

**DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 1**

Monday 18 November 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 part of the Design Cycle Model (DCM) involves mainly divergent thinking?

- A. Testing and evaluating
- B. Developing a chosen idea
- C. Generating ideas
- D. Researching and specifying requirements

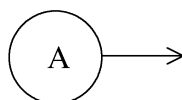
2. How do designers use orthographic drawings?

- A. Communicating initial ideas
- B. Allowing computer analysis
- C. Describing how an object is made
- D. Communicating precise shapes and sizes of objects

3. What is described as a sequence of instructions to describe a set of actions?

- A. Algorithm
- B. Flow chart
- C. Iconic model
- D. Processing Block Diagram

4. What is described by the flow chart symbol shown below?



- A. Connections to another process
- B. Decision
- C. Start / stop
- D. Input / output

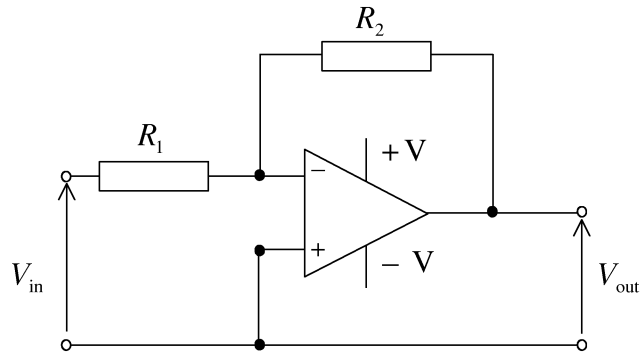
5. What is described as the pattern of production and profitability of a product?
- A. Design cycle
 - B. Design responsibility
 - C. Product cycle
 - D. Manufacturing
6. Which statements are disadvantages of using computer aided design (CAD)?
- I. Needs highly trained operators
 - II. Produces very accurate drawings
 - III. Requires capital expenditure
- A. I and III only
 - B. I and II only
 - C. II and III only
 - D. I, II and III
7. What is described as a conscious act to ensure a continuing market and allow new technologies to be incorporated?
- A. Design responsibility
 - B. Planned obsolescence
 - C. Resolving design conflicts
 - D. Legislation

8. Which criteria for the selection of materials should guide a socially responsible designer?
- I. Appearance
 - II. Ease of recycling
 - III. Energy used in processing
- A. I and II only
 - B. II and III only
 - C. I and III only
 - D. I, II and III
9. Which percentile range of children would be used to determine the maximum height of the top shelf in a school library?
- A. 5th
 - B. 5th – 95th
 - C. 50th
 - D. 95th – 100th
10. In which design context is electrical resistivity an important consideration?
- A. Hair dryer body
 - B. Garden seat
 - C. Car steering wheel
 - D. Pair of scissors

11. Which materials can be described as thermosets?
- A. Timber
 - B. Metals
 - C. Textiles
 - D. Plastics
12. Which materials have low density, low thermal conductivity, high toughness and medium resistance to deterioration in damp environments?
- A. Plastics
 - B. Timber
 - C. Metals
 - D. Ceramics
13. Which techniques are examples of wasting?
- I. Drilling a hole in metal
 - II. Making a cake
 - III. Cutting textile fibres with scissors
- A. I and II only
 - B. II and III only
 - C. I and III only
 - D. I, II and III
14. Which material is **not** shaped by casting?
- A. Metals
 - B. Ceramics
 - C. Food
 - D. Textile fibres

15. The permanent mounting of components on an electronic circuit board is an example of which manufacturing technique?
- A. Fusing
 - B. Machining
 - C. Sintering
 - D. Moulding
16. Which statement defines mechanisation?
- A. The processing of information in controlling the behaviour of a manufactured system
 - B. A volume production process involving machines controlled by humans
 - C. A volume production process involving machines controlled by computers
 - D. A programmed system that contains the collective knowledge of experts
17. Which statements describe the influence energy considerations have on the design of a product?
- I. Energy use in the manufacture of the product
 - II. The energy efficiency of the product in use
 - III. The recycling of the product at the end of its useful life
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

18. What is the function of the op-amp circuit shown below?



- A. Non-inverting op-amp
 - B. Inverting op-amp
 - C. Analogue-digital converter
 - D. Digital-analogue converter
19. Which transducer converts changes in temperature to changes in voltage?
- A. Thermocouple
 - B. Photovoltaic cell
 - C. Thermistor
 - D. Potentiometer
20. Which logic gate has the truth table shown below?

