



KENYATTA UNIVERSITY

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ENERGY TECHNOLOGY

TCU 301: INNOVATION AND DESIGN

1ST SEMESTER 2023/2024

TIME: 2 HOURS

INSTRUCTIONS:

1. Do Not Write Anything On This Question Paper
2. Answer Question One And Any Other Two Questions

QUESTION 1

- a. Define the following terms. [3 marks]
 - i. Constraint
 - ii. Engineering design process
 - iii. Brainstorming
- b. Outline the five (5) popular approaches to design [5 marks]
- c. With the help of a flowsheet, explain the prescriptive design process for problem identification and requirement selection [3 marks]
- d. Describe the procedure undertaken in product planning [9 marks]
- e. The main advantage of the systematic approach is that designers do not have to rely on coming up with a good idea at the right moment. Solutions can be systematically elaborated using the relevant methods. Discuss the following Solution finding methods.
 - i. Conventional Methods [5 marks]
 - ii. Intuitive Methods [5 marks]

QUESTION 2

- a. There are several basic phases of design process. Discuss the conceptual design phase. [11 marks] ✓
- b. Outline six (6) essential factors in product design [9 marks] ✓

QUESTION 3

- a. An essential part of a problem solving method involves step-by-step analysis and synthesis.
Outline the general problem solving process [5 marks] ✓
- b. Using a diagram, illustrate the design process [6 marks] ✓
- c. Discuss six (6) importance of design. [9 marks] ✓

QUESTION 4

- a. The Scientific Method is not a formula, but rather a process with a number of sequential steps designed to create an explainable outcome that increases our knowledge base. Discuss this process [10 marks]
- b. Outline six (6) conditions that must be satisfied when using a systematic approach [6 marks]
- c. What does an embodiment design entails [4 marks]

QUESTION 5

- a. Define the term simplified iteration model and list four (4) advantages of iterative model [5 marks]
- b. Explain the importance of standards and codes in design. [4 marks]
- c. Outline three (3) components of a problem [3 marks]
- d. Design is an essential part of the product life cycle. This cycle is triggered by a market need or a new idea. It starts with product planning and ends when the product's useful life is over with recycling or environmentally safe disposal. Describe the product life cycle. [8 marks] ✓