



**DESIGN TECHNOLOGY
STANDARD LEVEL
PAPER 1**

Thursday 10 May 2001 (afternoon)

45 minutes

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. At which stage of the IB simple design loop does divergent thinking predominate?
 - A. Researching and specifying requirements
 - B. Generating ideas
 - C. Developing the chosen solution
 - D. Testing and evaluating the chosen solution

2. A designer is working on finalising the layout of street furniture in a shopping centre having done an initial layout which users can try out. Which of the following strategies would be most suitable?
 - I. Observing user behaviour
 - II. Obtaining user responses
 - III. Literature search
 - A. I and II
 - B. I and III
 - C. II and III
 - D. I, II and III

3. Which of the following statements are **not** true of a physical model of a bridge?
 - I. It looks like the intended outcome.
 - II. It represents the forces acting on the bridge.
 - III. It can be used to calculate safety factors.
 - A. I and II
 - B. I and III
 - C. II and III
 - D. I, II and III

4. Which types of thinking are involved in brainstorming?
- I. Conceptual thinking
 - II. Divergent thinking
 - III. Analytical thinking
- A. I, II and III
- B. I and II
- C. I and III
- D. II and III
5. Which of the following statements are true of the design cycle?
- I. It is controlled by the designer.
 - II. It aims to put a design solution into commercial practice.
 - III. It aims to produce a solution to a problem.
- A. I and II
- B. II and III
- C. I and III
- D. I, II and III
6. Which of the following materials would be most difficult to recycle?
- A. Mixed plastic
- B. Glossy paper
- C. Coloured silica glass
- D. Brass (copper-zinc alloy)

7. Data for which percentile range would be least relevant in the design of a height adjustable ironing board?
- A. 5th percentile
 - B. 50th percentile
 - C. 95th percentile
 - D. 99th percentile
8. At which of the following stages in the life of a vacuum cleaner would consideration of disposal issues be most relevant?
- A. Design
 - B. Manufacture
 - C. Use
 - D. Disposal
9. A microelectronics company is setting up a fully automated factory in a developing country with no tradition of this industry. Which of the following criteria of appropriate technology would this development achieve?
- I. Employs local workers
 - II. Creates jobs
 - III. Sympathetic to local cultural circumstances
- A. I only
 - B. II only
 - C. III only
 - D. I and II

10. Which of the following statements are relevant to the definition of planned obsolescence?
- I. Ensures a continuing market
 - II. Enables the incorporation of safety features into the design
 - III. Enables the incorporation of new technologies into the design
- A. I and II
 - B. I and III
 - C. II and III
 - D. I, II and III
11. Many materials which can be shaped by casting can be joined by fusing. For which group of materials is this not typically true?
- A. Metals
 - B. Ceramics
 - C. Plastics
 - D. Food
12. Which of the following is defined as ‘wearing away a material by friction’?
- A. Machining
 - B. Straining
 - C. Abrading
 - D. Fusing

