



**DESIGN TECHNOLOGY  
HIGHER LEVEL  
PAPER 1**

Wednesday 15 November 2000 (afternoon)

1 hour

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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. Which of the following is represented in the IB simple design loop?
  - A. The final design solution is evaluated against the requirements set out in the specification.
  - B. Some elements of the design cycle are revisited several times before others are started.
  - C. To explore ideas the elements of the design cycle may be visited in different orders.
  - D. Feedback may occur between different elements in 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 of the following is true of CAD?
  - A. CAD provides computer control of manufacturing.
  - B. The only advantage of CAD is mass storage of design drawings.
  - C. CAD allows rapid modification of drawings.
  - D. Inexperienced CAD users can generate drawings as rapidly by CAD as by hand.

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 statements is true?
- A. The product cycle involves the design, production, sale and disposal of a product.
  - B. The design cycle involves putting a solution into commercial practice.
  - C. The design cycle does not consider disposal or recycleability of the product.
  - D. The product cycle refers to the product realisation and testing elements of the product.
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 decisions is likely to promote recycling most?
- A. Using recycled materials
  - B. Introducing a collection and recycling system for used products
  - C. Using recyclable materials
  - D. Using replacement parts

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 material group can be subdivided into vegetable **or** animal origin?
- A. Timber
  - B. Food
  - C. Plastic
  - D. Metal
11. Which of the following is defined as the ability of a material to withstand pulling forces?
- A. Hardness
  - B. Toughness
  - C. Tensile strength
  - D. Stiffness
12. Which of the following is **not** a wasting process?
- A. Straining
  - B. Cutting
  - C. Machining
  - D. Extruding

13. In which of the following design contexts should the thermal expansivity of the two materials be closely matched?
- I. A bimetallic strip for a thermostat.
  - II. The metal frame and glass for the window in the door of an oven.
  - III. The liquid and glass of a liquid-in-glass thermometer.
- A. I only
  - B. II only
  - C. III only
  - D. II and III
14. Which technique is a shaping process?
- A. Machining
  - B. Cutting by hand
  - C. Using fasteners
  - D. Weaving
15. 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.  $\Omega \text{ m}$

16. Which of the following describes craft production?

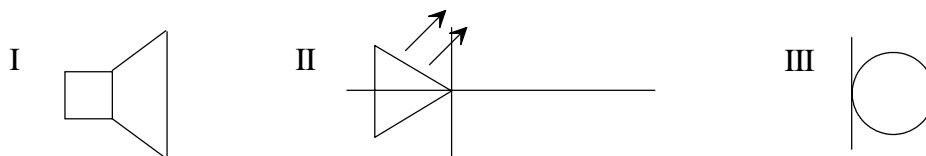
	Scale of production	Manual skills level required
A.	small	high
B.	large	high
C.	small	low
D.	large	low

17. 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.

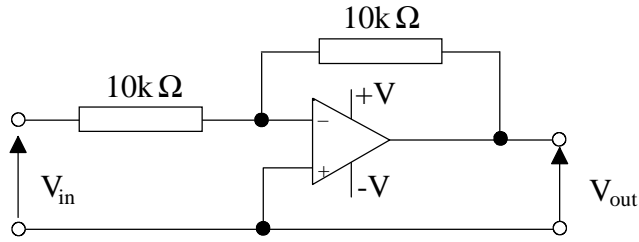
- A. I and II
- B. I and III
- C. II and III
- D. I, II and III

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



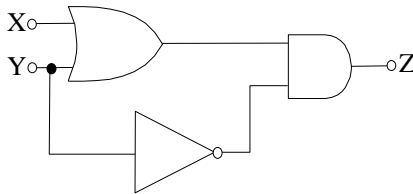
- A. I and II
- B. I and III
- C. II and III
- D. I, II and III

19. 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.  $V_{out} > V_{in}$

20. 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
0	1	0	0
0	0	1	0
0	0	0	1
- B. 

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1
- C. 

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1
- D. 

