



# MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)

University Examinations 2015/2016 Academic Year

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES MANAGEMENT

DEPARTMENT OF ENVIRONMENTAL STUDIES

..... SEMESTER EXAMINATION FOR DEGREE IN  
BACHELOR OF SCIENCE IN .....

ENS 242: GLOBAL WARMING AND CLIMATE CHANGE

Date:

Time:

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## SECTION A (COMPULSORY) (30 MARKS)

1. a) Define each of the following concepts
  - i) Anthropogenic forcing (2 marks)
  - ii) Climate change (2 marks)
  - iii) Climate forcing (2 marks)
  - iv) Climate system (2 marks)
  - v) Greenhouse effect (2 marks)
- b) Outline **FOUR** differences between climate and weather (4 marks)
- c) Express radiation balance in terms of shortwave and long wave radiations. (3 marks)
- d) State **FIVE** sources of biogeochemical climate records useful in climate change studies. (5 marks)
- e) Explain **FIVE** harmful effects of stratospheric ozone depletion. (5 marks)
- f) State **THREE** harmful effects of ozone build up in the troposphere. (3 marks)

**SECTION B : ANSWER ANY OTHER TWO QUESTIONS (40 MARKS)**

2. a) Explain the **FOUR** main external causes of climate change. (8 marks)
- b) Explain the **THREE** flexible mechanisms in the Kyoto protocol aimed at climate change mitigation and adaptation. (12 marks)
3. a) The solar luminosity of the planet Earth,  $S_0 = 1370 \text{ Wm}^{-2}$  and albedo,  $\alpha = 30\%$ . Given the Stefan-Boltzmann constant,  $\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$ , and a temperature change due to greenhouse effect,  $\Delta T = 33\text{K}$ , calculate the surface temperature,  $T_s$  of the Earth. (6 marks)
- b) With the help of factual figures, explain why the effective temperature of the earth is higher than that of the planet Venus, though being closer to the sun than the earth (4 marks)
- c) Discuss **FIVE** internal causes of climate change (10 marks)
4. a) Discuss any **THREE** positive and **THREE** negative climate feedbacks in response to elevated atmospheric carbon dioxide. (6 marks)
- b) Explain any **TEN** possible impacts of climate change on the environment, human health and economy of Kenya . (10 marks)
- c) Outline **FOUR** effects of global warming in Kenya. (4 marks)
5. a) Explain **FIVE** fundamental principles laid down in the Rio Declaration on the Environment and Development in 1992. (10 marks)