JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

UNIVERSITY EXAMINATIONS FOR THE DEGREE IN SCIENCE IN RENEWABLE ENERGY TECHNOLOGY AND MANAGENT

3RD YEAR 1ST SEMESTER 2017/2018 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TET 3312

COURSE TITLE: HYDROPOWER TECHNOLOGY

EXAM VENUE: WS **STREAM: BSc REN ENERGY TECH & MGT**

DATE: 14/12/2017 **EXAM SESSION: 9.00 – 11.00 AM**

DURATION: 2 HOURS

Instructions

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

1(a) Describe Streamflow analysis and show how it plays a significant role in determining the power output of a HEP plant (**5mks**)

(b) As a project manager of upcoming micro HEP plant in Siaya county, explain the significance of Flow duration curves that was analysed during planning and design stage of the project (**6mks**)

(c) Explain the role of a stream in Hydrological cycle in relation to a HEP plant (**5mks**)

(d) According to the World Energy Council, the Dam/ Reservoir are the most efficient energy storage method, briefly outline the merits of reservoir in an HEP plant (**7mks**)

(e) Kenya still relies heavily on Hydropower as it tries to diverse its energy production methods; explain the merits and demerits of a Hydropower generation (**7mks**)

2. (a) Due to global warming, briefly elaborate on how it has affected the economic viability of setting up HEP plant in Kenya (**5mks**)

(b) Briefly describe the main socio-economic benefits of a Sondu Miriu HEP plant to the Nyanza region (**5mks**)

(c) Discuss the main components of a typical HEP plant in Kenya (**10mks**)

3. (a) State the main factors that affect the power output of HEP plant (**4mks**)

(b) In Bondo county the county government intends to set up a micro HEP plant, as a project manager briefly outline the main environmental impact of this project (**8mks**)

(c) Discuss in detail the various types of HEP plant based on size, power output and location, in Kenya (**8mks**)

4. (a) As a project manager in charge of planning, design and construction of HEP plant in Siaya county, outline the kind of tools you will apply during feasibility stage (**5mks**)

(b) During data collection stage describe type of information you are likely to focus for better design and implementation of the project (**10mks**)

(c) What kind of stakeholders will you incorporate/ consider for better decision making during planning, design and implementation stage (**5mks**)

5. (a) As a Renewable Energy expert what are the main economic tools you require to evaluate the economic viability of a micro HEP plant (**6mks**)

(b) A small dam in the nearby town estimated to be 3m (**10ft)** high was constructed along a river with water flowing at 500 cubic feet per second. Calculate the amount of power the dam will generate. (The turbine and generator has a conversion efficiency of 80%) (**7mks**)

(c)The average annual residential energy use in that town is about 2000 kilowatt-hour for each person. Calculate how much electric energy is produced per annum and how many people the dam could serve (**7mks**)