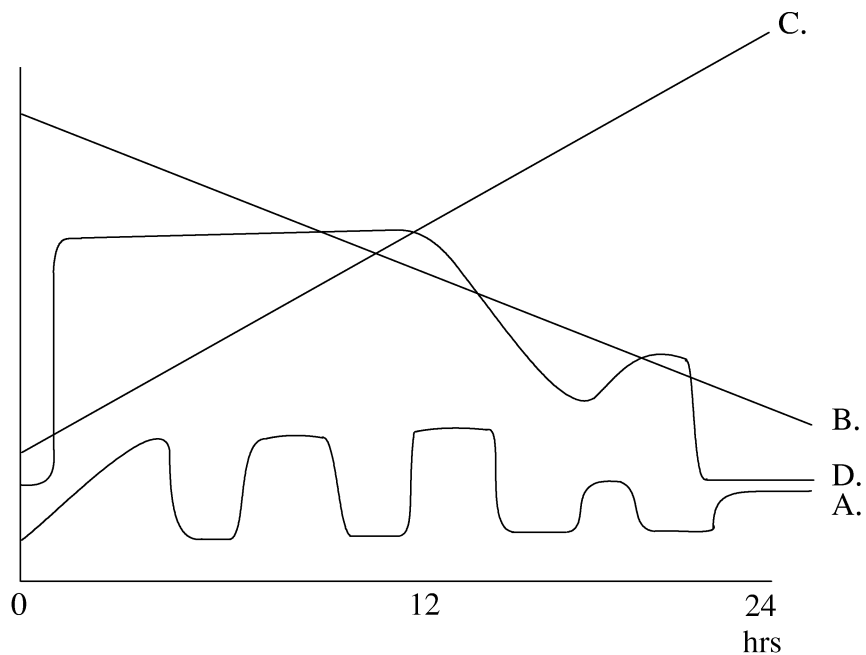
A	B	Out
0	0	0
0	1	1
1	0	1
1	1	0

- A. AND
- B. NOR
- C. EX-OR
- D. NAND

21. What term describes a technology that involves new types of equipment as a viable alternative to existing “main stream” technologies?

- A. Intermediate
- B. Alternative
- C. Appropriate
- D. Renewable

22. Which line on the graph below best describes the electrical energy use in one day in a town in an industrialised country?



23. Which shows the historical sequence of the developments in production systems?

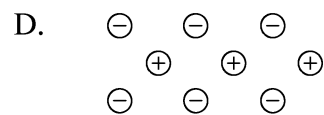
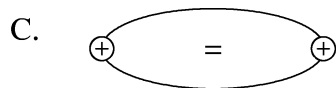
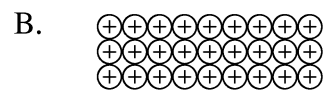
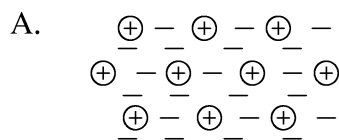
- I. Mechanisation
 - II. Craft
 - III. Automation
- A. I then II then III
 - B. III then II then I
 - C. II then I then III
 - D. III then I then II

24. Which methods would be most appropriate to evaluate a computer controlled machine?

- I. Literature search
- II. Performance testing
- III. Expert appraisal

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

25. Which diagram represents a metallic bond?



26. Which term is used to describe a material that is solid and has a glossy appearance but does not have a regular structure or crystal patterns?

- A. Metallic
- B. Fibrous
- C. Amorphous
- D. Sintered

27. Which statements are true of the cooling of molten metal?

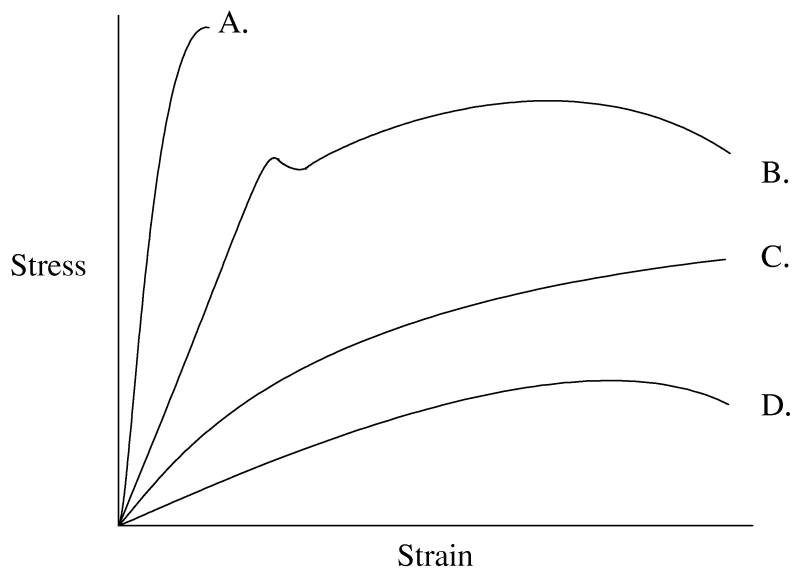
- I. Fast cooling produces large crystals
- II. Selective cooling affects directional strength
- III. Slow cooling produces large crystals

