



**DESIGN TECHNOLOGY  
STANDARD LEVEL  
PAPER 1**

Wednesday 15 November 2000 (afternoon)

45 minutes

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**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. For which of the following would a processing block diagram (PBD) be used?
  - A. Converting a crop into a product.
  - B. Representing input, process and output subsystems.
  - C. Describing the introduction, growth, maturity and decline of a product.
  - D. Converting an analogue signal into a digital signal.
  
2. The simple IB design loop
  - A. schedules the replacement of obsolete products.
  - B. considers details of distribution and sales.
  - C. describes the process of developing a design.
  - D. shows that evaluation takes place throughout the design cycle.
  
3. Which statement is true of all models?
  - A. Models are exact representations of solutions.
  - B. Models are always scale representations.
  - C. Computer models are more complete than other models.
  - D. Models are used to represent selected features of a solution.
  
4. Which statement about drawing techniques is true?
  - A. Freehand drawings are often more useful for convergent thinking.
  - B. Only orthographic drawings can be used for desk top publishing.
  - C. Orthographic drawings are best used to represent final design solutions.
  - D. Orthographic drawings are more useful for divergent thinking.

5. The strategy which would be most useful to a kitchen designer in generating ideas for a new kitchen design concept is
- A. brainstorming.
  - B. expert opinion.
  - C. parts catalogue.
  - D. computer animation.
6. Which of the following advantages **or** disadvantages of planned obsolescence is relevant to manufacturers but not to consumers?
- A. Regular need for product replacement
  - B. Cheaper products
  - C. Up to date technology
  - D. Creation of wealth
7. In which way does anthropometrics assist the designer?
- A. Improves the aesthetics of the design.
  - B. Ensures the design is comfortable in use.
  - C. Helps indicate the choice of materials.
  - D. Ensures the design fits the human frame.
8. Which of the following materials is likely to be most difficult to recycle?
- A. Composite
  - B. Paper
  - C. Glass
  - D. Copper

9. If a designer uses information for the 95th percentile to determine the internal height of a caravan, for which group of people would it be appropriate?
- A. The tallest 95%
  - B. The shortest 5%
  - C. The tallest 5%
  - D. The shortest 95%
10. Which of the following is **not** a criterion for appropriate technology?
- A. Uses easily maintainable, energy efficient technology.
  - B. Employs local workers.
  - C. Uses latest electronic technology.
  - D. Uses local resources.
11. Which material group can be subdivided into vegetable **or** animal origin?
- A. Timber
  - B. Food
  - C. Plastic
  - D. Metal
12. Which of the following statements are true of producing objects using a material in powder form that is compacted?
- I. Lighter, more intricate shapes can be produced than by casting.
  - II. No surface machining is required.
  - III. A mould is not required.
- A. I and III
  - B. II and III
  - C. I and II
  - D. I, II and III

13. Which of the following statements are true of composites?

- I. They fit easily into material classification because of their variability in composition.
- II. Their properties can be designed in by selecting properties from existing materials.
- III. They can be subdivided into natural and synthetic on the basis of their water absorbency.

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

14. Which of the following is **not** a wasting process?

- A. Straining
- B. Cutting
- C. Machining
- D. Extruding

15. In the manufacture of high performance car engines ceramic is used in combination with metal. Which of the following property combinations is correct?

	<b>Ceramic</b>	<b>Metal</b>
A.	tough	tough
B.	hard	tough
C.	tough	hard
D.	hard	hard

16. Which mechanical property is important in the extrusion of metals?
- A. Tensile Strength
  - B. Ductility
  - C. Toughness
  - D. Stiffness
17. Which technique is a shaping process?
- A. Machining
  - B. Cutting by hand
  - C. Using fasteners
  - D. Weaving
18. Which of the following requirements make sintering a commercially viable manufacturing process?
- I. Exceptionally high finish.
  - II. Unique combination of properties.
  - III. High production rate.
- A. I and II
  - B. I and III
  - C. II and III
  - D. I, II and III

19. Which of the following is defined as the ability of a material to resist the propagation (spreading) of cracks?
- A. Hardness
  - B. Toughness
  - C. Tensile Strength
  - D. Stiffness
20. Which of the following units are commonly used for thermal conductivity?
- A.  $\text{J m}^{-2}$
  - B.  $\text{K}^{-1}$
  - C.  $\text{W m}^{-1} \text{K}^{-1}$
  - D.  $\Omega \text{ m}$
21. Which of the following statements are true of fixed costs?
- I. They do not change with volume of production.
  - II. They include the cost of product design.
  - III. They include building and land costs.
- A. I and II
  - B. I and III
  - C. II and III
  - D. I, II and III

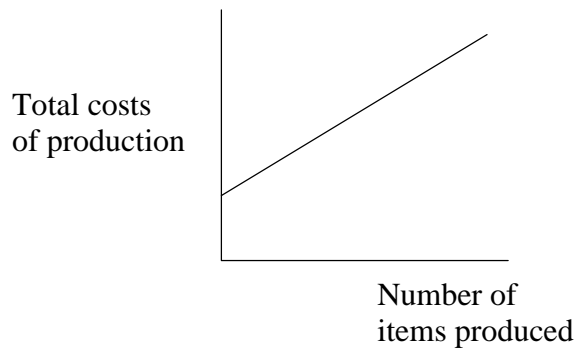
22. Which of the following describes craft production?

