



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
Department of Environmental Health Science

BSc. IN ENVIRONMENTAL MANAGEMENT AND WATER
RESOURCES

MAIN EXAMINATION PAPER 2016

TITLE OF PAPER : WATER QUALITY MANAGEMENT I
COURSE CODE : EHM 317
DURATION : 2 HOURS
MARKS : 100

INSTRUCTIONS :

- : READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
- : ANSWER **ANY FOUR** QUESTIONS
- : EACH QUESTION **CARRIES 25** MARKS.
- : WRITE NEATLY & CLEARLY
- : NO PAPER SHOULD BE BROUGHT INTO OR OUT OF THE EXAMINATION ROOM.
- : BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY
THE INVIGILATOR.

Question 1

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)**

TOTAL 25 MARKS

Question 2

- i) With an aid of adidiagram, describe the transport process of groundwater contamination, illustrating a typical plume pollutants. **(15)**
- ii) Explain three (3) reactions that can occur due to contamination of groundwater and give examples. **(10)**

TOTAL 25 MARKS

Question 3

- A) A reservoir has been 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)**
- B) The reservoir above is used for “body contact recreation” such as swimming and as a source of water for purification plant system for the nearby city.
 - i) What are the problems associated with the above uses as result of contamination? **(5)**
 - ii) How would the cause and seriousness of the situation be assessed? **(5)**
 - iii) What are the mitigation measures that should be put in place? **(5)**

TOTAL 25 MARKS

Question 4

- i) With an aid of a diagram, outline the stratification process that occurs in reservoir and explain how it affects water quality. (15)
- ii) Discuss the Nutrients (Nitrogen and Phosphorus) as limiting factors for algae growth. (10)

TOTAL 25 MARKS

Question 5

Discuss biological Water Quality Monitoring under the following.

- i) Monitoring with macro-invertebrates (15)
- ii) Early-warning bio-monitoring (10)

TOTAL 25 MARKS