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

28. Which material is made up of only **one** element or compound?

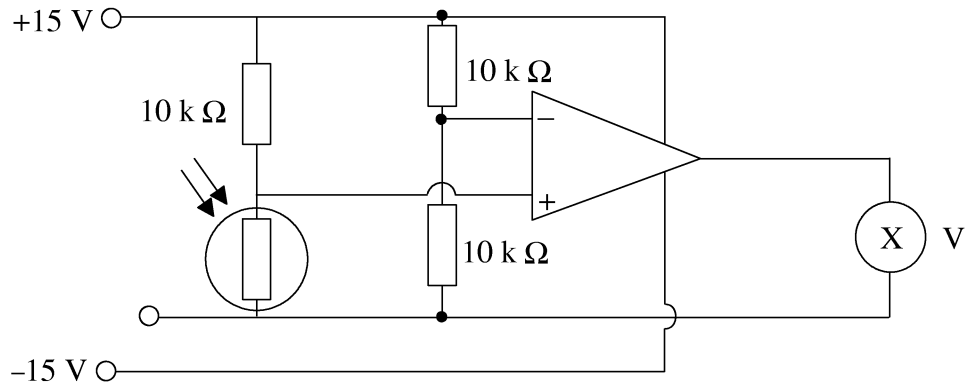
- A. Alloy
- B. Composite
- C. Pure substance
- D. Mixture

29. Which line on the graph below describes a brittle material?



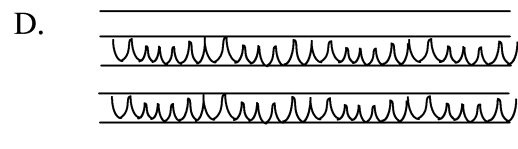
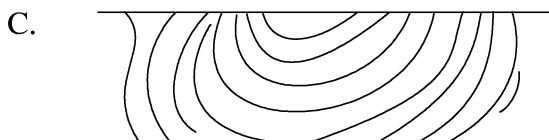
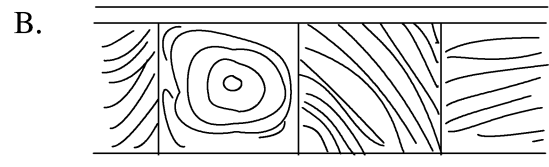
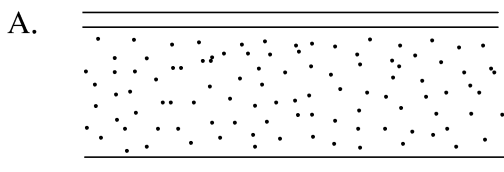
- 30.** What is meant by the body load of a structure?
- A. The external load of a structure
 - B. Loads where physical contact is made
 - C. A structure in equilibrium
 - D. A structure's own weight
- 31.** What is described as the turning effect produced by a force about a point?
- A. Mechanical advantage
 - B. Efficiency
 - C. Velocity ratio
 - D. Moment
- 32.** What would the percentage efficiency be if the mechanical advantage of a machine is 4.2 and the velocity ratio is 6.3?
- A. 15 %
 - B. 150 %
 - C. 6.6 %
 - D. 66 %
- 33.** Which statements are true of a DC motor used in a robotic welding machine?
- I. Create low torque at a non-variable high speed
 - II. The rate of rotation can fluctuate at high speed
 - III. Create large torque at low speeds
- A. I and II only
 - B. II and III only
 - C. I and III only
 - D. I, II and III

34. In the circuit below, what happens to the value of X (in volts) when the light level falls to zero (total darkness)?



- A. It will rise to +15 volts.
- B. It will fall to 0 volts.
- C. It will fall to –15 volts.
- D. It will vary slowly from 0 volts to –15 volts.
35. What can be used to convert a logic system from serial to parallel?
- A. J-K flip flop
- B. Shift register
- C. Servo system
- D. A-D converter

36. Which cross-section drawing depicts plywood?



37. Which formula describes the reduction of iron oxide to iron metal in a blast furnace?

- A. $\text{Fe}_2\text{O}_3 + \text{CaCO}_3 \rightarrow \text{Fe} + \text{CaO} + \text{CO}_2$
- B. $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- C. $\text{CaO} + \text{Fe}_2\text{O}_3 + \text{SiO}_2 \rightarrow \text{CaSiO}_6 + \text{Fe}$
- D. $3\text{CO} + \text{Fe}_2\text{O}_3 \rightarrow 2\text{Fe} + 3\text{CO}_2$

38. What resulted from the production of wrought iron?

- A. A reduction in the amount of iron made
- B. A rise in automation
- C. An engineering expansion
- D. An increase in the production of pig iron

39. Which resource provides the raw materials for nylon?

- A. Mineral products
- B. Timber products
- C. Petroleum products
- D. Natural fibres

40. Which material is produced by fermentation?

- A. Ceramic
- B. Plastic
- C. Mycoprotein
- D. Glass