



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

**UNIVERSITY EXAMINATIONS FOR THE DEGREE IN RENEWABLE ENERGY,
TECHNOLOGY AND MANAGENT**

4TH YEAR 1ST SEMESTER 2017/2018 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TET 3415

COURSE TITLE: ENERGY AND BUILT ENVIRONMENT

EXAM VENUE: CR

STREAM: BSc REN ENERGY TECH. & MGT.

DATE: 20/12/2017

EXAM SESSION: 2.00 – 4.00PM

DURATION: 2 HOURS

Instructions

- 1. Answer question 1 (Compulsory) and ANY other two questions**
- 2. Candidates are advised not to write on question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

QUESTION ONE (COMPULSORY)

- a. Describe the inter-relationship of the term energy and built environment. (3 marks)
- b. Passive solar energy efficient architectures are finding increased usage in contemporary buildings. Briefly explain the term passive solar energy efficient architecture (4 marks)
- c. State and explain various passive solar energy systems. (10 marks)
- d. As an upcoming energy expert, describe what or how tomorrow's energy efficient building should have? (5 marks)
- e. The management of Bondo County government in collaboration with the University is planning to set-up a renewable energy demonstration laboratory in the County. State and explain the design objectives of a whole building design to be considered by the stakeholders. (8 marks)

QUESTION TWO

- a. State the general expression for the energy balance as used in energy conservation (1 mark)
- b. Nowadays office buildings are taking measures to reduce energy consumption. The most common measure is known as Optimization. Discuss three optimization control measures commonly used. (6 marks)
- c. Define the term intelligent energy efficient building, key features of these buildings and discuss the rapid emergence of intelligent energy concept. (8 marks)
- d. As an upcoming renewable energy technologist, describe how you can achieve cost-effectiveness from energy conservation measures? (5 marks)

QUESTION THREE

- a. What is energy conservation? (1 mark)
- b. What does optimization of energy efficiency mean? (3 marks)
- c. State two major aspects that matter during the planning of technical services and logistics for building systems. (2 marks)
- d. The Ministries of both energy and housing has approached you with interest in understanding the principles of energy efficiency building system. State and explain four principles of energy efficiency building system to the ministry officers (8 marks)
- e. The need to focus on the sustainability of built environment exists in both developed and developing countries. State and explain the triple bottom line goals that buildings and building efficiency have significant impact on. (6 marks)

QUESTION FOUR

- a. Bondo County government housing department has invited all stakeholders in the building industry: owners, occupants and entire society to deliberate on the need for energy efficient buildings. Explain the benefits of efficient buildings to all stakeholders. (5 marks)
- b. From energy and environmental building concept standpoint, describe the strategy for design involved. (7 marks)
- c. How can unwanted energy flows with too much energy leaving or entering building via windows be corrected? (3 marks)
- d. State five types of passive solar energy systems. (5 marks)

QUESTION FIVE

- a. Lighting accounts for 28% of all commercial building electricity expenditure and thus represents a potential source of energy savings. Discuss the need for intelligent lighting in Kenya and what it entails (5 marks)
- b. Under criteria for architectural, mechanical, electrical and building system components describe the following:
 - i. Site and building orientation (10 marks)
 - ii. Envelope and façade design (3 marks)
 - iii. Daylight and lighting analysis (2 marks)