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The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Diploma in Technology / Bachelor of Technology (Engineering)
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX3174 Principles of Design**
Academic Year	:	2012/13
Date	:	August 22, 2013
Time	:	0930 hrs. – 1230 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 5 questions only.

Question 01

a. *Deferent specialist groups such as engineers, architects, etc., may try to emphasize the meaning of design according to their own specialty.*
Do you agree with this statement? Justify your answer.

b. Humans have been designing for 5000 years and there are literally millions of artifacts that worked and worked well, explain clearly, then why is it still necessary to study and redefine the design process.

c. List duties of an Engineering Designer in a modern design facility.

Question 02

a. *Engineering design is an interface with society, economy and technology.*

   i. Define separately the society, economy and technology in the context of engineering design.
   ii. Elucidate the importance of interfacing social, economic and technological aspects in engineering design practice.

b. Explain the responsibilities of an ergonomist in a modern design exercise. Justify your explanation quoting appropriate examples.

Question 03

a. Explain what do you understand by 'Design for the environment'.

b. Select any appropriate modern artifact and clearly explain the features to prove that the designer has given sufficient considerations to production-consumption-disposal cycle at the design stage.

Question 04

Assume that you are the leader of a design team, which has been given a task of designing a new commuter bus to be operated in Colombo city area.

a. You are required to make two questionnaires, one to passengers and one to drivers. List five (5) questions you would include in each questionnaire, to clarify problems and to identify the requirements of the design.

b. State four (4) major objectives that needed to be fulfilled by the design. Explain the reasons to select these major objectives.

c. Expand the above mentioned four objectives into sub objectives and arrange them in an objective tree diagram.

Question 05

a. *Engineering design starts with problems, and problems can be divided into ill-defined problem and well-defined problem.*

   i. Explain what ill-defined problem and well-defined problem are.
   ii. List three (3) characteristics of each type of problem.

b. Literature searching, brainstorming and checklist are three main techniques available to overcome difficulties in design problems. Explain each of them clearly stating the main features.

Question 06

a. *The system boundary in function analysis method, defines the functional limits for the product to be designed. Design experts iterate the importance of defining the system boundary at an optimum level without defining it too narrowly or too widely.*
   Clearly explain the consequences of defining the system boundary too narrowly or too widely.

b. Illustrate 'Black box representation' and 'Transparent box representation' within the context of function analysis method. Also explain the techniques which can be used to convert a 'Black box' to a 'Transparent box'.

Question 07

a. *In modern design and manufacturing process, making cannot start before designing is finished.*
Explain the nature of modern design and manufacturing environment stating evidence to prove the above statement.

b. Explain the term 'division of labour' and list its advantages and disadvantages.

Question 08

Answer any **three (03)** of the following.

a. Explain the life cycle assessment (LCA) and state the three (3) key elements of LCA.

b. Briefly explain the four (4) steps in performance specification procedure which intends to help in defining the design problem.

c. What is the importance of incorporating a 'safety factor' in engineering design?

d. Political factor cannot be forgotten in producing and implementing designs.
Explain the above statement with appropriate examples.

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