

Register No.: ..... Name: .....

## **SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**FOURTH SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 2023**

**COMMON TO CH, CE, FT, ME**

**(2020 SCHEME)**

**Course Code : 20EST200**

**Course Name: Design and Engineering**

**Max. Marks : 100**

**Duration: 3 Hours**

### **PART A**

***(Answer all questions. Each question carries 3 marks)***

1. Setting design objectives is the primary stage of any design. Why design objectives are so important? Substantiate your answer with a suitable example
2. Describe any three constraints that can occur in the design process of a ladder
3. Compare convergent thinking and divergent thinking.
4. You were asked to design a coffee mug. As a designer, use a design thinking approach for innovative and creative design
5. Proper communication throughout the design process is required to avoid biases and other issues, explain how a designer can effectively communicate designs using engineering tools
6. Describe how prototyping helps in the design process
7. Illustrate the advantages and disadvantages of concurrent engineering in design
8. Explain modular Design and Illustrate with suitable examples
9. Explain the cost factor calculation of a particular design
10. Write the role of economics in engineering design.

### **PART B**

***(Answer one full question from each module, each question carries 14 marks)***

#### **MODULE I**

11. a) Defining a Design Process and the steps involved in Design Process (4)
- b) Teachers face health issues through chalk powder inhalation while they rub the board with conventional dust removers. Develop a specially designed duster that can solve this issue by explaining (10)

each stage in the design process. Use hand sketches wherever necessary

**OR**

12. a) Define design constraints and how to identify the design constraints for a product with suitable examples (5)
- b) Students found inconvenience in carrying a water bottle and lunch box, a designer try to solve this problem by integrating a water bottle with a lunch box. List the design constraints for designing a “New lunch box” for school students (9)

**MODULE II**

13. Show how divergent and convergent thinking processes will help to choose the best design from a list of possible solutions, considering waste bin as a case study (14)

**OR**

14. Design a manual coconut husking tool for household purposes using an iterative design thinking process with the help of sketches (14)

**MODULE III**

15. Design a table for ironing garments and communicate your design using sketches with design detailing, material selection, scale drawings and dimensions (14)

**OR**

16. a) Why prototyping is essential in the industry. Explain with an example showing the steps involved in transforming the prototype into a product (8)
- b) How prototyping helps to design a candle holder to improve the life of the candle and reuse of wax (6)

**MODULE IV**

17. A toy manufacturing company decided to design a chair for babies (1-3 years). Draw a neat sketch showing the design and mention various aesthetic and ergonomic factors considered for the design. (14)

**OR**

18. Explain Bio-mimicry with suitable examples. Show the development of a nature-inspired design for an automobile car. Relate between natural and man-made designs. Use hand sketches to support your arguments (14)

**MODULE V**

19. A researcher invents a new device to track automobiles effectively and he decided to market his innovation. How he can protect his product from duplication in the market? Explain the design rights and how can an engineer put them into practice. (14)

**OR**

20. After every academic year, our institution produces a large number of paper waste even after too many preventive measures. How we can recycle this effectively. Illustrate the changes in design in terms of production, use and sustainability. (14)

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