



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

UNIVERSITY EXAMINATIONS FOR THE DEGREE OF SCIENCE IN RENEWABLE
ENERGY TECHNOLOGY AND MANAGEMENT

FOURTH YEAR FIRST SEMESTER 2015/2016 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TET 3412

COURSE TITLE: ENERGY AND CLEAN PRODUCTION

EXAM VENUE: AH 2

STREAM: BSc RE TECH & MGT

DATE: 14/10/2015

EXAM SESSION: 9.00 – 11.00 AM

TIME: 2 HOURS

Instructions to candidates

The paper contains FIVE questions.

Answer question ONE and any other TWO questions

QUESTION ONE

- a) What do you understand by the term Clean Development Mechanism and how it came up. (2 Marks)
- b) As a clean energy development expert attached in Kenya, highlight six clean energy development mechanisms that if practiced in Kenya will make our environment more cleaner than it is today. (6 Marks).
- c) Flue gas filtration from power plants is an essential process of minimizing pollution of air, based on the knowledge gained state five flue gas filtration processes stating where applicable. (20 Marks)
- d) Global warming is becoming a world challenge, explain what it is and how it comes about. (2 Marks)

QUESTION TWO

- a) What do you understand the term zero wastage. (2 Marks)
- b) As a clean development official who supervises the erection of new power plants highlight five major areas where you can be strict as you try to prevent pollution from power plants giving detailed examples of the same. (10 Marks)
- c) Transportation fuel from fossil origin is the highest source of carbon dioxide that highly pollutes the atmosphere. As an upcoming climate change expert give ways how you intend to challenge these risks and support your answer. (5 Marks)
- d) The environment performs three major in respect to man, that if without it is impossible to live, explain in detail. (3 Marks)

QUESTION THREE

- a) Having understood fully energy sources and generation, draw a well labelled energy generation diagram, highlighting conventional and renewable energy technologies and clearly demonstrating their interrelationships. (7 Marks)
- b) As a consultant of an organization in Uasin-Gishu county where we have wheat and maize farmers who want to produce gas from their crop wastes and use it to run an engine. Give possible ways to extract energy from these wastes explain all processes fully. (4 Marks)
- c) What distinct environmental effects are associated with these power plants;
 - i. Wind.
 - ii. Solar thermal.
 - iii. Electricity Transmission. (5 Marks)

- d) Smoke, fog, spray and mist are air pollutants; under what conditions do they occur.
(4 Marks)

QUESTION FOUR

- a) Derive stokes equation for particle settling in an environment. (5 Marks)
- b) Calculate the minimum size of the particle diameter that will be removed with 100 percent efficiency from a gravitational settling chamber given the following data; Air horizontal velocity and viscosity 0.3 m/s and 2.1×10^{-5} kg/m.s. Particle specific gravity is 2.0, settling chamber length 7.5 m and height 1.5 m. (4 Marks)
- c) Differentiate between
- Adsorption and Absorption
 - Biodegradation and Decomposition (4 Marks)
- d) Carbon monoxide is poisonous to humanity, explain this in detail showing its sources. (3 Marks)
- e) With reference application of clean production and taking Sweden as your country of choice, highlight four ways/practices in Sweden that are not practised in kenya which make it a clean production compliant country. (4 Marks)

QUESTION FIVE

- a) Acid rain is a menace in industrialized regions; explain its sources, chemical equations of formation and its two effects to the environment. (4 Marks)
- b) Discuss the relationship between environmental pollution and sustainable development. (2 Marks)
- c) A sample of analyzed air at 0°C and 1 atm pressure is reported to contain 9 ppm of CO. Determine the equivalent CO concentration in micrograms per cubic meter and milligrams per cubic meter. (5 Marks)
- d) As Turkana energy officer responsible for energy production and processing of fuels, state the environmental effects and their remedies on;
- Land
 - Water
 - Air (9 Marks)