	Scale of production	Manual skills level required
A.	small	high
B.	large	high
C.	small	low
D.	large	low

23. Which of the following is a volume production process involving machines controlled by computers?

- A. Mechanisation
- B. Automation
- C. Batch Production
- D. One-off production

The following diagram refers to Question 24 and shows the total costs of production against the number of items produced.

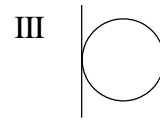
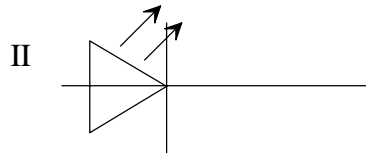
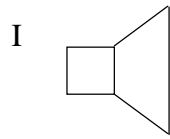


24. An increase in which of the following costs will change the gradient of the graph?

- I. Fuel costs
  - II. Raw material costs
  - III. Machinery costs
- A. I only
  - B. II only
  - C. III only
  - D. I and II

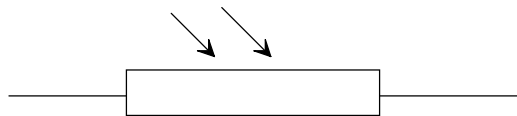


25. Which of the following symbols represent an output transducer?



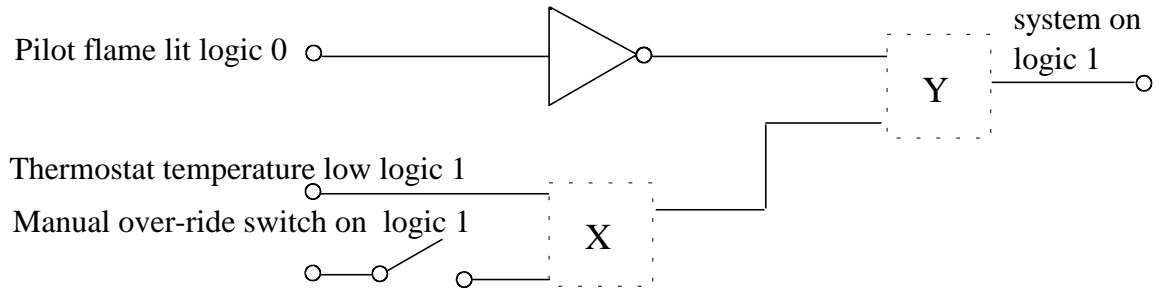
- A. I and II
  - B. I and III
  - C. II and III
  - D. I, II and III
26. Which of the following Boolean expressions describes an EX-OR gate?
- A.  $(A \cup B) \cup (\overline{A \cap B})$  or  $(A + B) \times (\overline{A \times B})$
  - B.  $(A \cup B) \cap (A \cap B)$  or  $(A + B) \times (A \times B)$
  - C.  $(A \cap B) \cup (A \cup B)$  or  $(A \times B) + (A + B)$
  - D.  $(A \cap B) \cup (\overline{A \cup B})$  or  $(A \times B) + (\overline{A + B})$

27. Which electrical component is represented by the following symbol?



- A. Light-dependent resistor
- B. Light-emitting diode
- C. Photovoltaic cell
- D. Variable resistor

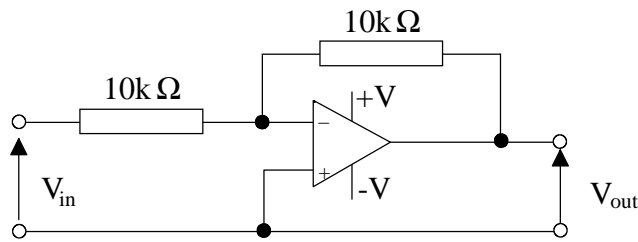
The following incomplete diagram of the logic for a gas central heating system refers to Question 28.



28. Which logic gates should be placed at X and Y in the circuit so that the system turns on if the pilot light is on and the thermostat temperature is low or the manual over-ride switch is on?

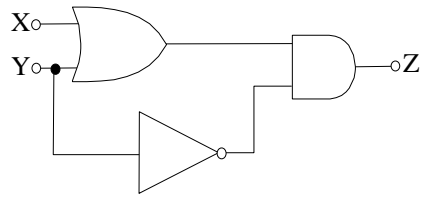
	X	Y
A.	AND	NOR
B.	NAND	NOT
C.	OR	AND
D.	OR	NAND

29. Which statement best describes the output of the following circuit?



- A.  $V_{out} = -V_{in}$
- B.  $V_{out} = V_{in}$
- C.  $V_{out} < V_{in}$
- D.  $V_{out} > V_{in}$

30. Which truth table shows the output (Z) of the logic circuit shown below with inputs X and Y?



X	0	0	1	1
Y	0	1	0	1

A.	1	0	0	0
B.	0	1	0	0
C.	0	0	1	0
D.	0	0	0	1