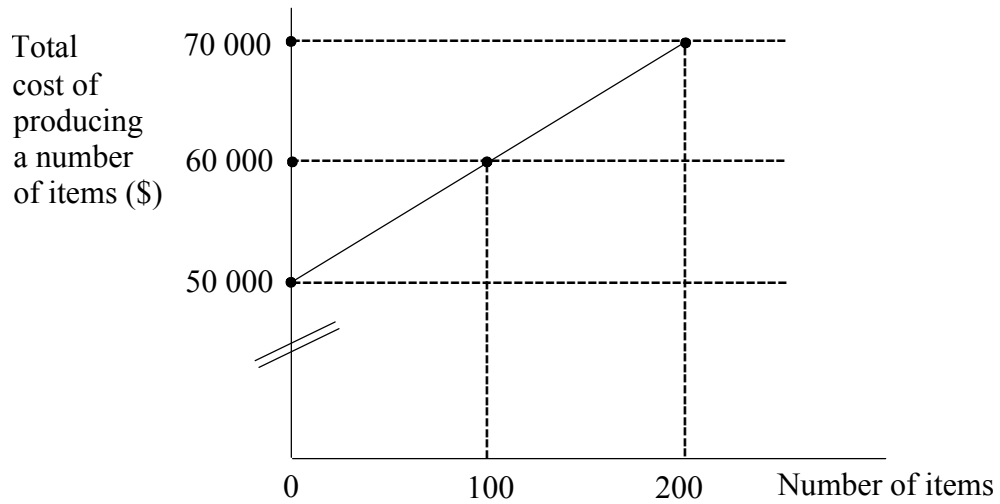
13. Electromagnets can be used to separate waste for recycling. For which materials can this be employed?
- A. Alloyed metals
 - B. Non-ferrous metals
 - C. Ferrous metals
 - D. Any metals
14. A mechanical component for a design requires physical properties typical of two different material groups. Redesign can be very costly. Which of the following solutions would it be most appropriate for a designer to evaluate first?
- A. Make two smaller parts, one out of each material
 - B. Use a composite of the two materials
 - C. Use the material which satisfies the most critical requirement
 - D. Redesign the components
15. Which of the following mechanical properties include Pascals in their common units?
- I. Tensile strength
 - II. Stiffness
 - III. Toughness
- A. I and II
 - B. I and III
 - C. II and III
 - D. I, II and III

16. A child's toy is to be made of material which is tough, lightweight and resistant to deterioration in damp environments. The best choice is
- A. composite.
 - B. ceramic.
 - C. metal.
 - D. plastic.
17. Hardness is defined as the ability of a material to
- A. resist penetration or scratching.
 - B. resist the propagation of cracks.
 - C. withstand pulling forces.
 - D. resist deflection or bending.
18. Which of the following relative values are true of the physical properties of timber?
- I. Low thermal conductivity
 - II. High electrical resistivity
 - III. High hardness
- A. I and II
 - B. I and III
 - C. II and III
 - D. I, II and III

19. Kevlar or Aramid fibres are used for bullet-proof vests. The success of these vests relies on
- A. the low tensile strength of the Kevlar fibres.
 - B. the high density of the Kevlar.
 - C. the fibre orientation in the resin matrix.
 - D. the ability to weave Kevlar fibres into fabric.
20. Ancient Chinese artisans were renowned for the quality of their bronze bells and sculptures. Bronze is an alloy of copper and tin. The products were produced by casting. Which of the following steps would **not** have been involved in the production process?
- A. Polishing the product by mild abrasion
 - B. Mixing copper with tin
 - C. Making a mould with appropriate features
 - D. Cutting the bronze to a rough shape
21. A new can opener has been designed for the mass market. The manufacturer decides to conduct a small number of user trials before beginning mass production. Which is the most likely scale of production for the user trial items?
- A. One-off
 - B. Volume
 - C. Craft
 - D. Batch

22. Mechanisation is a volume production process involving
- A. computer control.
 - B. a set number of items.
 - C. human control.
 - D. CAD and computer controlled manufacturing systems using the same database.
23. A designer is working on a mass-produced item which is only used for a short time and then disposed of. In terms of environmental impact, which of the following considerations is **least** important?
- A. Ergonomic considerations
 - B. Use of recycled materials
 - C. Use of recyclable materials
 - D. Energy used during manufacture

24.



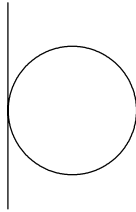
Which of the following statements are true?

- I. Fixed cost = 50 000 \$
- II. Variable cost = 6000 \$ per item
- III. Total cost of producing 200 items = 70 000 \$

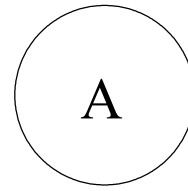
- A. I and II
- B. I and III
- C. II and III
- D. I, II and III

25. Which of the following symbols represents an input transducer?

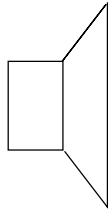
A.



