

**DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 1**

Wednesday 14 November 2007 (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. Designers working in the field of genetic engineering rely upon knowledge from which of the following?
 - I. science
 - II. technology
 - III. philosophy
 - A. I only
 - B. II only
 - C. III only
 - D. I, II and III

2. The designer normally spends **most** time collaborating with the client at which stage of the design cycle?
 - A. Brief
 - B. Generating ideas
 - C. Planning and realising the chosen solution
 - D. Testing and evaluating the chosen solution

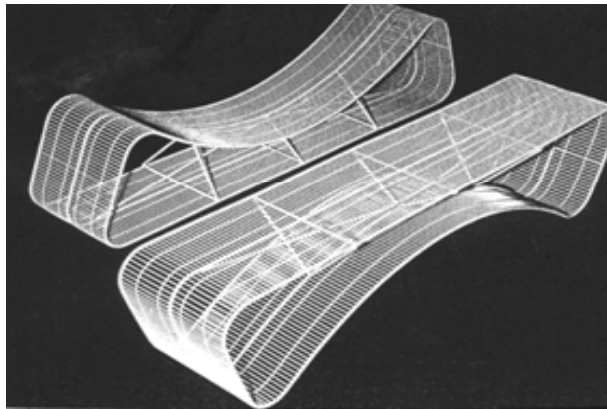
3. In designing a bridge which type of model is the designer **most** likely to use to evaluate the strength of the structure?
 - A. Physical
 - B. Algorithm
 - C. Flow chart
 - D. Mathematical

4. Designers sometimes produce perspective drawings of products because
- A. they are easier to draw than isometric drawings.
 - B. they are suitable for CAD.
 - C. they are more realistic than other drawings.
 - D. they require little skill.
5. Which psychological factor is of **least** importance in the design of a mobile phone?
- A. Light
 - B. Temperature
 - C. Sound
 - D. Texture
6. Using a questionnaire to gather information for a design brief is an example of
- A. literature search.
 - B. user trial.
 - C. user research.
 - D. expert appraisal.
7. The use of solar power to replace batteries as the energy source for torches is an example of
- A. planned obsolescence.
 - B. life cycle analysis.
 - C. fashion.
 - D. social responsibility of the designer.

8. When designing a new bread recipe which property is **least** relevant?
- A. Hardness
 - B. Density
 - C. Stiffness
 - D. Tensile strength
9. Which material in the IB properties/materials matrix is low in density, hardness and thermal conductivity and high in electrical resistivity?
- A. Textile fibres
 - B. Timber
 - C. Ceramics
 - D. Food

Questions 10 and 11 refer to Figure 1.

Figure 1: CAD image of a bench to be made from steel wire

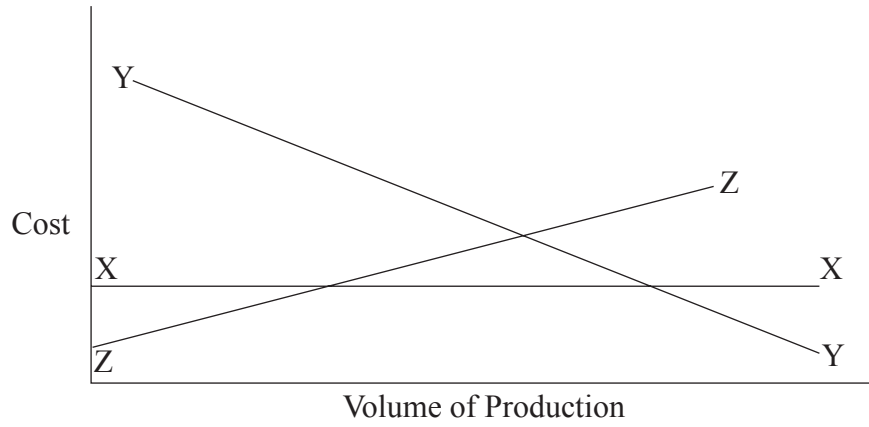


[Source: designed by Shin and Tomako Azumi (UK)]

10. Which technique would be appropriate to shape the bench?
- A. Bending
 - B. Moulding
 - C. Casting
 - D. Abrading

11. Which technique is **most** likely to be used to join the steel wires together?
- A. Using adhesives
 - B. Fusing
 - C. Using fasteners
 - D. Stitching
12. Which technique has the lowest set-up costs for the production of the mould?
- A. Lamination
 - B. Extrusion
 - C. Sintering
 - D. Injection moulding
13. Which production process does not involve robots?
- A. Automation
 - B. Assembly line production
 - C. Batch production
 - D. Mechanisation
14. What is a benefit of assembly line production to consumers?
- A. Cheaper products
 - B. A wider variety of products
 - C. A skilled workforce producing better products
 - D. Flexibility of manufacture

