



TECHNICAL UNIVERSITY OF MOMBASA
**Faculty of Engineering &
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN
CIVIL ENGINEERING

ECE 2519: ENVIRONMENTAL ENGINEERING

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: MARCH 2014

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (20 Marks)

- a) With the help of equations, explain how the chlorofluorocarbons (CFCs) can destroy the Ozone layer. **(5 marks)**
- b) Discuss why the Ozone hole is over Antarctica? **(5 marks)**
- c) Explain the potential effects of depleted Ozone layer on:
- Human Health
 - Plants
 - Marine Ecosystems

Question Two (20 marks)

- a) May governments and individuals have pondered what sustainable development is beyond a simple one statement sentence? The Rio Declaration on Environment and Development flashes out the definition by listing a number of principles of sustainability. List **FIVE** of these principles. (5 marks)
- b) For each of the following global environment issues, discuss the respective environmental conservation technologies and or policies to mitigate adverse effects:
- i) Desertification and land degradation
 - ii) Marine environment and resource degradation
 - iii) Loss of biodiversity
 - iv) Persistent organic pollutants
 - v) Stratospheric Ozone depletion
- (15 marks)

Question Three (20 marks)

- a) Outline the sequences that lead to smog formation giving all the products including the secondary pollutants formed. (10 marks)
- b) Outline the major atmospheric zones citing the temperatures, the approximate altitudes and the gases present in these zones. (10 marks)

Question Four (20 marks)

- a) Natural hazards and the natural disasters can be divided into several different categories. Outline, giving relevant examples, **FIVE** of these categories. (8 marks)
- b) Hazardous process of all types can have primary secondary and tertiary effects. Discuss, giving examples when these effects occur. (7 marks)
- c) Outline **TEN** factors that influence vulnerability to a given hazard. (5 marks)

Question Five (20 marks)**a) Case Study: Water Development: Dam Construction**

The shortage of water for one of the largest industrial areas in an east African Country has been identified as one of the major constraints to further economic growth. To secure more water supplies the government has proposed a major infrastructure project to build a large concrete dam in the central highlands, and to transfer the water from this reservoir to the industrial area through a 50km tunnel/pipe where it will be stored in a secondary reservoir. The main dam which will have a capacity of 1.95km³ and a surface area of 35km². A small hydro power scheme (60MW) will also be build for electricity for local towns, which could be expanded under a second phase to provide power for the more remote industrial area. This will be a major construction project which is in addition to the work for the dam will require the construction of new roads and temporary settlements. The dam location is in a relatively sparsely populated but several villages are located within the area to be flooded and the inhabitants of these will have to be moved to other locations. Labour to construct the dam will have to be brought to the area as there is insufficient local labour. The construction of the transfer tunnel, pipe

and canal will be thorough one of the country's national parks. The area is already the destination for some eco-tourists, and it is proposed to open up the area for major tourism activities when the roads to the area are improved following the construction of the dam.

The Fisheries Department is also interested in the introduction of fish to the dam and the development of an inland fisheries industry.

- a) From the various activities, involved in the above project, list **TEN** environmental impacts and their respective mitigation measures. Also determine the mix and expertise required for the study team?
(10 marks)
- b) Discuss ways in which the identification and consideration of project alternatives can be undertaken?
(5 marks)
- c) Review the factors that should be considered when choosing an impact identification method and outline how the choice could be made in a given situation.
(5 marks)