



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

**FIRST SEMESTER EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE
(RENEWABLE ENERGY TECHNOLOGY)**

SET 823: ENERGY FOR SUSTAINABLE DEVELOPMENT

DATE: Tuesday, 13th December, 2016

TIME: 5.30 p.m. - 8.30 p.m.

INSTRUCTIONS:

There are **FIVE** questions in this paper. Answer question **ONE** and any other **TWO** questions from the remaining **FOUR**. Question **ONE** carries 30 marks and all other **FOUR** questions carry 20 marks each.

QUESTION ONE

- a) The world is not on course for a sustainable energy future. New technologies will be needed if the world wants to reverse the unsustainable energy trends.
- i) Discuss some of the energy trends that hinders us from achieving a sustainable energy future (6 Marks)
 - ii) Explain some of the new energy trends that are being put in place to guarantee a sustainable energy future (6 Marks)
 - iii) What are the new drivers to sustainability? (6 Marks)
- b) Our civilization has developed under economic, social and ecological limitations. For this reason, sustainability has become an unavoidable issue in all major planning and undertakings that involve future use of energy and any other natural resources. Explain. (6 Marks)
- c) Sustainable development has been defined in many ways, but the most frequently quoted definition is from Our Common Future, also known as the Brundtland Report, which merges two urgent goals: (a) to ensure appropriate, secure, wealth life for all people, and (b) to live and labour in accordance with bio-physical limits of the environment. Give an account of how you understand this definition in relation to economic, social and environmental sustainability. (6 Marks)

QUESTION TWO

Energy exploration and exploitation has been identified as one of the major problem to sustainability. For this reasons, engineers and technologists are actively involves in efforts to come up with amicable solutions to these challenges

- a) Explain some of guiding principles that are necessary to guide engineers and technologists to realize sustainable development. (7 Marks)
- b) Outline some guidelines that can be adopted to help in coming up with amicable solutions to these challenges (7 Marks)
- c) Discuss six implications of the new paradigm can bring about a change in the direction of sustainability. (6 Marks)

QUESTION THREE

- a) Discuss the key energy challenges in sub-Saharan Africa from a resource management perspective. Describe, in your opinion, the main challenges and solutions to achieving sustainable use of energy resources in relation to technical, economic and governance-related stating where the greatest opportunities lie. (12 Marks)
- b) The ministry of Energy and Petroleum and the Energy Regulatory Commission are fronting/supporting a number of new energy practices that are being adopted in Kenya that are important for sustainable development. Clearly outline some of these emerging cultures of sustainability (8 Marks)

QUESTION FOUR

- a) Describe in detail any energy source, its potential, current utilization and environmental impacts. (6 Marks)
- b) Based on the described energy source (Question four (a)), state some measures to minimize or prevent their environmental impacts for sustainable development. (5 Marks)
- c) As an energy engineer working in Kenya, what are three likely challenges that you might face in setting up an energy project using the energy source described in question four (a)? State how you will overcome them to ensure that the project results in sustainable development. (9 Marks)

QUESTION FIVE

Air pollution in Asia has worsened since 2000 and is responsible for deaths of thousands of people in Beijing, Jakarta, Seoul and Manila. The pollution is a result of the use of fossil fuels by the industry and transport sectors. The problem got aggravated in Asia due to the use of poor quality fuel, inefficient method of energy production, use of vehicles in poor condition and traffic congestion. This was revealed during a research conducted by World Bank and Stockholm Development Institute. The research states that air pollution in the continent has surpassed the combined emissions in Europe and North America. The deaths caused by fine particulate matter far exceed those caused by sulphur dioxide, nitrogen oxide, ozone and lead. The health cost in major Asian cities now exceed for 15-18 percent of urban income expenditure, claims World Bank officials.

- a) A project under Clean Development Mechanism is to be proposed to contain the growing air pollution in the countries discussed, at the same time tackling a development initiative. Propose a Clean Development Mechanism initiative that might be used in all the regions discussed here? Focus your answer on the impact on the populace and the activity. (8 Marks)
- b) There is a proposed decision to remove all vehicles from the road that fails to meet specified norms of emission level within a specified time period. As part of citizen forum you are requested to give views on the enforced regulation. State your views on this considering the environment, social and economic aspects. (6 Marks)
- c) Suppose you are a Carbon Credit Auditor appointed to assess the greenhouse gas emission reduction strategies. Identify a component of assessment and brief the methodology that could be adopted in connection with this. (6 Marks)