

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
Third Semester B.Tech Degree Examination December 2020 (2019 Scheme)

**Course Code: EST200**

**Course Name: DESIGN AND ENGINEERING**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions. Each question carries 3 marks*

Marks

- |    |   |     |
|----|---|-----|
| 1  | Discuss the importance of design constraints?   | (3) |
| 2  | Describe how to select the "best possible design" from the generated design alternatives.             | (3) |
| 3  | Discuss how to manage the conflicts in a team executing the design thinking process.                  | (3) |
| 4  | How does the design thinking approach help engineers in creating innovative and efficient designs?    | (3) |
| 5  | Clarify the part of mathematics and physics in the design engineering process.                        | (3) |
| 6  | What are factors to be considered in preparing technical reports to communicate a design efficiently? | (3) |
| 7  | Describe the use of value engineering in the design process.  | (3) |
| 8  | How does intelligence in nature inspire engineering designs?  | (3) |
| 9  | How to estimate the cost of a particular design?  | (3) |
| 10 | How do ethics play a decisive role in engineering design?   | (3) |

**PART B**

*Answer any one full question from each module. Each question carries 14 marks*

**Module 1**

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|----|---|------|
| 11 | Design two alternatives of a chair suitable for a five-year-old child, and then to narrow down to the best design based on objectives and constraints. Sketch both the designs. | (14) |
| 12 | Identify the objectives, functions and constraints for designing a water level indicator. Illustrate the various stages of the design process. Provide suitable sketches.       | (14) |

**Module 2**

- 13 Design a water bottle that can be opened with one hand. Illustrate the various stages involved in design thinking. Sketch the final design. (14)
- 14 During the Covid-19 pandemic, people have to wear a mask, but wearing a mask is not comfortable. Empathize about this design problem and arrive at a solution using the design thinking process, so that people can select the level of protection provided by masks according to different situations. Illustrate the solution using sketches. (14)

**Module 3**

- 15 Design a foldable steel table. Draw the detailed 2D drawings of the same with design detailing, scale drawings and dimensions. Use only hand sketches. (14)
- 16 Prepare a technical report for a newly designed website for online training of students with neat diagrams for presenting to a client. (14)

**Module 4**

- 17 Apply value engineering to a pen, and design a lightweight pen torch. Illustrate the solution using sketches. (14)
- 18 Design waste bins to be kept at bus stops for waste collection enabling source separation. The bin should be theft-resistant and protect the contents of the bin from external weather conditions. Design the bins with ergonomic consideration for waste collection workers. Sketch the design using hand drawings. (14)

**Module 5**

- 19 Design a fan which automatically reduces speed or stops when the temperature reduces during the night for energy conservation. Use hand sketches to support your design. (14)
- 20 Describe how to estimate the cost of a pen and list the various parts. Show how the economics will influence the engineering designs. Use hand sketches to support your arguments. (14)

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