

**DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 1**

Wednesday 14 May 2003 (afternoon)

1 hour

INSTRUCTIONS TO CANDIDATES

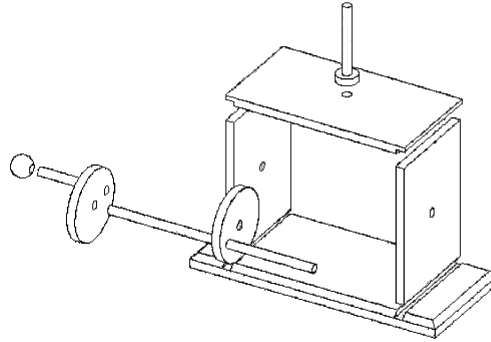
- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

1. What is defined as “a set of precise limits for the complete range of performance requirements for the design of a product”?
 - A. The brief
 - B. The specification
 - C. Radical design
 - D. The research

2. What defines “incremental design”?
 - A. A sequence of instructions to describe a set of actions.
 - B. A completely new product is devised by going to the root of the problem.
 - C. Small changes to the design which appear trivial but the cumulative effect is very significant.
 - D. Designing in stages from problem to completion.

3. What happens during the “planning and realizing the chosen solution” stage of the IB simple design cycle?
 - A. A final concept is developed to meet the specification.
 - B. Detail drawings, material lists and costings are determined.
 - C. The outcome is tested and evaluated against the specification.
 - D. Divergent thinking is used to consider ways to solve the problem.

4. What type of drawing is shown below?



- A. Freehand drawing
- B. Perspective drawing
- C. Exploded isometric drawing
- D. Orthographic drawing

5. Which criteria are used to evaluate products?

- I. Performance
- II. Ease of use
- III. Construction and cost

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

6. What is “a 3-D scale model based on a specific percentile, with moving parts”?

- A. Manikin
- B. Iconic model
- C. Ergonome
- D. Physical model

7. What is the most efficient way of designing and producing a product from a manufacturer's point of view?
- A. Value for money
 - B. Cost-effectiveness
 - C. Break-even point
 - D. Material costs
8. In which design context is material density an important consideration?
- A. Electrical insulation
 - B. Wooden toys
 - C. Winter clothing
 - D. Food packaging
9. What mechanical property of a material is its ability to resist the propagation of cracks?
- A. Stiffness
 - B. Toughness
 - C. Hardness
 - D. Ductility
10. What is "the fusing of solid particles together by heat and pressure without completely liquefying the particles"?
- A. Sintering
 - B. Welding
 - C. Injection moulding
 - D. Laminating

11. What technique was employed to make the wooden seat of the stool shown in the photograph below?



- A. Laminating
 - B. Moulding
 - C. Casting
 - D. Sintering
12. What technique is used to convert a tree into useful timber?
- A. Extrusion
 - B. Cutting and machining
 - C. Sintering
 - D. Moulding
13. What type of production needs pre-processed materials and interchangeable parts delivered to a flow line?
- A. Craft production
 - B. Assembly line production
 - C. Mechanization
 - D. Automation

14. What contributed to the introduction of automation?
- A. Steam power
 - B. Skilled craftsmen
 - C. Computers
 - D. Water power
15. What is in the late stage of its product life-cycle?
- A. Ballpoint pen
 - B. PC
 - C. Cassette tape
 - D. Solar panel
16. What must a manufacturer do to take a “clean technology” approach?
- A. Use CFC propellants in aerosols.
 - B. Use fossil fuels to create power.
 - C. Increase use of raw materials.
 - D. Minimize negative impacts on the environment.
17. Who actively resist talk of environmental protection?
- A. Ecowarriors
 - B. Ecochampions
 - C. Ecofans
 - D. Ecophobes

18. How are manufacturers encouraged to embrace “green design” and “clean technology”?
- I. Consumer pressure
 - II. Legislation
 - III. Increased energy costs
- A. I and II
 - B. II and III
 - C. I and III
 - D. I, II and III
19. Which design objective for the green design of a product would not be addressed in a life cycle analysis?
- A. More effective use of materials
 - B. Reduction in damage or pollution
 - C. Reduction in nuisances, *e.g.* noise
 - D. Removal of safety hazards
20. Which product is least likely to have repairability as a design consideration?
- A. Washing machine
 - B. Disposable camera
 - C. Vacuum cleaner
 - D. Car tyre

