



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF CIVIL ENGINEERING

SET 310: INNOVATION AND DESIGN

DATE: WEDNESDAY, 18TH APRIL 2012

TIME: 2.00 P.M. – 4.00 P.M.

INSTRUCTIONS

Answer any **THREE (3)** questions

All questions carry equal marks

Use each question on a fresh page

Q1 (a) Briefly describe the following terms

- (i) Engineering design
- (ii) Product design
- (iii) System design
- (iv) Graphic design
- (v) Mechanical design in contrast with Mechanical Engineering Design (10 marks)

(b) Almost everyone is involved with design in one way or another even in daily living, because problems are posed and situations arise which must be solved. Consider the case of a family of Mr. Njuguna and his wife Nancy who have three children. Mr. Njuguna is employed but Nancy is a house wife their three children Rose 12, Stephen 10, and Ruth 8, and discuss how you would plan a family vacation for them. When is the optimal solution reached. (10 marks)

- Q2 (a) (i) Discuss the meaning of DESIGN (2 marks)
- (ii) Distinguish between 'the statement of a need' and 'identification of the problem' as used in design. Briefly explain the difference between a well-defined and ill-defined need, Give examples. (8 marks)
- (b) The total design process is made up of phases. Explain, briefly, the phase to answer the questions:- How does it begin?. What happens next?
What factors influence or control the decisions which are made? Finally how does this design process end? (10 marks)

- Q3 (a) Discuss the terms:-
(i) Innovation
(ii) Design
(iii) Production Engineering
(iv) Design mock-up (8 marks)
- (b) Briefly explain, what is involved in a 'Systematic Design Technique' (use a sketch).
Describe and distinguish the various stages (12 marks)
- Q4 (a) Distinguish between
(i) Primary needs and secondary needs
(ii) System design and products design (8 marks)
- (b) When we use the expression Design Considerations we are referring to some characteristics which influence the design of the elements or perhaps, the entire system. Explain it.
Name at least ten important design consideration and discuss them briefly in as far as they impact the design of a system or elements etc (12 marks)
- Q5 (a) The consideration of cost plays an important role in the design decision process. Explain this briefly (4 marks)
- (b) Briefly describe as a principle of cost reduction the following:-
(i) The use of standard sizes
(ii) Large tolerances
(iii) Breakeven points
(v) Cost estimates (16 marks)
