

# The Open University of Sri Lanka

## Faculty of Engineering Technology



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Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	: DMX3374/MEX3174 Principles of Design
Academic Year	: 2017/18
Date	: January 24, 2019
Time	: 1330 hrs. – 1630 hrs.
Duration	: 3 hours

### General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of 8 questions. All questions carry equal marks.
3. Answer any five (5) questions only.

### Question 01

- a. *The hardest part of design is deciding what to design.*

Assuming that the above statement is correct, justify the statement quoting appropriate examples. You should clearly mention the factors which affect in finalizing the design and how these factors are addressed by the design team.

- b. *Main responsibility of a design team is to come up with a solution to a problem.*

Discuss the challenges that a design team will face in finding a solution to a problem. You may use appropriate examples to justify your explanation.

### Question 02

- a. Discuss the main features of Designing and Manufacturing in a 'traditional craft based society' and a 'modern design environment'. Also discuss the relative advantages and disadvantages of both scenarios.
- b. Considering a Light Bulb, explain how it evolved over the past years in order to make it more suitable to the customer, social, environmental and economical requirements. You may quote specific features/components/design concepts of a Light Bulb to elucidate your answer.

**Question 03**

- a. Discuss at least six (6) main responsibilities of a design engineer in a modern design environment.
- b. Figure.Q3a, Figure.Q3b, Figure.Q3c and Figure.Q3d show different types of ladders and there are considerable differences in the configurations, mechanisms, etc, of these ladders. Quoting at least five (5) main features (example; difference in engagement with floor) explain why these ladders are so different. You may answer the question considering the design intent, applications and rationale of each design.

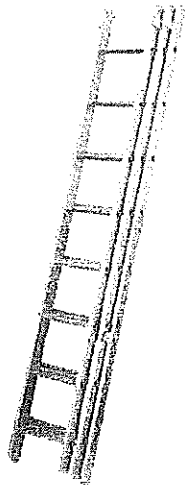


Figure.Q3a

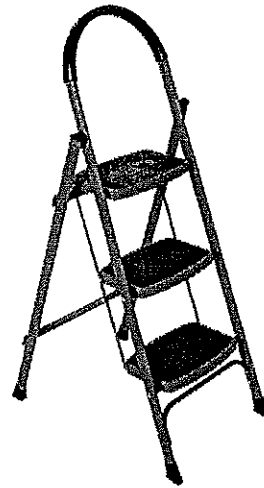


Figure.Q3b

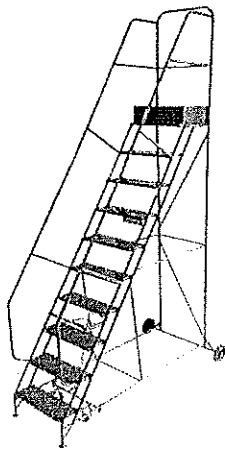


Figure.Q3c

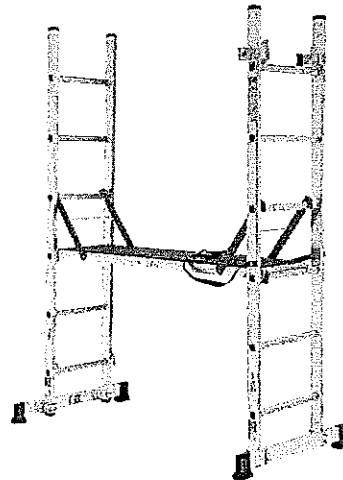


Figure.Q3d

**Question 04**

Assume you are a team leader of a design team and your team has given a task of designing a 'safe beverage container' for a leading food based beverage manufacturer.

- List eight (8) attributes / characteristics of a 'safe beverage container'.
- Draw an objective tree diagram which indicates the intended objectives of the 'safe beverage container'.
- State the importance of having a proper objective tree diagram at the beginning of a design task.

**Question 05**

- Design Methods can be divided mainly into two, namely 'Creative Methods' and 'Rational methods'. Explain these methods and the different techniques used under each method.
- Explain the importance of an ergonomist in a modern design exercise. Justify your explanation quoting appropriate examples.
- Literature surveys** and **Morphological charts** are methods being used to overcome the difficulties in design problem. Explain clearly, how these methods addresses the problems encountered in design.

*Note: You shall clearly explain specific difficulties encountered and how to clarify them by these methods.*

**Question 06**

- Starting from the 'Need' and ending with the 'Working Drawings' illustrate the French's model of the design process.
- Consider an appropriate problem in the society which you need to find solutions and list down the activities you conduct at each stage of the illustrated design process under part (a). Your answer should clearly indicate that when a design process is followed, a solution could be found systematically.

**Question 07**

- It is said that designing is a collaborative activity not just a job of engineers, Explain.
- Explain why a design team should be given due consideration to the environmental and social aspects before proposing a solution. Your answer should clearly mention the consequences of being not so, using appropriate examples.
- Illustrate the Production-Consumption-Disposal cycle and list three (3) ways to promote sustainable consumption and production.

**Question 08**

Answer any **three (3)** from the following.

- a. Discuss the Black box representation and Transparent box representation in the context of functional analysis method. Explain the relationship of these two.
- b. Explain what Holistic design approach is, and state the importance of adhering this approach in modern day design exercises.
- c. Explain the term '**division of labour**' and list its advantages and disadvantages. Also state the types of manufacturing industries where 'division of labour' is extensively being used.
- d. *New designs/artifacts as a result of advancement of technology do not always uplift the social standards, but destroy the society.*  
Justify the above statement using suitable examples of such designs/artifacts.

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