N10/4/DESTE/HPM/ENG/TZ0/XX

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DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 1

Thursday 11 November 2010 (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. How many stages are represented in the IB design cycle model?

A. 5

B. 6

C. 7

D. 8

2. Which type of drawing would be **most** suitable to show the public a proposed new design for the interior of an airport building?

A. Orthographic

B. Isometric

C. Exploded isometric

D. Perspective

3. What is an advantage of using a mathematical model at the design development stage of a structure?

A. It is easier to understand than a physical model.

B. It is a good representation of the shape and form of the structure.

C. It is cost-effective.

D. It requires little skill.

4. How has the increased availability of CAD/CAM influenced the role of designers in the product cycle in terms of control and involvement?

	Control	Involvement
A.	More	More
B.	Less	More
C.	More	Less
D.	Less	Less

5. For an invention to become an innovation it needs to

A. diffuse into the marketplace.

B. become a dominant design.

C. be a result of market pull.

D. be a result of technology push.

6. Figure 1 shows a family of storage units. What corporate strategy has been used by the company?

Figure 1: Family of storage units

[©Inter IKEA Systems B.V. 2010]

A. Product development

B. Diversification

C. Market development

D. Market penetration

7. What is an objective of green design?

A. Longer product life cycle

B. Shorter product life cycle

C. Longer design cycle

D. Shorter design cycle

8. One objective as a result of a life cycle analysis of a washing machine is to redesign the machine with reduced weight. Which part of the life cycle does this affect **most**?

A. Production

B. Use

C. Distribution

D. Disposal

9. Which design for manufacture (DfM) strategy would be **most** appropriate when designing a product for ease of recycling at the end of its life?

A. Design for materials

B. Design for process

C. Design for assembly

D. Design for disassembly

10. Which material is classified as a mixture?

A. Metal

B. Composite

C. Ceramic

D. Timber

11. Which material has the highest tensile strength?

A. Laminated wood

B. Particle board

C. Pine

D. Mahogany

12. What is a characteristic of a superalloy?

A. They are easy to use.

B. They are cheap to manufacture.

C. They can only be used at low temperatures.

D. They can be used at high temperatures.

13. Which property describes urea-formaldehyde plastic?

A. Soft

B. Tough

C. Ductile

D. Brittle

14. Which type of glass is **most** likely to be used as a glass top for a coffee table?

A. Pyrex

B. Laminated

C. Toughened

D. Lead crystal

15. Magneto-rheostatic materials are used for which car parts?

A. Engine mounts

B. Shock absorbers

C. Valves

D. Clutches

16. Which material is **not** suitable for casting?

A. Metal

B. Timber

C. Food

D. Ceramic

17. Why is craft production increasing in popularity in industrialized countries?

A. To create cheaper products

B. Reduced amount of skills required

C. Market pull

D. Technology push

18. What is an advantage of a *just-in time* (JIT) system?

A. It is easy to introduce.

B. It puts less pressure on workers.

C. It is not related to market conditions.

D. It optimizes production.

19. What limits the increased use of clean technology?

A. Lack of legislation

B. Lack of incentives

C. Spread of global manufacturing

D. Complexity of clean technology

20. Which consideration is **not** an aspect of planned obsolescence?

A. Ease-of-maintenance

B. Construction

C. Style

D. Materials

21. Which strategy is appropriate for a user trial?

A. Obtaining user responses

B. Observing user behaviour

C. Identifying user needs

D. Identifying user preferences

22. Which criterion would be used to assess value for money in relation to long-term use?

A. Reliability

B. Safety

C. Ease-of-use

D. Performance

23. Which energy source was used throughout the Industrial Revolution?

A. Oil

B. Water

C. Coal

D. Solar

24. What is an advantage of nuclear power?

A. Low in capital costs

B. High energy density

C. Low safety issues

D. High consumer demand

25. What is a disadvantage of wind farms?

A. They are only suitable for large-scale production of energy

B. They are expensive to maintain

C. They work better when sited off-shore

D. They require a lot of space to be cost-effective

26. What is the effect of a load on a material which takes it beyond the yield point?

I. It deforms plastically
II. It deforms elastically
III. It yields to the stress and breaks
IV. It yields to the strain and stretches

