UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

Department of Environmental Health Science

Main Examination 2011

Title of paper: WATER QUALITY MANAGEMENT 1

Course code: EHS 582

Time allowed: 2 HOURS

Marks allocation: 100 Marks

Instructions:

1) Answer **Four (4)** questions
2) Each question is weighted 25 marks
3) Write neatly and clearly
4) Begin each question in a separate sheet of paper

This paper is not to be opened until the invigilator has granted permission

Question 1.

Surface freshwater systems are often subjected to man-made pollution.

    a) Describe the main types of pollution. (15)

    b) How do they affect the cycling of nutrients in freshwater reservoir such as Mntjoli Dam. (10)

Question 2.

"There are a series of microbial activities occurring along the flow direction of groundwater initially containing some organic compounds"

    a) Describe the reactions which take place under these conditions. (15)

    b) Why do they occur in the observed sequence (10)

Question 3.

    a) With an aid of a diagram sketch a Water Resources System and corresponding types of standards and/or regulations that can be applied to manage water quality. (15)

    b) What are the corresponding monitoring points in this system? (10)

Question 4.

A reservoir has been found to be contaminated with *Escherichia coli* bacteria at very high levels (more than 2500 per 100ml).

    i) What are the likely sources for this kind of contamination? (10)

The reservoir is used for "body contact recreation" such as swimming and as a source of water for purification plant system for the nearby city.

ii) What problems would be there for these uses because of the contamination? (5)

iii) How would you attempt to assess the cause and seriousness of the situation? (5)

iv) What are the mitigation measures to be put in place? (5)

Question 5.

It has been suggested that it would be possible to improve the water quality (reducing algal biomass, reducing organic contents, lowering phosphorus and nitrate levels, etc.) of Mntjoli Dam by "ecosystem control" measures such as installing underwater constructions to stimulate growth of communities, harvesting biomass from the dam, etc.

a) Describe these ecosystem control measures. (15)

b) Explain the theoretical basis for these approaches (10)

Question 6.

The so called Vollenweider Model is commonly used for prediction of eutrofication in Lakes and Reservoirs.

a) Discuss the assumptions that are made in developing this model (15)

b) By means of a diagram describe this model (10)