



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY  
SCHOOL OF SPATIAL PLANNING  
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN  
WATER RESOURCE AND ENVIRONMENTAL MANAGEMENT  
SEMESTER 2016/2017 ACADEMIC YEAR**

**CENTRE: MAIN CAMPUS**

---

**COURSE CODE: PWE 3212**

**COURSE TITLE: WATER RESOURCE TECHNOLOGY I**

**EXAM VENUE:**

**STREAM: SPATIAL PLANNING**

**DATE:**

**EXAM SESSION:**

**TIME: 2 HOURS**

---

**Instructions:**

- 1. Answer question 1 ( compulsory ) and ANY other 2 questions.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

- Q 1a) Describe **THREE** kinds of investigations usually conducted for reservoir planning **(6 Mks)**
- b) Distinguish between the terms (i) Dead Storage (Bank Storage) and (iii) Safe Yield as used in reservoir engineering **(6 Mks)**
- c) Explain any **THREE** factors that are considered when selecting the type of dam to construct **(6 Mks)**

d) Using energy equation, describe how gross energy head of water in motion contributes to Hydropower Production **(6 Mks)**

e) Distinguish between a reservoir and a dam and state **THREE** components of dam outlet works **(6 Mks)**

Q2a) Broadly describe any **FOUR** classifications of reservoirs **(8 Mks)**

b) A reservoir has the following areas enclosed by contours at various elevations. Determine the capacity of the reservoir elevations of 200 to 300.

Elevation	200	220	240	260	280	300
Area of contours (Km <sup>2</sup> )	150	175	210	270	320	400

By:

(i) Trapezoidal Rule **(6 Mks)**

(ii) Prismoidal Rule **(6 Mks)**

Q3a) In reference to reservoir catchment, explain **FOUR** factors that Influence sedimentation **(8 Mks)**

b) Otwerro village has a drainage basin area of 40,000 m<sup>2</sup>. The basin experiences an estimated suspended sediment discharge of 36,000 kg/year and a bed load discharge of 22,000 kg/yr. (Take *estimated bed load density* = 2500kg/m<sup>3</sup> ; *estimated soil density* = 500kg/m<sup>3</sup>. Calculate:

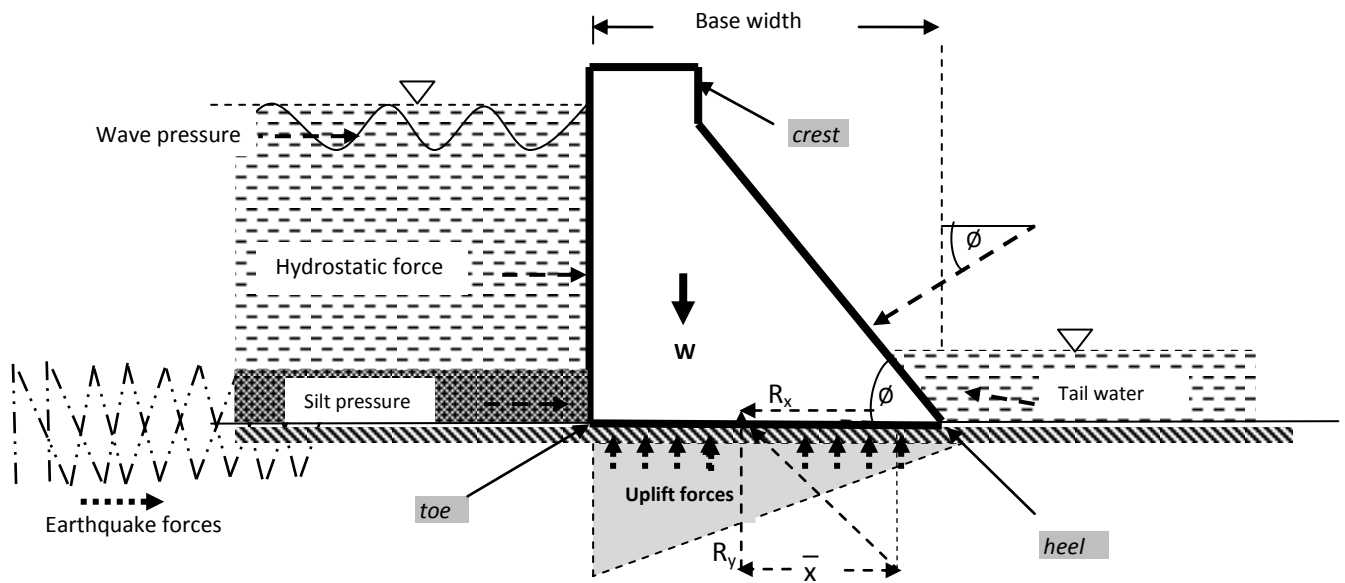
(i) The Erosion rate and Unit Erosion Rate of the reservoir **(4Mks)**

(ii) The the bed-load lowering rate **(4 Mks)**

(iii) The soil lowering rate **(4 Mks)**

Q4a) With the aid of sketch diagrams, describe any **FOUR** types of dams **(8 Mks)**

b) A gravity dam might experience disturbances against the expected stability designed for it as illustrated in the diagram below. Cases of occurrence of such forces might reduce design life of the dam or might cause damage to it.



Required:

- (i) Describe the necessary procedure for dam stability analysis (6 Mks)
- (ii) Describe how you would determine if the dam is safe (6 Mks)

Q5 Answer the following questions in reference to hydropower production:

- (a) Use sketch diagrams to describe the **THREE** types of hydro-power plants (8 Mks)
- (ii) Explain the steps involved in assessment of hydro-power resource/plant (6 Mks)
- (iii) What are the advantages and limitations of hydro-power (6 Mks)