



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ENERGY ENGINEERING

SET 543: CASE STUDY IN RENEWABLE ENERGY

DATE: Monday, 16th April, 2012

TIME: 8.00 a.m. – 10.00 a.m.

INSTRUCTIONS:

Do question **ONE** and any other **TWO**.

Question 1 (Compulsory)

- i) Define the term “innovation” (2 marks)
- ii) Discuss four approaches to evaluate renewable energy systems (8 marks)
- iii) Using a schematic flow chart, describe the innovation cycle that could be used to come up with a new low cost approach for producing Bioethanol (5 marks)
- iv) List and explain four key innovation principles (4 marks)
- v) List the 5 main issues to be considered in the setting up a pilot project (5 marks)
- vi) Omenga intends to obtain funding for setting up a renewable energy project in Bujumbura, explain to him three appropriate methodologies he can use in evaluation his Renewable energy project (6 marks)

Question 2

- i) Using an appropriate diagram explain what you understand by the term “valley of death” as regard the financing aspects of early stage technology investments. (8 marks)

- ii) Using the technology adoption cycle indicate 2 main challenges faced by innovators (6 marks)
- iii) Explain the tenuous link between the inherent risk in an investment (high or low risks) and the attendant returns (high or low returns) as appertains to investments in renewable energies (4 marks)
- iv) List 2 factors to be considered with regard to risk and returns on energy investments in Kenyatta University (2 marks)

Question 3

- i) The SCORE stove presents an innovation case study that involves a wide array of risks and assumptions. Using a diagram of the SCORE stove, indicate the various risks, assumptions and mitigation/managing measures based on the technology adoption cycle (8 marks)
- ii) Differentiate between Environmental cost benefit analysis and the Economic & welfare based analysis methods for evaluation of renewable energy technologies. (4 marks)
- iii) Indicate to Agnes 4 different sources of financing of her innovation including the type of funding she may obtain (4 marks)
- iv) Differentiate between Special purpose vehicles and club deals as means of financing energy innovations (4 marks)

Question 4

- i) Technologies normally undergo a process that leads to full commercialization of the initial prototype. Depict and describe this technology adoption cycle (6 marks)
- ii) Using a Logical framework depict the goal, objectives and probable activities of a project to pump water using a mechanical wind pump in northern Kenya as part of the project management cycle. (11 marks)
- iii) Explain the emergy approach to evaluation of renewable energy systems (3 marks)