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

21. Which statement is true?
- A. Resources are greater than reserves.
  - B. Reserves are greater than resources.
  - C. Resources are undeveloped, reserves are stored.
  - D. Resources are exploited, reserves are undeveloped.
22. Which of the following are used to overcome fluctuations in the supply of wind energy?
- I. Appropriate location of energy production facilities
  - II. Storage as electrical energy during peak production for use during peak demand
  - III. Use of alternative energy supplies
- A. I and II
  - B. II and III
  - C. I and III
  - D. I, II and III
23. Which row of the table represents the most appropriate combination of evaluation criteria and data collection method?

	<b>Evaluation Criteria</b>	<b>Data Collection Method</b>
A.	Environmental impact	User trial
B.	Ergonomic	Literature search
C.	Durability	User trial
D.	Reliability	Literature search



24. Which of the following has **not** been extensively used to transfer data for mechanised production?
- A. Voice
  - B. Paper tape
  - C. Punched cards
  - D. Magnetic media
25. Which of the following statements are true of carbon steel after rapid cooling by quenching?
- I. The grain size is small.
  - II. The steel becomes more brittle.
  - III. Plastic deformation occurs.
- A. II and III
  - B. I and III
  - C. I and II
  - D. I, II and III
26. A crystal of cadmium chloride will shatter under pressure and easily dissolve in water. The bonding in cadmium chloride is mainly
- A. covalent.
  - B. ionic.
  - C. metallic.
  - D. secondary.
27. Which of the following bonds causes high electrical and thermal conductivity?
- A. Ionic
  - B. Simple covalent
  - C. Network covalent
  - D. Metallic

- 28.** Cadmium sulphide is often used in the manufacture of photocells. Cadmium sulphide is formed by the combination of the elements cadmium and sulphur in fixed proportions. Cadmium sulphide is
- A. an alloy.
  - B. a compound.
  - C. a composite.
  - D. an element.
- 29.** A measure of stiffness could be
- A. force / area.
  - B. change of length / original length.
  - C. load / deflection.
  - D. design load / normal maximum load.
- 30.** Which of the following corresponds to the part of a stress-strain curve beyond which the material will not return to its original shape?
- A. Ultimate stress (UTS)
  - B. Plastic region
  - C. Elastic region
  - D. Yield stress

31. Which statements characterise alternating current (a.c.) electric motors?

- I. Little fluctuation at high speeds.
- II. High torque.
- III. Low torque.

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

32. Which of the following statements are true?

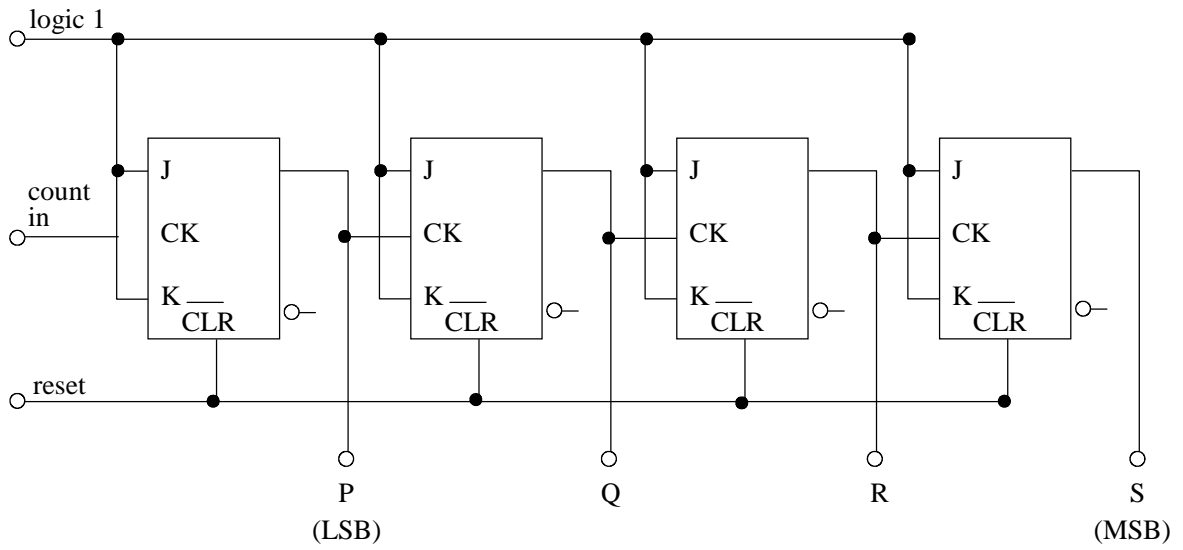
- I. When a lever is in equilibrium its resultant moment is zero.
- II. In a simple gear mechanism that slows down motion the torque increases.
- III. Increasing the mechanical advantage of a lever decreases its velocity ratio.

