manufacturing a horseshoe**



[Source: <http://www.cottamhorseshoes.com>. Used with permission.]

Which combination of rate of cooling and grain size is achieved by quench hardening the hot iron?

	<b>Rate of cooling</b>	<b>Grain size</b>
A.	Rapid	Small
B.	Slow	Small
C.	Rapid	Large
D.	Slow	Large

20. **Figure 6** shows a car windscreen (windshield) that has been damaged through impact.

**Figure 6: A car windscreen damaged by impact**



[Source: <http://commons.wikimedia.org/wiki/File:Windshield-spiderweb.jpg>]

What glass would have been used to manufacture the windscreen of the car?

- A. Soda glass
  - B. Pyrex glass
  - C. Toughened glass
  - D. Laminated glass
21. Which manufacturing technique is described as a single thread passing in and out of a fabric?
- A. Machining
  - B. Knitting
  - C. Weaving
  - D. Stitching

22. What is **not** true of an end-of-pipe solution to cleaning up a manufacturing process?
- A. It is an incremental approach to clean technology.
  - B. It increases the complexity of a manufacturing process.
  - C. It identifies where waste and emissions come from in a manufacturing process.
  - D. It is consistent with sustainable development.
23. Why is there a shortage of “master craftsmen” in industrialized countries?
- A. Reduction in training courses
  - B. Decreased automation
  - C. No market for craft produced products
  - D. Changing attitudes towards employment opportunities
24. What is a characteristic of fashion?
- A. Predictable timescale
  - B. Individuality
  - C. Social pressure
  - D. Materials obsolescence

25. **Figure 7** shows a child’s shape sorting toy.

**Figure 7: Child’s shape sorter**

Figure 7 removed for copyright reasons  
Go to this link: [http://www.battatco.com/products/battat/battat\\_pg/products\\_battat.html#!prettyPhoto/12/](http://www.battatco.com/products/battat/battat_pg/products_battat.html#!prettyPhoto/12/)

What would have been a major consideration in the design specification for the shape sorter shown in **Figure 7**?

	<b>Texture</b>	<b>Colour</b>
A.	No	No
B.	No	Yes
C.	Yes	No
D.	Yes	Yes

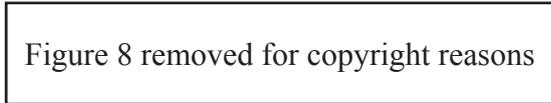
26. Which of the following processes have been made easier by the introduction of automation?

	<b>Quality control</b>	<b>Quality assurance</b>
A.	No	No
B.	No	Yes
C.	Yes	No
D.	Yes	Yes

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

The Roomba<sup>®</sup> (**Figure 8**) was the first low-cost vacuum cleaning robot. It was developed by the iRobot<sup>®</sup> company which has a reputation for its pioneering corporate strategy. The Roomba<sup>®</sup> can be programmed to clean at particular times of the day and can work without supervision while its owners are out at work. It is 30 cm in diameter and 10 cm high. It has rechargeable batteries that provide approximately 90 minutes of cleaning for each charge and returns automatically to its base to recharge (**Figure 9**).

**Figure 8: The Roomba<sup>®</sup> robotic vacuum cleaner**

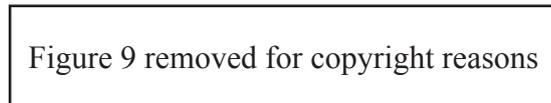


Virtual Walls tells Roomba<sup>®</sup> where to clean by restricting off-limit areas

Roomba<sup>®</sup> won't get stuck on cords, carpet fringe or tassels

Cleans the whole floor, under and around furniture and along walls

**Figure 9: The Roomba<sup>®</sup> charging unit located next to a skirting board**



27. What is true of pioneering companies, such as the iRobot<sup>®</sup> company?
- I. They are financially secure.
  - II. They do a lot of market research.
  - III. They have a strong research and development capability.
- A. I and II only
  - B. I and III only
  - C. II and III only
  - D. I, II and III
28. What disadvantage does focusing on developing a product family of robotic vacuum cleaners have for the iRobot<sup>®</sup> company?
- A. Increased market share
  - B. Decreased profit
  - C. Longer time-to-market
  - D. Increased risk
29. Which criterion for the evaluation of the Roomba<sup>®</sup> is likely to be most important in relation to its long-term use?
- A. Product image
  - B. Reliability
  - C. Aesthetics
  - D. Ease of use
30. Which cost for the Roomba<sup>®</sup> is an example of a fixed cost?
- A. Research and development
  - B. Materials
  - C. Distribution
  - D. Energy
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