IB Design Technology Practice Exam (Sample)

Study Guide

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Questions

1. What does solid modelling primarily represent?

- **A. Layers of design that are stacked**
- **B. A clear representation of the final part**
- **C. The assembly of various components**
- **D. A flexible and adjustable design framework**

2. What does the term 'matrix' refer to in a composite?

- **A. The combined strength of elements**
- **B. The primary material that surrounds reinforcing materials**
- **C. The end result after processing**
- **D. An external layer added for protection**

3. What is the significance of an oblong shape in a flow chart?

- **A. Data processing**
- **B. Input/output**
- **C. Start/stop**
- **D. Decision making**

4. What are end-of-pipe technologies primarily used for?

- **A. Creating new products**
- **B. Enhancing efficiency**
- **C. Reducing pollutants and waste**
- **D. Improving production methods**

5. What is the process of placing a thin veneer and glueing it to a material called?

- **A. Injection moulding**
- **B. Blow moulding**
- **C. Laminating**
- **D. Turning**

6. Which statement best describes a Local Combined Heat and Power system?

- **A. A system that only generates electricity from solar panels**
- **B. A system that produces heat and electricity simultaneously**
- **C. A method of electricity generation that does not produce heat**
- **D. A network that distributes energy from a central power plant**

7. Magneto-rheostatic fluids are defined by their change in what property?

A. Temperature when exposed to a magnet

B. Viscosity when exposed to a magnetic field

C. Density when heated

D. Color when electrified

8. Which factor can lead to increased productivity and efficiency in work environments?

A. Adequate lighting

B. High levels of noise

C. Extreme temperatures

D. Overcrowding

9. Which term refers to body measurements specifically related to size, strength, and physical capacity?

A. Clearance

B. Dynamic data

C. Anthropometrics

D. Adjustability

10. Which technique directly contributes to the creation of three-dimensional objects through layering?

A. Solid modelling

B. Stereolithography

C. Fused deposition modelling (FDM)

D. Mockup creation

Answers

1. B
2. B
3. C
4. C
5. C
6. B
7. B
8. A
9. C
10. C

Explanations

1. What does solid modelling primarily represent?

A. Layers of design that are stacked

B. A clear representation of the final part

C. The assembly of various components

D. A flexible and adjustable design framework

Solid modeling primarily represents a clear and detailed representation of the final part. This method of modeling provides a comprehensive view of the object's physical properties, including its volume, surface area, and mass, as well as allowing for precise geometric detailing. Solid models are often used in computer-aided design (CAD) applications to create three-dimensional representations of objects that can be visualized and modified easily. By focusing on the final part, solid modeling helps engineers and designers ensure that the dimensions and features meet specified requirements before the manufacturing process begins. The clarity in representation also aids in communication among team members, stakeholders, and manufacturers, leading to more efficient collaboration and fewer errors during production. Other options refer to different aspects of design and modeling. For instance, assembly of various components pertains to how multiple parts come together, while flexible design frameworks relate more to parametric or modular design approaches rather than solid modeling. The concept of layered designs is often associated with techniques like 2D drafting or certain types of additive manufacturing, rather than the three-dimensional focus of solid modeling.

2. What does the term 'matrix' refer to in a composite?

A. The combined strength of elements

B. The primary material that surrounds reinforcing materials

C. The end result after processing

D. An external layer added for protection

In the context of composites, the term 'matrix' specifically refers to the primary material that surrounds and binds together the reinforcing materials, such as fibers or particles. This matrix serves several important functions: it transfers loads to the reinforcing materials, provides overall shape and structure to the composite, protects the reinforcing materials from environmental damage, and helps improve the composite's durability and functionality. The matrix is crucial in composite materials because it directly influences the performance characteristics such as flexibility, strength, and corrosion resistance. Common matrix materials include polymers, metals, and ceramics, each selected based on the desired properties of the composite. The other options do not accurately define the term 'matrix' within the context of composites. While the combined strength of elements relates to the overall capabilities of the composite, it does not define what the matrix is. The end result after processing refers to the final product but doesn't describe the matrix itself. Similarly, an external layer added for protection pertains to a different aspect of composite structure, such as a coating or finish, rather than the matrix's role in binding and supporting the reinforcements.

