

**DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 1**

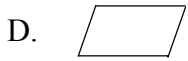
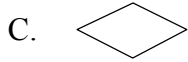
Monday 20 May 2002 (afternoon)

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. Which symbol is used to represent input/output in a flow chart?



2. Of what is “identifying a problem within a context” an element?

- A. The Product Cycle
- B. The Design Cycle Model
- C. The Materials Matrix
- D. The Systems Model

3. Which tool would a designer use for analysing complicated electronic systems?

- A. A processing block diagram
- B. An algorithm
- C. An orthographic sketch
- D. A 3D sketch

4. Which are advantages of using a Computer Aided Design (CAD) package?

- I. Rapid production of drawings by inexperienced users
- II. Multiple access to the same drawing
- III. Rapid modification of drawings

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

5. Which is an example of symbolic modelling?
- A. A wooden replica of a proposed new object.
 - B. A computer spreadsheet.
 - C. A folded paper model.
 - D. A computer-generated 3D representation.
6. Which processes help designers to generate ideas?
- I. Sketching
 - II. User trials
 - III. Brainstorming
- A. I and III
 - B. I and II
 - C. II and III
 - D. I, II and III
7. Which percentile range would be used to design a new playground ride?
- A. 99th percentile
 - B. 95th percentile
 - C. 50th percentile
 - D. 5th percentile

8. Which statements about designers' responsibilities are correct?
- I. Designers must resolve conflicts.
 - II. Designers must consider the needs of the user.
 - III. Designers should only consider the needs of the manufacturer.
- A. I and II
 - B. II and III
 - C. I and III
 - D. I, II and III
9. Which statement does **not** reflect social responsibility in design?
- A. Material use
 - B. Recyclability
 - C. Energy use
 - D. Aesthetics
10. Which is a mechanical property of a material?
- A. Density
 - B. Hardness
 - C. Stiffness
 - D. Thermal Conductivity
11. In which design context would hardness be the most important property?
- A. A motorcycle wheel axle
 - B. A steel bridge member
 - C. A set of bicycle handlebars
 - D. A craft knife blade

12. What defines toughness?
- A. A mixture of materials, one of which is plastic.
 - B. The ability of the material to resist deterioration in a damp environment.
 - C. The ability of the material to resist the propagation of cracks.
 - D. The resistance of the material to abrasion.
13. Which combination of properties is needed for the nose cone of a supersonic aircraft?
- I. Low weight
 - II. Low Thermal Expansion
 - III. High Thermal Conductivity
- A. I and II
 - B. I and III
 - C. II and III
 - D. I, II and III
14. How would the body of the product shown below be produced?



- A. Casting
- B. Machining
- C. Weaving
- D. Extruding

15. What is a composite?

- A. A material composed of small pieces joined together
- B. A mixture of one or more metals
- C. A mixture composed of two or more materials with one substance acting as the matrix or glue
- D. A thermoplastic material able to withstand high impact loads

16. Which are examples of one off production?

- I. A mould for an injection moulding machine.
- II. A scale model of a proposed new product.
- III. An exhibition stand and display.


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

17. Which are variable costs?

- A. Capital costs
- B. Design costs
- C. Material costs
- D. Plant and machinery costs

18. Which statements describe a NAND gate?

I. It has two or more inputs

II. The diagram shows a standard NAND gate symbol, which is a D-shaped symbol with a small circle (bubble) at the output end. It has two input lines on the left and one output line on the right.

III. It performs the AND function and inverts the output

A. I and II

B. I and III

C. II and III

D. I, II and III

19. Which statements are true of a closed loop system?

I. A reference signal is compared with a feedback signal so that a control action can be performed.

II. An analogue signal is converted to a digital signal.

III. A non-electrical signal is converted into an electrical signal.

A. I only

B. II only

C. III only

D. I and II

20. What is the function of a transducer?

A. It changes an analogue signal to a digital signal.

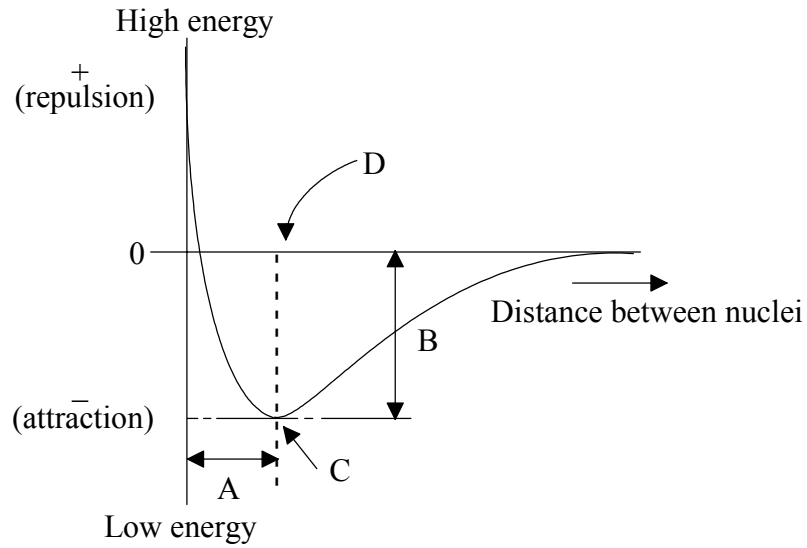
B. It changes a non-electrical signal into an electrical signal or vice versa.

