



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

((A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

**UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN
CIVIL ENGINEERING**

ECE 2519: ENVIRONMENTAL ENGINEERING

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Answer question **ONE (COMPULSORY)** any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **TWO** printed pages

Question One (Compulsory - 30 Marks)

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 the reservoirs to the industrial area through a 50km tunnel where it will be stored in a secondary reservoir. The main dam which will have a capacity of 1.05 km^3 and a surface area of 35 km^2 . A small hydro-power scheme (60MW) will also be built 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 in addition to the works for the dam will require the construction of new roads and temporary settlements. The dam location is a relatively sparsely populated area but several villages are located within the area to be flooded, and the inhabitants of these will have to

be moved to other location. Labour to construct the dam will have to be brought to the area as there is insufficient labour locally. The construction of the transfer tunnel and canal will be through one of the country's national parks.

The area is proposed to open up the area for major tourism activities when roads to the area are improved following 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.

Using the case study provided, undertake the following tasks:

- a) From the various activities involved in the project, describe **FIVE** environmental impacts and their respective mitigation measures. **(15 marks)**
- b) Identify the stakeholders-institutions, including local communities NGOs, CBOs that are likely to be involved in scoping of the project. **(10 marks)**
- c) Determine the expertise required for the study team. **(5 marks)**

Question Two (20 marks)

- a) Water pollution is generally judged in terms of the intended use, departure from the norm, effects on public health or ecological impacts. Describe heavy metals and sediments as some of the major forms of water pollution. **(10 marks)**
- b) For each of the following global environmental issues, discuss the underlying causes and the social and economic impacts respectively.
 - i) Desertification and Land Degradation
 - ii) Deforestation and Unsustainable use of forests. **(10 marks)**

Question Three (20 marks)

- a) Natural Hazards and natural disasters can be divided into several different categories. Outline, giving relevant examples of these categories. **(10 marks)**
- b) Hazardous process of all types can have primary, secondary and tertiary effects. Discuss, giving respective examples when these effects occur. **(10 marks)**

Question Four (20 marks)

- a) Outline the sequences that lead to smog formation giving all the products including the secondary pollutants formed. **(10 marks)**
- b) Cost Benefit Analysis is widely used in economic activities. Explain how it should be adopted for environmental management. **(10 marks)**

Question Five (20 marks)

- a) Formulate a definition for Environmental Impact Assessment and explain why mitigation measures are an essential component. **(10 marks)**

- b) Global environmental problems extend beyond national borders. Global warming is one of the problems. Discuss the status of international agreements with respect to Global warming.
(10 marks)