JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF SPATIAL PLANNING

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN HORTICULTURE AND BACHELOR OF SCIENCE IN SOIL SCIENCE

SEMESTER 2018/2019 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: PES 3212

COURSE TITLE: WATER RESOURCES 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.**

QUESTION ONE

a) With the aid of a labeled diagram, distinguish between a reservoir and a dam **(6 Marks)**

b) Describe **Three** kinds of investigations usually conducted for reservoir planning **(6 Marks)**

c) Explain **Three** factors you would consider when selecting type of dam to construct? Define the following terms as apply to reservoir engineering:

i. Safe Yield as used in reservoir engineering **(2 Marks)**
ii. Dead Storage **(2 Marks)**
iii. Bank storage **(2 Marks)**

d) Describe any **Three** types of dams that are typically constructed in Kenya **(6 Marks)**

e) With the aid of a sketch diagram, explain how surface water, rain water and groundwater sources are generated from water cycle **(6 marks)**

QUESTION TWO

a) Broadly describe any FOUR classifications of reservoirs **(8 Marks)**

b) A reservoir has the following areas enclosed by contours at various elevations. Determine the capacity of the reservoir elevations of 300 to 400.

Elevation	300	320	340	360	380	400
Area of contours (Km^2)	180	205	230	320	400	460

By:

(i) Trapezoidal Rule **(12 Marks)**

(ii) Prismoidal Rule

QUESTION THREE

a) With reference to a reservoir and its catchment, explain **four** factors that Influence/ affect sedimentation and **four** methods that can be adopted to control reservoir siltation. **(8 Marks)**

b) Yatta village has a drainage basin area of 40,000 m^2. The basin experiences an estimated suspended sediment discharge of 36,000 kg/year and a bed load discharge of 22,000 kg/year.

The estimated bed load density = 2500kg/m^3
The estimated soil density = 500kg/m^3

Calculate: (i) The Erosion rate and Unit Erosion Rate of the reservoir
(ii)The rate at which the bed-load would be lowered
(iii) The Rate at which the soil will be lowered **(12 Marks)**

QUESTION FOUR

A dam may be constructed to that height which is permissible within the given topography of the location or limited by the expenditure that may be possible for investment. The excess flood water, therefore, has to be removed from the reservoir before it overtops the dam. By giving relevant examples and sketch diagrams where applicable, describe the flowing components of a typical gravity dam:

a) Spillways **(5 Marks)**
b) Diversion works **(5 Marks)**
c) Terminal structures **(5 Marks)**
d) Outlet works **(5 Marks)**

QUESTION FIVE

In reference to typical hydropower production plant:

(i) Explain the mechanism of hyro-power production **(5 Marks)**
(ii) Use sketch diagrams to describe the **THREE** types of hydro-power plants **(5 Marks)**
(iii) Explain the steps involved in assessment of hydro-power resource/plant **(5 Marks)**
(iv) what are the advantages and limitations of hydro-power **(5 Marks)**