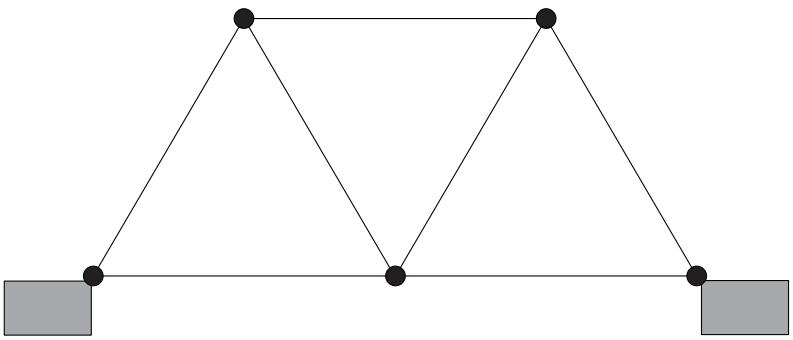
A. I and III

B. I and IV

C. II and III

D. II and IV

27. What is true of the bridge structure shown below?



A. All internal forces are tensile

B. All internal forces are compressive

C. It is in equilibrium

D. It is not in equilibrium

28. If a chair breaks when a user sits on it. What does this refer to?

A. Strength of the structure

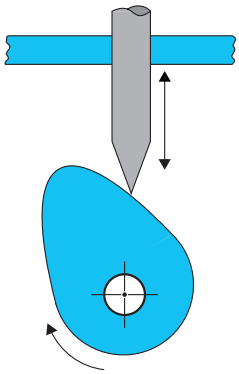
B. Stiffness of the structure

C. Strength of the material

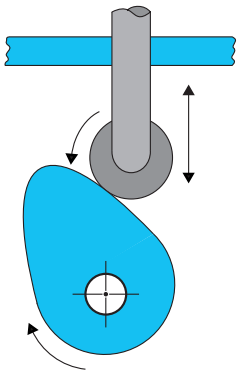
D. Stiffness of the material

29. Which cam follower is an example of a knife follower?

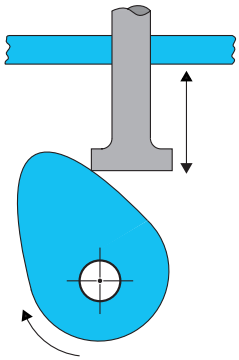
A.



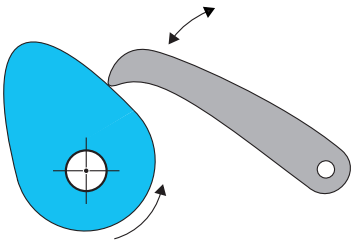
B.



C.



D.



30. What effect does a linkage have on the motion of components in a mechanical system?

A. It decreases the speed

B. It increases the speed

C. It changes the direction

D. It changes the type

31. Plaster of Paris is used in lost wax casting to

A. create the initial mould.

B. reduce costs.

C. make the wax more porous.

D. cover the wax.

32. Which is a permanent joining technique?

A. Use of rivets

B. Use of screws

C. Use of bolts

D. Use of hinges

33. Which technique is **not** used in the manufacture of plastic bottles?

A. Injection moulding

B. Extrusion

C. Blow moulding

D. Rotational moulding

34. What makes grey water systems more cost effective for larger buildings?

	Volume of grey water generated	**Capacity to use reclaimed water**
A.	Low	Low
B.	Low	High
C.	High	Low
D.	High	High

35. What property does the U value of a material relate to?

A. Density

B. Thermal expansivity

C. Thermal conductivity

D. Resistivity

36. What is a characteristic of an appropriate technology?

A. Enhances biodiversity

B. Supports economic growth

C. Not detrimental to the environment

D. Promotes ecosystem integrity

Questions 37–40 relate to the following case study. Please read the case study carefully and answer the questions.

Figure 2 and **Figure 3** show the Ultracane manufactured by Sound Foresight Ltd (UK). It was developed for use by blind and partially-sighted people. In development it was called the "Bat cane" as it bounces ultrasound off objects and feeds back information to the cane. The feedback is not audible but tactile so it does not interfere with other hazard information. Buttons on the cane indicate the direction of the object and the intensity of the vibration lets the user know how far away the object is. The Ultracane is manufactured from a lightweight composite material and is available in 10 different lengths.

Figure 2: Ultracane controls

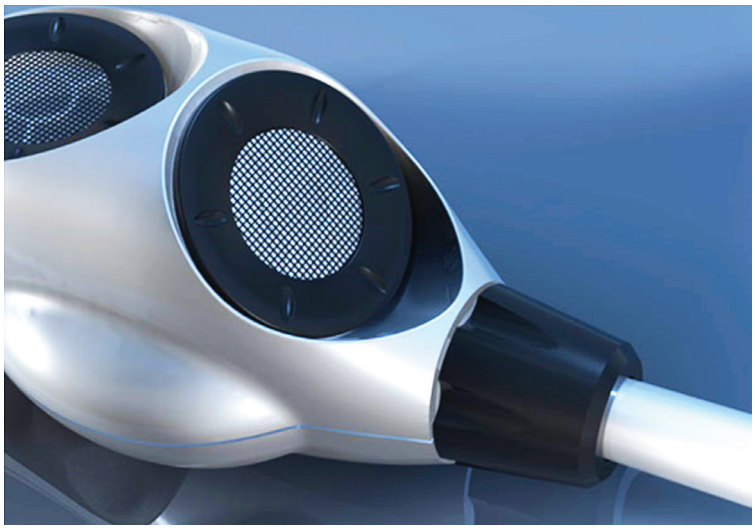


Figure 3: Ultracane in use

[Source: www.cambridgeconsultants.com. Used with permission.]

37. Which ideas generating technique would have been used in the development phase of the Ultracane?

A. Adaptation

B. Analogy

C. Attribute listing

D. Morphological analysis

38. Which percentile range is most likely to have been used to decide on the range of sizes for the cane?

A. 5th–95th

B. 1st–99th

C. 25th–75th

D. 5th–50th

39. Which property is **least** important in deciding which material to use for the cane?

A. Density

B. Toughness

C. Hardness

D. Ductility

40. Which type of sustainability does the cane **most** satisfy?

A. Economic

B. Political

C. Environmental

D. Social