

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Mechanical Engineering



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	: 2019/20
Date	: 07 th October 2020
Time	: 09.30 hours– 12.30 hours
Duration	: 3 hours

General Instructions

1. This question paper consists of Eight (08) questions.
2. Answer any Five (05) questions only.
3. All questions carry equal marks.

Question 01

- a. *The professional designers say that the modern design is a group effort.*
Assuming the above statement is correct, select an appropriate engineering product and clearly state the different kind of specialized groups involved in designing and manufacturing of the product. You should also clearly state the key duties of each group.
- b. Explain why the designers must give sufficient consideration to production-consumption-disposal cycle at the design stage of engineering artifacts.

Question 02

- a. Considering a Mobile Phone, 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 the mobile phone in explaining your answer.
- b. What do you understand by **Ergonomic factors** in design?
Select any appropriate modern product and clearly explain to what extent that the designer has given sufficient considerations to **Ergonomic factors** at the design stage.

Question 03

- a. Clarifying objectives of a design is very important for a designer. Why is it so?
- b. Imagine that you are a designer, and has been given the task of designing a SMART PEDESTAL FAN which automatically controls its rotational speed and oscillating angle according to the ambient temperature, humidity, user location, user movement, etc. List the relative design objectives and expand them into sub objectives and arrange them in an objective tree diagram according to their importance.

Question 04

- a. Describe four (4) main challenges faced by a designer when designing a new artifact.
- b. Figure Q4a, Figure Q4b, Figure Q4c and Figure Q4d show different types of chairs and there are considerable differences in the configurations, mechanisms, materials, etc., of these chairs. Quoting at least five (5) main features (example; differently designed back rests) explain why these chairs are so different. You shall answer the question considering the design intent, applications and rationale of each design.

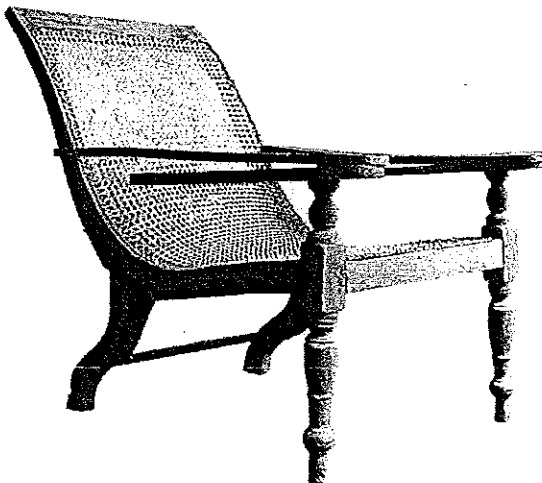


Figure.Q4a

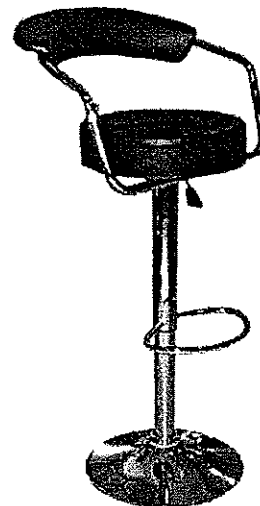


Figure.Q4b

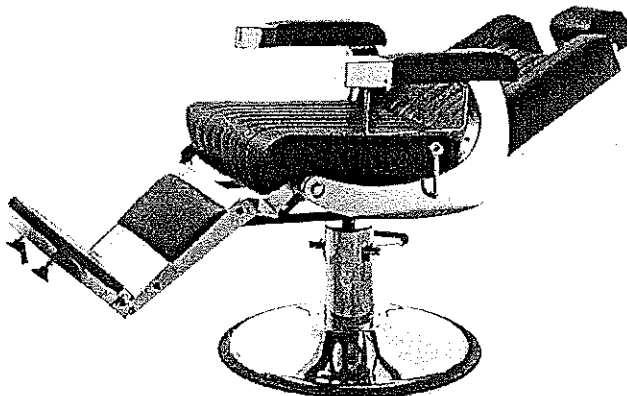


Figure.Q4c



Figure.Q4d

Question 05

- a. Assume that you are the leader of a brainstorming session. Explain what a brainstorming session is, and clearly explain the procedure that you follow in the brainstorming session to get the expected outcome.
- b. *Use of the experience gained from the previous similar types of artifacts to design subsequent ones makes the new design better in quality and appearance.*
Do you agree with this statement? Justify your answer using an appropriate example.

Question 06

- a. *Different design organizations follow different design processes and that design processes have been changed over the time, as per the requirements.*
List the reasons that different organizations adhere to different processes and explain why these processes keep on changing from time to time.
- b. Given below are several phases of engineering design. They are not arranged in the proper sequence.

Evaluation
 Synthesis
 Definition of the Problem
 Presentation
 Recognition of need
 Analysis
 Optimization

Arrange these phases in the correct sequence and draw a suitable flow chart incorporating these phases with their interrelationships to show that when the flow chart is followed, the design process would result in a successful design.

Also explain the main activities conducted in each phase of the arranged process.

Question 07

- a. *Some technological innovations have altered the history and greatly influenced in further engineering developments.*
Explain using an appropriate example for such innovation.
- b. *Not always new designs/artifacts as a result of advancement of technology uplift the social standards but destroy the society.*
Justify the above statement using suitable examples of such designs/artifacts.

Question 08

Answer any three (03) of the following.

- a. *Political factor (or factors related to authorities) cannot be forgotten in producing and implementing designs.*
Do you agree? Justify your answer.
- b. *As far as the nature of modern design is concerned, efficient communication is essential.*
Clearly explain why it is essential to have appropriate communication methods in modern design environment.
- c. Explain clearly a “well-defined problem” and an “ill-defined problem”.
Note: Your answer should address the respective characteristics in each problem.
- d. Describe the importance of Aesthetic consideration in modern engineering designs.

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