

## **TEST QUESTIONS TO ACCOMPANY:**

*Product Design* by Paul Rodgers and Alex Milton

This series of test questions, created for use with your students, provides short answer, multiple-choice, true/false, fill in the blank, and discussion/essay questions based on the text and arranged by chapter. A separate answer key is available.

### **Introduction**

1. Select three of the following types of product, explain what they are and give examples:
  - consumer product
  - one-off artistic works
  - consumer durables
  - bulk products
  - industry products
  - industrial equipment products
  - special purpose products
  - industrial plant
2. List the four key functions involved in new product design.

### Discussion/essay questions

1. What do you think is meant by “product design”? Why is product design important?
2. Discuss the role of the product designer today. How do you think this role has changed over recent years? How might it develop in the future?

### **Chapter 1: Historical and cultural context**

1. What did the Industrial Revolution herald that led to the emergence of a profession known as a “product designer”?
2. List two significant industrial developments in the eighteenth century that led to the rapid development of efficient semi-automated factories.
3. What did Thomas Edison develop in 1875?
  - a. a working telephone
  - b. the spinning jenny
  - c. the incandescent light bulb
  - d. the swivel chair
  - e. none of the above
4. What did the reform movements which emerged during the second half of the nineteenth century advocate?
5. Why did Japanese art become influential in Western design in the second half of the nineteenth century?
6. Why was the Deutscher Werkbund founded in 1907 in Munich?
7. Who was the first director of the Bauhaus when it opened in Weimar in 1919?

8. What were the beliefs of the Modern movement in design at the beginning of the twentieth century?
9. True or False? Art Deco was an eclectic decorative arts style that first appeared in Milan in the first half of the twentieth century?
10. Why were the 1930s in the United States often referred to as the “streamlined” decade?
11. List five characteristics of “Good Form” in design in the early 1960s.
12. What were Italian designers of the late 1960s and 1970s dissatisfied with? What did they protest against?
13. Why did product design develop at a much slower rate than other forms of design in China from the 1930s to 1970s?
14. It is widely acknowledged that the Italian groups \_\_\_\_\_ and \_\_\_\_\_ produced the first objects of Post-Modern design.
15. Briefly explain what is meant by “Neo-modernist” design.
16. \_\_\_\_\_ products is a term that covers designed objects that are created by combining often mundane and utilitarian products in a new context.
17. What is a “blobject”?

### Discussion/essay questions

1. Write an essay on the importance of the Industrial Revolution and the various reform movements of the nineteenth century in the development of product design. Consider significant inventions and the work of key manufacturers and artists/designers.
2. Research in more detail either the Deutscher Werkbund or the Bauhaus in Germany in the first decades of the twentieth century. Consider why they were founded, key figures involved, and the type of products created.
3. What were the economic and political effects of World War II and how did they impact on design in the United States and Western Europe? Why do you think Italy emerged as one of the foremost design nations after the war?
4. What is Post-Modernism? Where and why did it emerge? Why do you think it is still influential?
5. Discuss design trends which have emerged at the beginning of the twenty-first century. Consider Critical design, blobjects and individualized products and the importance of advances in technology such as CAD, rapid prototyping, and injection molding. What future trends do you think might emerge?

### **Chapter 2: Research, brief, and specification**

1. Briefly explain what is meant by the “background stage” in research and outline several methods that can be used.
2. What is the difference between an unstructured and a structured interview?
3. Outline one advantage and one disadvantage of questionnaires and surveys.
4. Select three of the following methods used in the exploratory stage of research and briefly explain what each involves and why it is valuable:
  - camera journals

- narration
  - focus groups
  - shadowing
  - ethnography
  - personas
5. Briefly explain the difference between branding research, market research, and retail research.
  6. What is the first thing which needs to be done when creating a product design brief?
  7. In the product design brief what do the following three key product development perspectives describe or specify?
    - marketing perspective
    - technical perspective
    - sales perspective
  8. What methods can be used to define the relative importance of design features?
  9. Briefly explain what a Product Design Specification (PDS) is and why it is essential in the product design process.
  10. In a PDS the \_\_\_\_\_ is any element that can be measured.

#### Discussion/essay questions

1. Discuss the importance of the brief in the product design process. What questions is it important to consider when writing a brief?
2. Why do you think identifying customer wants, needs, and demands is such an important part of the product design process? What methods can you use to help you establish clear design specification targets?

### **Chapter 3: Concept design**

1. Briefly explain what is meant by a “concept design.”
2. What is the difference between the convergent thinking and divergent thinking approaches to concept design?
3. Select three of the following concept generation methods and outline what each involves:
  - brainstorming
  - attribute listing
  - analogical thinking
  - idea checklists
  - breaking the rules
  - lateral thinking
  - mind mapping
4. What are the two broad categories of concept sketches? How do they differ?
5. True or false? The general arrangement (GA) is the drawing which describes the preliminary form of the design and the layout of its components.
6. The art of “coloring in” a sketch is known as \_\_\_\_\_.

