True/False

1. Product designers have an easy job because they can keep in touch with customers and respond to the marketplace via market surveys. F

2. Product design can refer to affordability, aesthetics, and functionality of the product to the consumer. T

3. Product design is very subjective, but to the consumer it is appearance, price, and convenience of operation. T

4. Product design is less important than brand name. F

5. Good product design does not impact costs. F

6. A good product designer must have an artistry background. F

7. Product design has been positively associated with sales, profits, stock price, and brand reputation. T

8. Current employees, reverse engineering, and crowdsourcing are all sources of product design ideas. T

9. Reliability and standardization are not important factors in product design because they reduce product variety. F

10. Ease of manufacturing and assembly, reliability, standardization, and environmental considerations are key principles in designing. T

11. Product design is best done using a gatekeeper approach as it prevents errors from occurring. F

12. The use of cross-functional teams allows for concurrent or simultaneous engineering. T

13. A flexible engineering approach to product design does not allow for late-stage design changes. F

14. CMS and FAD are two of the best known tools for engineering and production design. F

15. 3D printers are now becoming an indispensable tool to manufacture prototypes for innovators. T

16. Target costing sets cost goals for components and finished products by adding the desired profit margin to the estimated market price. F

17. Market research and social media are great ways to test prototypes of new products. F

18. Building and testing product prototypes for use by consumers is an effective but expensive way to evaluate design. T

19. The consequences of bad design are limited to lost sales or loss of reputation. F

20. Technical success and commercial success are the two dimensions of design performance. T

21. Computer-aided design (CAD) refers to the use of specialized computer programs to direct and control robots. F

22. "Green" design satisfies environmental, sustainability, and ethical concerns. T

23. Consumers do not care much about design colors such as green design. F

24. An exclusive focus on quantitative measures can inhibit true experimentation and blue-sky ideas for product design. T

25. Compatibility and complexity are just two of the ways adopters perceive the attributes of the design. T

26. Designers may tend to overlook design conflicts and deficiencies because of ever-tightening deadlines and inadequate collaboration. T

27. Designing for the triple bottom line (TBL/3BL), "people, project, profit," is the goal of sustainable design. F

28. Product designs are being increasingly localized for user relevance and product differentiation. T

29. Product design using lighter components is considered an environmentally sound approach. T

30. Low-cost designs are only for poorer global markets. F

31. Modular design can only be applicable to tangible products because services cannot be put together in that way. F

32. IP protection is one way of protecting product design from imitators. T

33. It is impossible for an operations manager to enhance productivity while being environmentally sound. F

34. The customer is usually an important participant in the design and the delivery of services. T

35. Kansei engineering is a design tool which allows the emotional image of a product to be converted to specific design elements. T

Multiple Choice

1. Which of these statements regarding Apple's approach to design is false?
   A) Design is what the product looks like.
   B) Design is what the product feels like.
   C) Design is a layered approach to product development.
   D) Design is how it works.

2. Product design means
   A) an embodiment of beauty, functionality, emotion, and personal effort to the designer
   B) detailed specifications, ease of manufacturing, ease of repair, low costs to the manufacturer
   C) ergonomic work movements, robust quality, craftsmanship to the worker
   D) all of the above

3. From the consumer's point of view, design means
   A) convenience of operation
   B) aesthetics
   C) price
   D) all of the above

4. From an operations perspective, which of the following statements about design is not true?
   A) A good design must have a good customer fit.
   B) A good design must be cheap.
   C) A good design must have a good manufacturing fit.
   D) A good design must be ergonomic.

5. Studies have shown a direct relationship between design and which of the following?
   A) corporate financial performance
   B) worker happiness
   C) recycling
   D) factory layouts

6. Good design lowers the cost of
   A) components
   B) manufacturing
   C) recycling
   D) all of the above

7. Sources of ideas for new product design can come from which of the following methods?
   A) political change
   B) legal change
   C) technological change
   D) none of the above

8. A company such as Dyson is a highly successful design company because
   A) They believe in cross-functional knowledge.
   B) There is an informal and open physical environment.
   C) There are no design divas.
   D) All of the above are true.

9. Design for manufacturability (DFM) asks the designer to explicitly consider
   A) manufacturing ease, safety, productivity, cost
   B) cost, safety, ease of repair
   C) manufacturing ease, safety, profits
   D) productivity, profits, cost

10. Standardization is an important design principle reflecting
    A) a reduced variety of formats
    B) improved reliability
    C) reduced time and costs
    D) all of the above

11. Reducing the complexity of a product by standardization can be done by
    A) design modularization
    B) design for destruction (DFD)
    C) design miniaturization
    D) value engineering

12. Which of the following is not true for products to be considered environmentally friendly?
    A) using more recycled materials
    B) green in color
    C) using less energy in production
    D) using less nonpolluting ingredients

13. Opportunities for creating new product design arise from
    A) changes in technology
    B) changes in customer needs and desires
    C) changes in quality standards
    D) all of the above

14. Flexible or concurrent engineering in product design allows for
    A) speedier product development
    B) lower quality
    C) less customer interaction
    D) engineering to take charge of the design process