21. Which is a composite timber?

- A. Plywood
- B. Pine wood
- C. Hardwood
- D. Softwood

22. How is particleboard made more acceptable as a material for modular furniture?

- I. Veneered
 - II. Untreated
 - III. Varnished or painted
- A. I and II
 - B. II and III
 - C. I and III
 - D. I, II and III

23. What material comprises 60–80 % SiO_2 , 10–25 % B_2O_3 , 8 % Na_2O_2 and 3 % Al_2O_3 ?

- A. Toughened glass
- B. Soda glass
- C. Laminated glass
- D. Borosilicate (pyrex) glass

24. What material is made by blowing oxygen through liquid iron to reduce the carbon level below 6 %?
- A. Mild steel
 - B. Wrought iron
 - C. High carbon steel
 - D. Pig iron
25. Which is a cellulose polymer obtained from a sub-tropical plant?
- A. Bamboo
 - B. Cotton
 - C. Nylon
 - D. Composite thread
26. How can the properties of a woven fabric be modified for a particular design application?
- I. Change the properties of the thread used
 - II. Use different fibres to produce the fabric
 - III. Change the type of weave used
- A. I and II
 - B. II and III
 - C. I and III
 - D. I, II and III
27. What are described as a regular arrangement of particles?
- A. Ions
 - B. Atoms
 - C. Crystals
 - D. Molecules

- 28.** What is an alloy?
- A. A mixture that contains at least one metal
 - B. A substance made of two or more other substances that can be separated
 - C. A mixture of two or more substances
 - D. A substance formed by the combination of elements
- 29.** What material has very low solubility in water, very low electrical resistivity, a wide hardness range and is very stiff?
- A. Ceramic
 - B. Food
 - C. Metal
 - D. Textile
- 30.** What are “weak forces of attraction between molecules”?
- A. Ionic bonds
 - B. Metallic bonds
 - C. Covalent bonds
 - D. Secondary bonds
- 31.** What is true of a thermoset?
- A. Reversible effect of temperature
 - B. Strong primary bonding between adjacent chains
 - C. Weak secondary bonding between adjacent chains
 - D. Easily recyclable

32. What do the three structures (I, II and III) have in common?

- I. A wall made of wattle and daub
- II. A racing car body shell
- III. A reinforced concrete building

- A. They are all composite materials.
- B. They are all natural materials.
- C. They are all made from polymers.
- D. They are all made from man-made materials.

33. What defines plastic deformation?

- A. The ability of plastics to be moulded
- B. The ability of a material to resist deformation
- C. The permanent deformation of a solid due to stress
- D. The ability of a material to be drawn into a wire

34. What is calculated by the formula $\frac{\text{stress}}{\text{strain}}$?

- A. Plastic flow region
- B. Ultimate stress (UTS)
- C. Yield stress
- D. Young's Modulus

35. Which of the following devices produces energy from renewable resources?
- I. Wind generator
 - II. Water Turbine
 - III. Coal-fired power station
- A. I and II
 - B. II and III
 - C. I and III
 - D. I, II and III
36. What uses local materials and local labour, is low in capital costs and involves decentralized renewable energy sources?
- A. Resource
 - B. Appropriate technology
 - C. Reserve
 - D. Alternative technology
37. Which were the main proposals in Agenda 21 of the Rio Conference?
- I. Sustainable energy development
 - II. Prevent stratospheric ozone depletion
 - III. Short-term profitability
- A. I and II
 - B. II and III
 - C. I and III
 - D. I, II and III

38. Why might a designer reject the concept of planned obsolescence?
- A. Conservation of resources
 - B. Increased profitability
 - C. Increased productivity
 - D. Increased research and development requirements
39. What is “technology that involves new types of equipment or organizational forms and is a viable alternative to existing mainstream technologies”?
- A. Intermediate technology
 - B. Appropriate technology
 - C. Alternative technology
 - D. Sustainable technology
40. Which product characteristic is consistent with sustainable development?
- A. Meets the cultural requirements of user
 - B. Low durability and repairability
 - C. Exchange value is greater than use value
 - D. Requires exceptional user skills
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