7. What is the difference between CAD and CAM technology?
8. Indicate where the vanishing point or points is/are on each of the following types of perspective drawing:
  - one-point perspective
  - two-point perspective
  - three-point perspective
9. What do designers use orthographic drawings for?
10. What is the form/function of each of the following four types of model?
  - sketch model
  - mock-up
  - appearance model
  - test rig
11. How do prototypes assist the design and development process?
12. Select three of the following prototyping tools and briefly explain what each are used for:
  - quick-and-dirty prototyping
  - paper prototyping
  - experience prototyping
  - role-playing
  - body storming
  - empathy tools
  - be your customer
  - try it yourself
  - scenario modeling
  - scenario testing
  - story boards
  - informance
  - rapid prototyping
13. What is meant by “concept selection”? List three methods that can be used for choosing a concept.

#### Discussion/essay question

1. Discuss the role CAD now plays in the design process. What advantages are there with using CAD? Are there any disadvantages?

#### **Chapter 4: From manufacture to market**

1. What is the detail design process mainly concerned with?
2. For each of the following five basic steps of the detail design process briefly explain what it involves:

- product subdivision
  - design and selection of components and sub-units
  - integration of parts
  - product prototyping and testing
  - completion of manufacturing information set
3. What is the difference between an alpha prototype and a beta prototype?
  4. What does the information set contain?
  5. In the design process the sharing of data and ideas between engineers and designers is known as \_\_\_\_\_ design.
  6. What does the acronym DFMA stand for?
    - a. design for materials and assembly
    - b. directions for material assembly
    - c. design for manufacture and assembly
    - d. designed forms, manufactured, and assembled
    - e. none of the above
  7. The term used to describe engineered materials made from two or more components is \_\_\_\_\_.
  8. What does GRP consist of?
  9. What is an “elastomer”? List some examples of elastomers.
  10. What is the most common type of glass? What is it used for?
  11. What are the properties of carbon steel? When might stainless steel be used instead?
  12. What are the properties of aluminum that makes it the second most commonly used metal after steel?
  13. What is zinc commonly used for? Why?
  14. What is the difference between thermoplastics and thermosets?
  15. What is acrylic used as an alternative to? What applications might it be seen in?
  16. What are the properties of polyester (PET)? List some of its applications.
  17. What does the acronym MDF stand for?
    - a. manufactured dense fiberboard
    - b. medium-density fiberboard
    - c. modern design furniture
    - d. medium-density fabric
    - e. none of the above
  18. List the five ways of making things.
  19. “Machining” is the collective term for which processes?
  20. Select one of the following methods of cutting and briefly explain what it involves:
    - die cutting
    - water-jet cutting
    - laser cutting
    - etching
  21. What is the process of joining metal parts by applying heat and/or pressure known as?
    - a. joinery
    - b. weaving
    - c. blow molding

- d. welding
  - e. none of the above
22. Briefly explain what the process of casting involves.
  23. Blow molding enables the production of what type of forms?
  24. What is die-casting? What is the process ideal for?
  25. \_\_\_\_\_ covers a set of manufacturing processes that involve the manipulation of sheets, tubes, and rods into predetermined forms. List three such processes.
  26. For each of the following finishing processes outline what is involved:
    - plating
    - spray painting
    - powder coating
    - subtractive processes
  27. What is meant by “brand values” and “brand image”?
  28. List the “Seven Ps of Marketing.”

#### Discussion/essay questions

1. Discuss why the selection of materials for the manufacture of a product is important. What factors do you need to consider in this selection? Why does a designer need to be increasingly aware of the environmental aspects of manufacture?
2. Why do you think branding is important to companies and consumers? Consider why consumers are drawn to brands and how companies use brand identity.

#### **Chapter 5: Contemporary issues**

1. What is meant by “planned obsolescence”? What does it enable manufacturers to do?
2. What is meant by “sustainable product design”?
3. Sustainability requires that products should be considered systematically and avoid making a loss in which three areas?
4. What is the importance in terms of sustainability of ease of assembly and disassembly of a product?
5. What factors need to be considered in a life cycle assessment for a product?
6. How does reducing the weight of a product help with sustainability?
7. What is the purpose of ethical design?
8. The legal action by which an injured party seeks to recover damages from personal injury or property loss from the producer or seller of a product is known as \_\_\_\_\_.
9. Negligence in design is usually based on one of three factors. List these.
10. Briefly explain what is meant by “inclusive design” (also known as “universal design” and “design for all”).
11. Select three of the following terms concerned with designing usable products and provide a definition for each:
  - equitable use
  - flexibility in use

- simple and intuitive to use
  - perceptible information
  - tolerance for error
  - low physical effort
  - size and space for approach and use
12. List the three categories of user capabilities.
  13. What is ergonomics the study of? How do designers use ergonomics?
  14. An \_\_\_\_\_ audit is a technique used to evaluate different products by comparing the proportion of the population that will be unable to use them.
  15. What is the difference between visceral design and behavioral design?
  16. For each of the following four design pleasures briefly explain what they derive from:
    - physio-pleasure
    - psycho-pleasure
    - socio-pleasure
    - ideo-pleasure

#### Discussion/essay questions

1. Discuss the impact of the emergence of environmentalism on product design and manufacture? Why is “green” or “sustainable” design so important today?
2. What ethical issues do contemporary designers need to consider? Draw up your own list of ethical guidelines to help you when designing products.

#### **Chapter 6: Design education and beyond**

1. Briefly explain what is meant by “copyright”, “trademarks”, and “patents.”

#### Discussion/essay question

1. Discuss why you think it is important for designers to formally protect their intellectual property? Consider the ways in which product designs can be protected today.