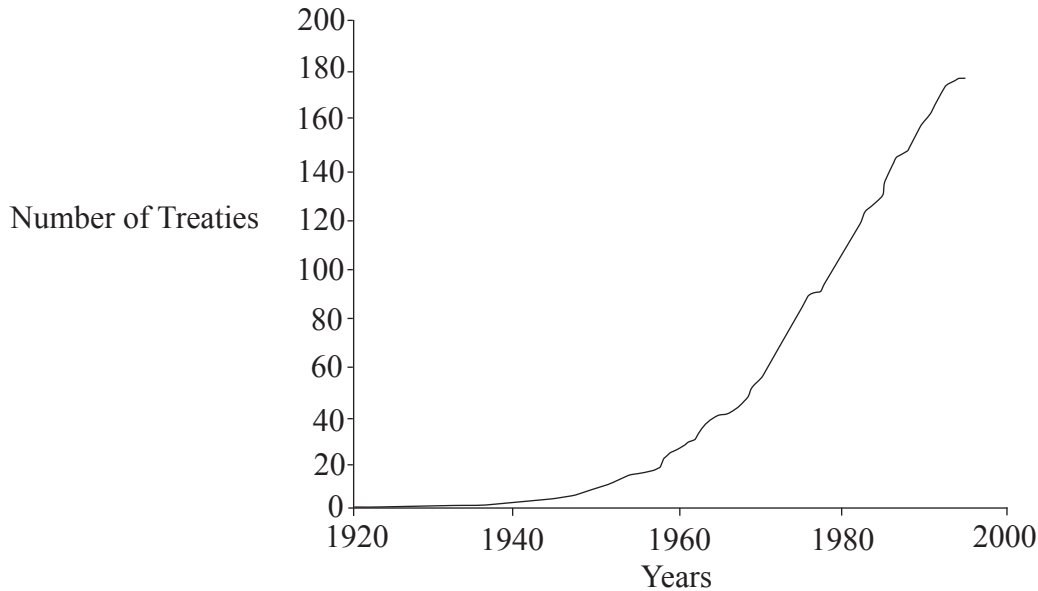
15. **Figure 2: Diagram of fixed costs related to variable costs**



For the three costs in the graph above, the item cost and variable costs would be represented by

| | Item | Variable |
|----|-------------|-----------------|
| A. | Z | Y |
| B. | X | Y |
| C. | Y | Z |
| D. | X | Z |

16. **Figure 3: Graph of growth of international environmental treaties between the period of 1920 - 2000**



A possible reason for the sharp increase in treaties after 1960 is that

- A. there was minimum damage to the environment before 1960.
 - B. there was no mass production before 1960.
 - C. after 1950 the technological revolution took place.
 - D. governments became more environmentally pro-active after 1960.
17. Which is **least** likely to persuade a company to adopt strategies for green design?
- A. Legislation
 - B. Market pull
 - C. More energy efficient manufacturing process
 - D. An increased cost of production

18. Clean technology is the **most** common environmental strategy adopted by companies because
- A. manufacturers are keen to make changes.
 - B. adopting life cycle analysis is more difficult.
 - C. manufacturers need to comply with legislation.
 - D. it does not increase costs.
19. Life cycle analysis should be considered at which stage of the design cycle?
- I. the brief
 - II. research and specification
 - III. generating ideas
- A. I only
 - B. II only
 - C. III only
 - D. I, II and III
20. The use of different plastics in cars has the **most** harmful impact on the environment due to the fact that using plastics
- A. saves fuel by reducing weight.
 - B. makes recycling more difficult.
 - C. makes forming shapes easier.
 - D. means additional surface finishes are not required.