15. The five steps involved in the design process are
    A) idea generation, concept development, design engineering, manufacturing engineering, and production
    B) concept generation, idea development, manufacturing engineering, design engineering, and production
    C) idea generation, concept development, design engineering, concurrent engineering, and execution
    D) concept generation, concept development, flexible engineering, manufacturing engineering, and production

16. Joe's Surf 'N Turf Stand uses only 8 ingredients but offers 25 different platters. This process is known as
    A) design engineering
    B) flexible design
    C) product development
    D) modular design

17. Some of the "softer" aspects of design include
    A) staffing design projects with the right people
    B) knowing when to outsource
    C) cooperation and communication between design and marketing
    D) all of the above

18. Disadvantages of a functional design strategy include
    A) narrow functional perspectives
    B) inefficiencies
    C) time consuming

D) all of the above

19. Which of the following statements is **true** regarding computer-aided design (CAD)?
    A) It is the use of robotic technology to do product design.
    B) It uses a mix of hardware and software to develop 3D mechanical designs.
    C) It is an obsolete technology.
    D) It increases the prototyping and development time.

20. CAM, CAQC, and other computer-aided manufacturing and testing technologies use programmable equipment to bring
    A) computers into the workplace
    B) a reduction in the product design cycle
    C) precision, speed, and flexibility to manufacturing engineering
    D) more design options before a final selection is made

21. Procter and Gamble's (P&G) use of TwitterMoms is an example of
    A) crowdfunding
    B) prototyping
    C) crowdsourcing
    D) the use of social media to aid in product trials

22. All of the following groups would be subjects in the prototype testing of a new patient room at a hospital except
    A) patients
    B) nurses
    C) janitors
    D) all of the above

23. Companies such as Swatch, Seiko, and Sony employ which of the following design testing methods?
    A) sink or swim
    B) prototyping
    C) 3D modeling
    D) variety and speed

24. Products are more "environmentally friendly" when they are made
    A) in countries where environmental regulations are lax
    B) overseas
    C) using less energy
    D) using the cheapest available labor

25. Technical success in a design can be evaluated by
    A) reliability and durability
    B) cost and development time
    C) ergonomic and safety metrics
    D) all of the above

26. Experience and studies suggest that all of the following can lead to design flaws except
    A) the pressure for fast design development

B) a lack of coordination and incentives
C) the use of CAD
D) determining the unmet needs of the customer

27. The technical performance of an individual design can be assessed through metrics such as
A) MTBF (mean time between failures)
B) MTTF (mean time to failure)
C) ECNs (the number of engineering change notices)
D) all of the above

28. The success of a particular design commercially can be evaluated through financial and market-oriented metrics such as
A) number of defects
B) consumer surveys
C) market share
D) none of the above

29. Which of the following is an example of a trend in product design?
A) design for disassembly
B) design for outsourcing
C) design for manufacturing and assembly
D) design for globalization

30. Subway sandwich shop has a poster that shows, for each sandwich on the menu, the description and quantities of all of the ingredients used to make the sandwich. This is an example of a(n)
A) assembly drawing
B) bill of materials
C) work order
D) CAD

31. Which of the following examples involves customer participation in the design of the service?
A) choosing a lane at the supermarket
B) investing in a financial portfolio
C) getting an X-ray at the hospital
D) eating at a fast-food restaurant

32. Airline check-in kiosks are an automated example of a service design that
A) reduces customer interaction
B) reduces standardization
C) exemplifies green design
D) modularizes the service

33. As a full-time or part-time college student, which of the following is an example of your role in the service design process?
A) Your advisor selects your classes for you.
B) You select your own classes and then go to your academic advisor.
C) You go to your department head, who then sends you to your advisor.
D) Your advisor sends you to your department head, who directs you to the list of courses offered online.

Short Answer

1. The use of computers and information technology to control machinery is called _____. CAM

2. _____ and _____ fit are two of the ways of describing a good design from an operations perspective. CUSTOMER / MANUFACTURING

3. Product design means _____, _____, and _____ to the consumer. AFFORDABILITY / AESTHETICS / FUNCTIONALITY

4. Design is important because it has been positively associated with _____, _____, _____, and _____. SALES / PROFITS / STOCK PRICE / BRAND REPUTATION

5. Companies such as Nike and Apple often use _____ inspired ideas to come up with new products. CUSTOMER

6. A firm that incorporates sensitivity to environmental issues as well as ethical issues engages in _____ design. GREEN

Essays

1. Identify and discuss three basic sources of new product design.

2. Identify a company that you consider to make well-designed products. What is it about the product that appeals to you?

3. Discuss the advantages and disadvantages of standardization in product design.

4. What are some benefits associated with CAD and CAM?

5. Give some examples of recent products that have replaced older ones due to design improvements.

6. What steps can an operations manager take to achieve environmentally friendly designs?

7. Outline and discuss the tasks involved in an actual design process of a new product. How is this different than the design process for a new service?

8. How do companies measure design performance?

9. Identify and discuss three current trends in design.

10. What is the patent process and why is it important in product or service design?

11. Consider a product or service that you currently use. How can you improve on its design? Is this feasible for the provider to do?