C. It changes a low voltage to a higher voltage.

D. It amplifies a signal so that it can be detected.

21. What term describes a technology that stands between traditional and modern technology?
- A. Intermediate
 - B. Appropriate
 - C. Alternative
 - D. Clean
22. Which factors determine whether a reserve is exploited?
- I. The market
 - II. The technology
 - III. The availability
- A. I and II
 - B. I and III
 - C. II and III
 - D. I, II and III
23. Which method of evaluation is most appropriate for a new food product?
- A. Literature search
 - B. User trial
 - C. Performance tests
 - D. Expert appraisal
24. Which was advanced by developments in Information Communication Technology?
- A. Volume production
 - B. Mechanisation
 - C. Automation
 - D. Craft production

25. Which label describes the equilibrium separation of a particle in a bond?



26. What is a substance that cannot be decomposed into simpler substances?

- A. A compound
- B. An alloy
- C. An element
- D. A composite

27. Extremely rapid cooling of a molten metal results in

- A. an amorphous structure.
- B. small grain size.
- C. large grain size.
- D. a single crystal.

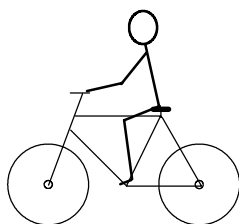
28. Which of the following are primary bonds?

- I. Ionic
- II. Covalent
- III. Metallic

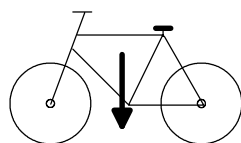
- A. I and II
- B. I and III
- C. II and III
- D. I, II and III

29. Which diagram represents the body load of a bicycle?

A.



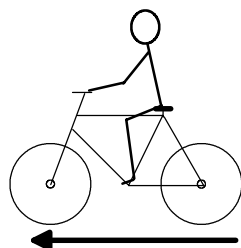
B.



C.



D.



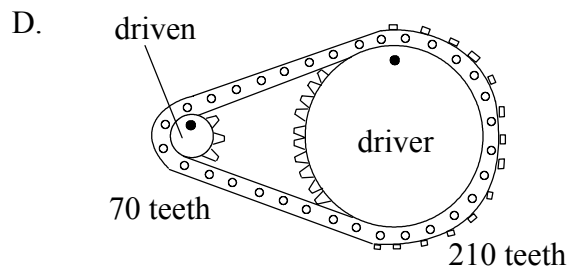
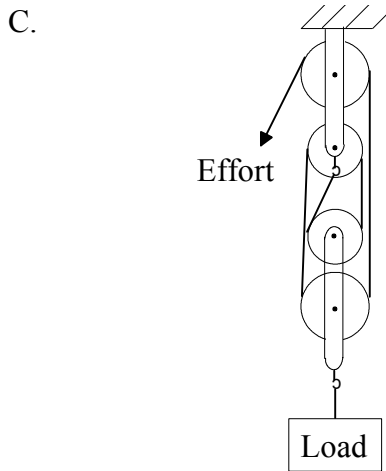
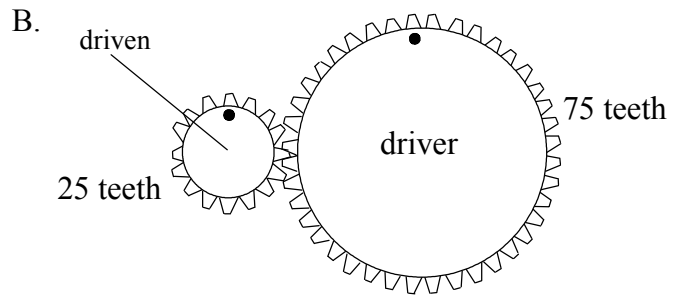
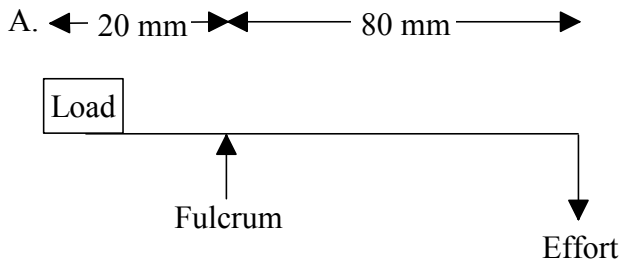
30. Which relationship defines *stiffness*?

