



**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**

**3<sup>RD</sup> YEAR 1<sup>ST</sup> SEMESTER 2018/2019 ACADEMIC YEAR**

**CENTRE: MAIN CAMPUS**

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**COURSE CODE: TET 3312**

**COURSE TITLE: HYDROPOWER TECHNOLOGY I**

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

**DATE: ../12/2018 EXAM SESSION:**

**DURATION: 2 HOURS**

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### **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**

#### QUESTION ONE

- a) Describe Streamflow analysis and how it plays a significant role in determining the power output of a HEP plant (5mks)
- b) As a project manager of an upcoming micro HEP plant in Bondo County, elaborate the significance of Flow duration curves that was analysed during planning and design stage of the project (6mks)
- c) Explain in general 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 diversify its energy production methods, explain the merits and demerits of a Hydropower generation (7mks)

#### QUESTION TWO

- 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 in detail the main components of a typical HEP plant in Kenya (10mks)

#### QUESTION THREE

- a) State the main factors that affect the power output of HEP plant (4mks)
- b) Some of the county government intends to set up a micro HEP plant, as part of stakeholder briefly outline the main environmental impact of this project (8mks)
- c) According to the Ministry of Energy act (2006), discuss in detail the various types of HEP plant based on size, power output and location, in Kenya (8mks)

#### QUESTION FOUR

- a) As an assigned project manager in charge of planning, design and construction of HEP plant, outline what 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 sustainable design and construction of the project (10mks)
- c) What kind of stakeholders will you incorporate/ consider for better decision making during planning, design and implementation stage (5mks)

#### QUESTION FIVE

- a) As a Renewable Energy expert what are the main economic tools you would consider to evaluate the economic viability of a micro HEP plant (6mks)
- b) A small dam in the nearby town estimated to be 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)