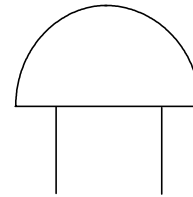
B.



C.



D.



26. Which logic gate can be expressed by the statement “A or B but not both”?

A. NOT

B. OR

C. NOR

D. EX-OR

27. Which combination of digital logic gates would give the output Z from the inputs X and Y?

X	Y	Z
0	0	1
0	1	0
1	0	0
1	1	0

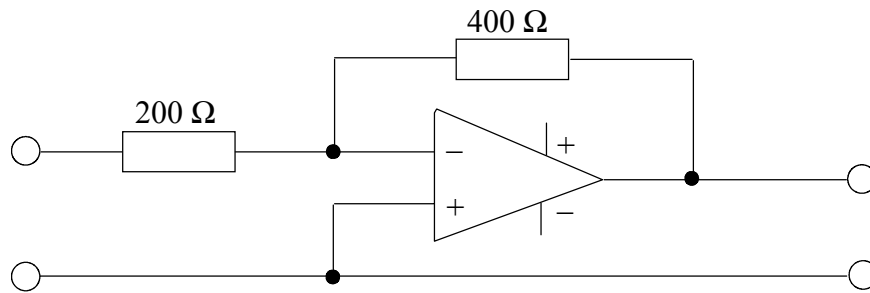
A. AND and NOT

B. OR and NOT

C. NAND and NOT

D. EX-OR and NOT

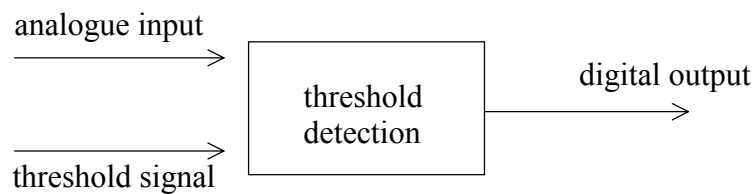
28.



Which combination describes the circuit?

	Arrangement	Gain
A.	Non-inverting	3
B.	Non-inverting	1.5
C.	Inverting	-2
D.	Inverting	-0.5

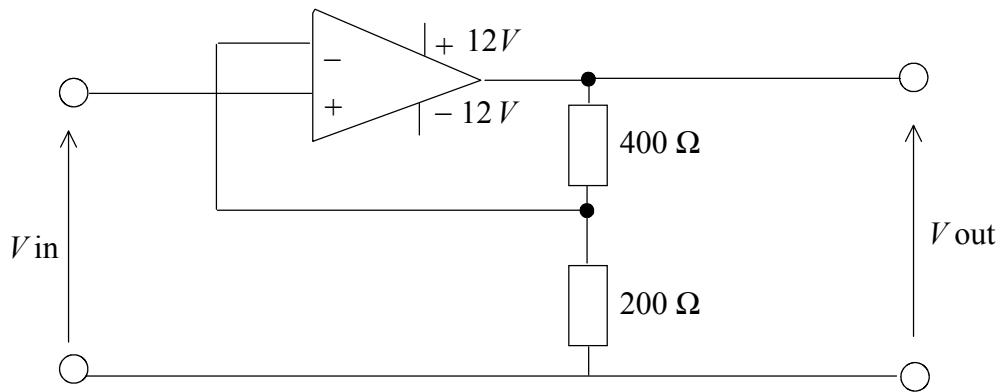
29.



What is the function of the arrangement shown?

- A. Transducer
- B. A-D converter
- C. D-A converter
- D. Digital logic gate

30.



What is the output voltage for the circuit if the input voltage is 1.2 volts?

- A. 1.2 volts
- B. 2.4 volts
- C. 3.6 volts
- D. 4.8 volts