- A. $\frac{\text{load}}{\text{effort}}$
- B. $\frac{\text{force}}{\text{area}}$
- C. $\frac{\text{load}}{\text{deflection}}$
- D. $\frac{\text{stress}}{\text{strain}}$

31. What is “the ratio of work done by a load to the work done by the effort”?

- A. Efficiency
- B. Velocity Ratio
- C. Mechanical Advantage
- D. Work

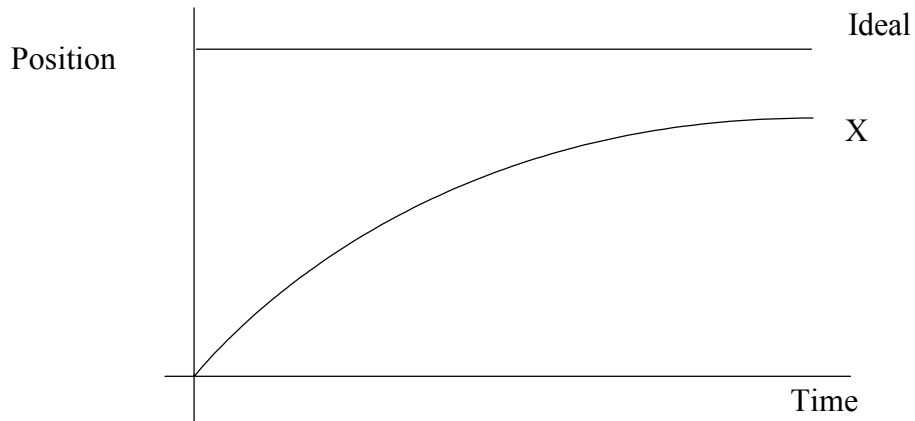
32. Which of the following has a velocity ratio of 1:4?



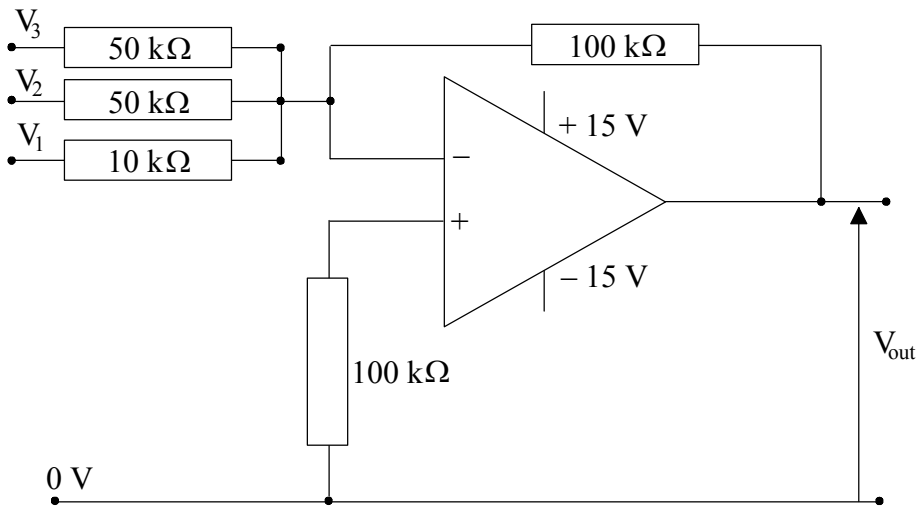
33. What is *power*?

- A. The force of an energy source
- B. The rate at which work is done
- C. The speed of a mechanism at a given time
- D. The ability to do work

34. The curve X of a position control servo system describes the condition of



- A. under damping.
 - B. hunting.
 - C. critical damping.
 - D. overdamping.
35. What would be the expected output voltage from the circuit shown below if $V_1 = 1\text{ V}$, $V_2 = 0\text{ V}$ and $V_3 = 0.5\text{ V}$?



- A. 1.5 V
- B. -11 V
- C. -7 V
- D. -1.5 V

36. Which statement is true of hardwood trees?

- A. They are deciduous.
- B. They grow only in the tropics.
- C. They are coniferous.
- D. They produce resinous timber.

37. Which statements are true for glass?

- I. Requires low energy to produce
- II. Made up of SiO_2 , CaCO_3 and Na_2CO_3
- III. Is brittle, transparent and unreactive

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

38. Which material is resistant to damp conditions, has high corrosion resistance, is used for cutlery, and is self finished and solvent resistant?

- A. Mild steel
- B. Stainless steel
- C. Cast iron
- D. Polyamide

39. Which properties are found in nylon fibres?

- I. Non-absorbent
- II. Strength increases when wet
- III. Melts at high temperatures

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

40. Which material is produced by sintering of ceramic alloys made from various metal oxides, non metal oxides and metals?

- A. Cement
 - B. Superconductors
 - C. Bricks
 - D. Ceramics
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