3. What is the significance of an oblong shape in a flow chart?

A. Data processing

B. Input/output

C. Start/stop

D. Decision making

The oblong shape, often referred to as a rounded rectangle or oval in flowchart terminology, is significant for indicating the start and stop points of a process. It establishes the boundary of the workflow by marking where the process begins and where it concludes. This visual cue is essential for readers to easily identify the entry and exit points in a flowchart, ensuring clarity in understanding how the entire process is structured. In flowcharts, the use of distinct shapes for different functions aids in quickly communicating the nature of each step. The rounded shape specifically serves to highlight that a flow gets initiated and eventually comes to an end, guiding viewers through the logical progression of the information or actions involved.

4. What are end-of-pipe technologies primarily used for?

A. Creating new products

B. Enhancing efficiency

C. Reducing pollutants and waste

D. Improving production methods

End-of-pipe technologies are primarily focused on reducing pollutants and waste generated from industrial processes. These technologies are designed to treat or manipulate waste products before they are released into the environment. For instance, they might include systems for filtering emissions, treating wastewater, or capturing harmful by-products. The essence of these technologies lies in their function to address environmental impacts by treating waste at the point of release rather than preventing it from being produced in the first place. This reactive approach aims to mitigate the damage to ecosystems and human health caused by industrial activities, aligning with broader sustainability goals. While enhancing efficiency and improving production methods can contribute to reducing waste, those aspects typically fall under proactive measures taken during the design and production phases rather than focusing solely on pollution control after the fact. Additionally, creating new products is a different focus, emphasizing innovation rather than waste management. Thus, the primary role of end-of-pipe technologies is indeed centered on the reduction of pollutants and waste.

5. What is the process of placing a thin veneer and glueing it to a material called?

A. Injection moulding

B. Blow moulding

C. Laminating

D. Turning

The process of placing a thin veneer and gluing it to a material is known as laminating. This technique involves bonding layers of materials together, often to enhance aesthetic appeal, durability, or to improve other functional properties of a substrate. In woodworking and material design, laminating allows the creation of finished surfaces that appear more attractive while also providing stability to the material. Veneers are commonly used in laminating processes to provide a wood finish on less expensive substrates, allowing for a sophisticated look without the cost of solid wood. This method is also prevalent in creating composite materials where layers can be engineered for specific characteristics—like moisture resistance or strength—making it widely utilized in various industries, including furniture, cabinetry, and flooring. The other processes listed involve different manufacturing techniques that do not specifically relate to the application of veneers and gluing. For instance, injection moulding is a method used to create parts by injecting molten material into a mould, while blow moulding is used for shaping hollow plastic parts. Turning, on the other hand, refers to a machining process where material is rotated against a tool to shape it, typically seen in lathe work. None of these processes involve the specific action of applying a thin layer of material like veneer on top

6. Which statement best describes a Local Combined Heat and Power system?

A. A system that only generates electricity from solar panels

B. A system that produces heat and electricity simultaneously

C. A method of electricity generation that does not produce heat

D. A network that distributes energy from a central power plant

The statement that best describes a Local Combined Heat and Power system is one that highlights its dual functionality of generating both heat and electricity simultaneously. This is the essence of such a system, which, instead of operating in isolation to produce just one form of energy, utilizes the thermal energy generated during the electricity production process, making it more efficient overall. In practical terms, Local Combined Heat and Power systems are often used in settings like residential buildings, industrial facilities, or district heating networks where there is a consistent demand for both heat and electricity. By capturing and repurposing the heat that would otherwise be wasted, these systems can significantly improve energy efficiency and reduce greenhouse gas emissions. The other choices do not accurately convey the characteristics of Local Combined Heat and Power systems. For instance, a system that generates electricity solely from solar panels is limited in application compared to the broader functionality of generating both heat and electricity. A method of electricity generation without heat does not align with the concept of combined heat and power, as it neglects the critical aspect of heat recovery. Lastly, a network distributing energy from a central plant does not capture the essence of localized generation and simultaneous production, which is fundamental to combined heat and power technologies.

