JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

UNIVERSITY EXAMINATIONS FOR THE DIPLOMA IN CIVIL ENGINEERING (TVET)

1ST YEAR 2ND SEMESTER 2023/2024 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TDE 2128

COURSE TITLE: WATER RESOURCES, WATER SERVICES AND SANITATION MANAGEMENT PRINCIPLES

EXAM VENUE: **STREAM: Dip CIVIL ENGINEERING**

DATE: ../04/2024 **EXAM SESSION:**

DURATION: 2 HOURS

Instructions

1. **Answer ALL questions in Section A (Compulsory) and ANY other three questions in Section B**
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**

SECTION A (30 Marks)

1. a) Describe the major components of the hydrologic cycle. (12 Marks)
   b) List any four causes of errors of rainfall data. (4 Marks)
   c) Precipitation can be divided into two categories which is liquid and solid. List two types from each category. (4 Marks)
   d) Differentiate between convective precipitation and orographic precipitation. (4 Marks)
   e) Explain the measures taken for personal safety in hydrometry (6 Marks)

SECTION B (40 Marks)

2. a) i) List any four Geologic time scale (4 Marks)
      ii) List and explain the internal structure of the earth (6 Marks)
   b) Discuss aquifer types and their characteristics. (8 Marks)
   c) Define isostasy (2 Marks)
3. a) i) State and explain Civil laws (6 Marks)
      ii) Explain the roles of water sector regulators and institutions. (8 Marks)
   b) Explain causes of land degradation. (4 Marks)
   c) List two physical properties of minerals. (2 Marks)
4. a) i) Discuss three classification of wells (6 Marks)
      ii) Explain factors affecting well siting. (6 Marks)
   b) Write short notes on:
      i. Types of water harvesting reservoirs (4 Marks)
      ii. Discuss factors affecting site selection for water harvesting structures (4 Marks)

5. a)

Distance from bank(m)	Depth(m)	Time(s)	Revolution(Rev)
1.7	0.23	60	25
3.2	0.36	60	39
5.4	0.67	62	53
6.1	1.50	61	67
6.9	3.70	65	87
7.8	2.49	65	92
9.1	0.90	63	140

The table above shows a discharge computation sheet. Using the data provided calculate to the nearest two decimal place: (15 Marks)

i. The discharge of the river
ii. The average velocity given V=0.44N+0.07

b) The normal annual rainfall at stations A, B, C and D in a basin are 80.97, 67.59, 76.28 and 92.01cm respectively. In the year 1980, the station D was inoperative and the stations A, B and C recorded annual rainfall of 91.11, 72.23 and 79.89cm respectively. Estimate the rainfall at station D in that year. (5 Marks)