

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN
CHEMISTRY AND BACHELOR OF ENVIRONMENTAL SCIENCE**

CHEM 344: ENVIRONMENTAL CHEMISTRY I

STREAMS: BSC (CHEM); BSC (ENV SCI)

TIME: 2 HOURS

DAY/DATE: THURSDAY 05/12/2019

11.30 A.M. – 1.30 P.M.

INSTRUCTIONS:

- Answer question ONE (compulsory) and any other TWO questions.

QUESTION ONE (30 MARKS)

- (a) Explain the variations of temperature with altitude in different layers of the atmosphere. (4 marks)
- (b) List six health and environmental effects of UV-B radiation. (3 marks)
- (c) Write the two equations for non-catalytic destruction of ozone in the atmosphere. (2 marks)
- (d) Write the equations for catalytic destruction of ozone in the stratosphere by free radicals both in the presence and absence of atomic oxygen. (3 marks)
- (e) State two major sources of atmospheric nitric oxide, sulphur oxides and ozone depleting substances. (3 marks)
- (f) Discuss the causes and effects of the Minamata disease. (4 marks)
- (g) Describe in details how the chemical oxygen demand (COD) of water samples is determined experimentally. (4 marks)
- (h) Describe the production, advantages and disadvantages of biodiesel over crude oil produced diesel. (6 marks)

QUESTION TWO (20 MARKS)

- (a) Explain ozone depletion and formation of ozone holes in the Antarctica regions. (10 marks)
- (b) Discuss the catalytic technology that is used to control emissions from gasoline internal combustion engines. (6 marks)
- (c) Discuss two technologies that are commonly used to remediate contaminated soils. (4 marks)

QUESTION THREE (20 MARKS)

- (a) (i) Define the greenhouse effect. (1 marks)
- (a) (ii) List six major greenhouse gases. (3 marks)
- (b) Discuss the formation and environmental effects of acid rain. (6 marks)
- (c) Explain three technologies used for disinfection of drinking water. (3 marks)
- (d) Describe the industrial production and uses of the following polymers. (6 marks)
 - (i) Polylactic acid
 - (ii) Polycaprolactone

QUESTION FOUR (20 MARKS)

- (a) Discuss the formation and effects of photochemical smog. (8 marks)
 - (b) Explain five sources of major soil pollutants. (5 marks)
 - (c) State two major sources of formaldehyde, particulate matter and asbestos indoor air pollutant ion. (3 marks)
 - (d) (i) Explain three potential sources of hydrogen for fuel. (3 marks)
 - (d) (ii) State two ways of storing hydrogen for vehicular usage. (1 mark)
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