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

33. A simple two gear mechanism has a driver gear with 12 teeth rotating at 240 rpm. How fast will the driven gear rotate if it has 48 teeth?

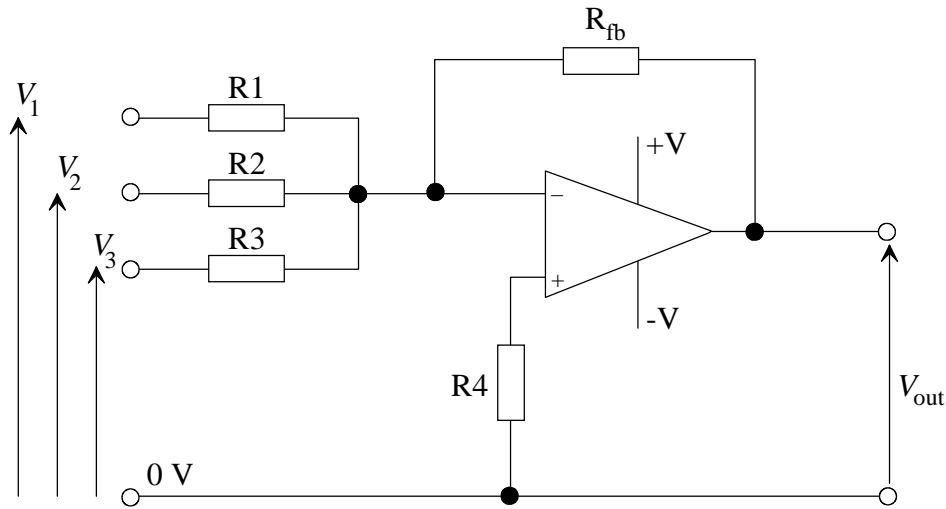
- A. 60 rpm
- B. 120 rpm
- C. 480 rpm
- D. 960 rpm

The following diagram of a binary counter refers to Question 34.



34. If the original state of the bistable output is 1100, what will be the output after 4 clock pulses?
- A. 0010
  - B. 1010
  - C. 0110
  - D. 1110

The following diagram of a summing amplifier refers to Question 35.



35. What is the output voltage when  $R_1 = R_2 = R_3 = R_{fb} = 12 \Omega$  if  $V_1 = V_2 = V_3 = 6V$ ?

- A. 6 V
- B. 18 V
- C. 24 V
- D. 144 V

36. Which of the following statements are true of mycoprotein?

- I. It has a high protein content.
- II. It has a low cholesterol content.
- III. It can be formed into chunks.

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

37. During production of iron from iron ore, calcium oxide is needed to
- A. reduce iron oxide to iron to produce pig iron.
  - B. decrease the amount of carbon in the reduced iron metal.
  - C. remove silicon dioxide impurities.
  - D. ensure the coke is at the right temperature and conditions to convert iron oxide to iron.
38. Which of the following statements are true?
- I. Plywood can be produced with a larger area than solid timber.
  - II. Plywood is composed of plies with the grain of successive plies at an angle of  $90^\circ$  to the previous layer.
  - III. Plywoods are usually soft woods.
- A. I and II
  - B. I and III
  - C. II and III
  - D. I, II and III
39. Which statement is **not** true?
- A. Cotton is very absorbent
  - B. Cotton melts when exposed to high temperatures
  - C. Cotton is relatively inelastic.
  - D. Cotton increases in strength when wet
40. Scrap glass is added to new raw materials to
- A. make the process more economic.
  - B. produce higher quality glass.
  - C. save raw materials.
  - D. make it bullet proof.
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