



KIBABII UNIVERSITY

2021/2022 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER

SPECIAL/SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE IN RENEWABLE ENERGY AND
BIOFUELS TECHNOLOGY

COURSE CODE: REN 214

COURSE TITLE: Introduction to Engineering Design

DATE: **18/7/2022**

TIME: **2:00PM-4:00PM**

INSTRUCTIONS TO CANDIDATES

Answer question ONE and any other two questions

This paper consists of 4 printed pages. Please Turn over

- (a) State the five steps used for solving design problems [5 Marks]
- (b) (i) Explain how the Kenya Ceramic Jiko (KCJ) evolved to its “current design” [5 Marks]
(ii) State any **Five** methods of fastening or joining metallic components [5 Marks]
- (c) With reference to simple machines:
(i) State the five types [5 Marks]
(ii) Sketch each of the machines stated above [5 Marks]
- (d) Explain what is meant by the design process being “iterative” [5 Marks]

Question Two

- (i) Explain what is meant by Computer Aided Engineering, CAE [5 marks]
- (ii) Explain the use of 3D printing in product development [7 marks]
- (iii) Explain what is meant by “reverse engineering”. [5 marks]
- (iv) What is “rapid prototyping”? [3 marks]

Question Three

- (a) State any 5 types in which structural steel is supplied [5 Marks]
- (b) State and explain any 5 applications of aluminium [5 Marks]
- (c) Engineers must understand the difference between requirements and constraints. Let’s say a team of engineers is asked to design a pair of kids’ tennis shoes for less than KES 250. They determine that the only way to manufacture shoes for this price is to use recycled materials. What is the team’s *constraint*? [2 Marks]
- (d) State the step of the engineering design loop which distinguishes an engineer from a technician? [1 Marks]
- (e) Explain the difference between a “model” and “prototype” [4 Marks]
- (f) Identify all the members of a design team [3 Marks]

Question Four

- (a) Explain what is meant by “machine design” [3 Marks]
- (b) (i) Material selection is an important step in designing products. State any FIVE properties of materials that influence choice [5 Marks]
- (ii) Define the properties mentioned above [10 Marks]
- (c) Explain the term kinematics as applied to machines [2 Marks]

Question Five

Discuss the last phase of product design [20 Marks]