7. Magneto-rheostatic fluids are defined by their change in what property?

A. Temperature when exposed to a magnet

B. Viscosity when exposed to a magnetic field

C. Density when heated

D. Color when electrified

Magneto-rheostatic fluids are specifically designed to change their viscosity in response to applied magnetic fields. When a magnetic field is introduced, the structure of these fluids alters at a microscopic level, leading to a significant change in their flow characteristics. This property makes them particularly useful in various applications, such as dampers and clutches, where control over fluid movement and resistance is required. The other options describe different phenomena not associated with magneto-rheostatic fluids. For instance, temperature changes due to magnetic exposure do not relate to the core functionality of these fluids. Similarly, density changes from heating, or color changes when electrified, do not pertain to the unique characteristics of magneto-rheostatic fluids. Therefore, the focus here is squarely on the significant alteration of viscosity under magnetic influence, which is what defines their behavior and utility in technology.

8. Which factor can lead to increased productivity and efficiency in work environments?

A. Adequate lighting

B. High levels of noise

C. Extreme temperatures

D. Overcrowding

Adequate lighting significantly contributes to increased productivity and efficiency in work environments by creating a more comfortable and conducive atmosphere for work. Proper lighting enhances visibility, allowing employees to perform tasks more accurately and with less eye strain. It also reduces fatigue that can arise from insufficient lighting. Additionally, well-lit spaces can positively impact mood and energy levels, fostering a more engaging and alert work environment. In contrast, factors such as high levels of noise, extreme temperatures, and overcrowding can hinder concentration and lead to stress, thus negatively affecting productivity. Effective lighting serves not only practical purposes but also supports overall well-being, making it a crucial element in optimizing workspaces for better performance.

9. Which term refers to body measurements specifically related to size, strength, and physical capacity?

A. Clearance

B. Dynamic data

C. Anthropometrics

D. Adjustability

The correct term that refers to body measurements specifically related to size, strength, and physical capacity is anthropometrics. This area of study focuses on the dimensions and physical characteristics of the human body, which are essential for various applications, including ergonomic design, clothing manufacture, and equipment development. By understanding anthropometric data, designers can create products and spaces that better accommodate the needs of users. Clearing, dynamic data, and adjustability are related concepts but do not specifically pertain to the measurement of human body dimensions. Clearance typically refers to the space between objects or surfaces, whereas dynamic data refers to information that changes over time, often in relation to performance metrics. Adjustability speaks to the ability of a product or design to be modified for different users or conditions but does not encapsulate the measurements of physical dimensions and capacities that anthropometrics covers.

10. Which technique directly contributes to the creation of three-dimensional objects through layering?

A. Solid modelling

B. Stereolithography

C. Fused deposition modelling (FDM)

D. Mockup creation

Fused deposition modelling (FDM) is a popular technique for creating three-dimensional objects through a layering process. It works by extruding thermoplastic materials layer by layer to build up the desired shape of the object. This additive manufacturing process allows for a high degree of customization and complexity in design, as it can produce intricate geometries that are often difficult to achieve using traditional subtractive manufacturing methods. FDM is particularly favored for its efficiency and cost-effectiveness, making it accessible for both prototyping and final product manufacturing. It is widely used in various industries, from automotive to healthcare, for creating prototypes, functional parts, and even end-use products. The ability to manipulate digital models into tangible objects through this layering technique is what sets it apart as a direct contributor to 3D object creation. Techniques like solid modelling and stereolithography also play significant roles in 3D design and production. However, while solid modelling refers to the creation of a digital representation of an object in 3D space, stereolithography is a specific 3D printing method that uses a UV laser to cure resin layer by layer. Mockup creation involves building a physical or digital representation but does not involve the additive layering process that FDM utilizes to construct objects