21. Which statement does **not** describe hardwoods?

- A. They only grow in tropical climates
- B. They have broad leaves
- C. They are deciduous
- D. They are slow growing

22. **Figure 4: The first bridge to be constructed from metal**



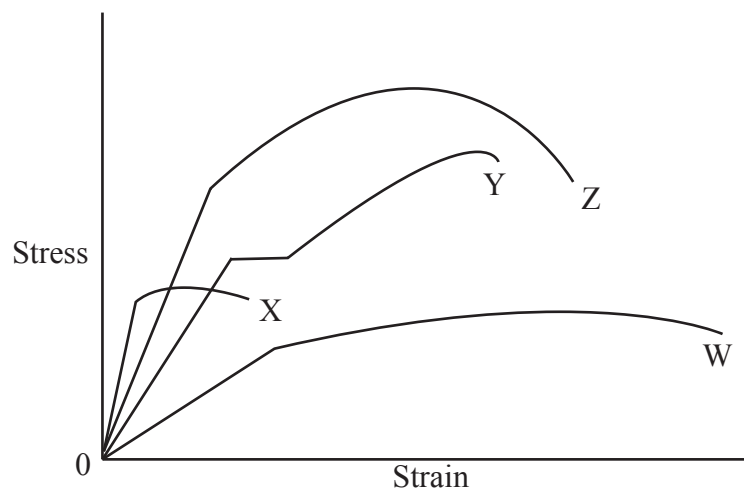
It is made from

- A. wrought iron.
- B. mild steel.
- C. cast iron.
- D. stainless steel.

- 23.** Glass windows in a house are normally manufactured from
- A. borosilicate glass.
 - B. soda-lime glass.
 - C. scrap glass.
 - D. crystal glass.
- 24.** Shirts are often manufactured from a combination of cotton and polyester because
- A. cotton is not an abundant resource.
 - B. polyester grows in more regions of the world.
 - C. cotton is a non-renewable resource.
 - D. 100% cotton would be more expensive.
- 25.** A requirement for the commercially viable manufacture of mycoprotein is
- A. it is easier to cook than meat.
 - B. the use of a cheap substrate.
 - C. it is tasteless.
 - D. it is made from fungus.
- 26.** Superconductors are made from
- A. ceramic alloys.
 - B. metal alloys.
 - C. ceramic/metal composites.
 - D. plastic/metal composites.

27. In diamond the covalent bonding of carbon atoms are arranged in which geometric pattern?
- A. Pyramid
 - B. Tetrahedron
 - C. Dodecahedron
 - D. Cubic
28. In the IB properties/bonding matrix, which type of bond has two very high physical properties and two very low physical properties?
- A. Network covalent
 - B. Metallic
 - C. Ionic
 - D. Simple covalent
29. Alloying affects malleability of metals by
- A. reducing tensile strength.
 - B. increasing hardness.
 - C. reducing toughness.
 - D. increasing stiffness.
30. Polyurethane would be suitable for including in the manufacture of
- A. paint.
 - B. food packaging.
 - C. car tyres.
 - D. plastic cups.

31. Which of the following is **least** suitable as a building material?
- A. Concrete
 - B. Kevlar
 - C. Mortar
 - D. Wattle-and-daub
32. Which structural failure is due to lack of stiffness rather than lack of strength?
- A. A car tyre bursts
 - B. A chair breaks when you sit on it
 - C. A shelf bends too much when loaded with books
 - D. A roof collapses under the weight of snow
33. Figure 5 shows the stress/strain curves of a range of materials.



Which material has the greatest ductility?

- A. Y
- B. W
- C. Z
- D. X

34. The unit of stress is
- A. Nm^{-2}
 - B. Nm
 - C. Nm^2
 - D. Nm^{-1}
35. Which of the following is a renewable resource?
- A. Coal
 - B. Gas
 - C. Water
 - D. Oil
36. Which contributes to an appropriate technology policy?
- A. High unemployment
 - B. High energy use
 - C. Compatibility with local culture
 - D. Capital intensive
37. Which renewable energy resource is **not** affected by geographical location in the production of electricity?
- A. Wind
 - B. Solar
 - C. Hydroelectric
 - D. Nuclear

- 38.** One reason why a consumer might be opposed to recycling is that
- A. it is not good for the environment.
 - B. more energy may be used in recycling materials than is saved.
 - C. most products are not recyclable.
 - D. recycling is a fashion.
- 39.** Governments have difficulty introducing legislation for sustainable development because
- A. consumers oppose it.
 - B. designers oppose it.
 - C. sustainable development is diverse.
 - D. it is not possible to prosecute offending manufacturers.
- 40.** What is a barrier to achieving sustainability in manufacturing?
- A. A possible decrease in short-term profitability
 - B. An increase in service sector based activities
 - C. Anticipated sources of pollution at the design stage
 - D. A market pull situation
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