NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES
SCHOOL OF AGRICULTURE AND NATURAL RESOURCES SCIENCES
DEPARTMENT OF AGRICULTURAL SCIENCE AND AGRIBUSINESS

QUALIFICATIONS: BACHELOR OF SCIENCE IN AGRICULTURE	
QUALIFICATIONS CODE: 07BAGA	**LEVEL: 7**
COURSE CODE: WRM721S	**COURSE NAME:** WATER RESOURCES MANAGEMENT
DATE: NOVEMBER 2024	**PAPER:** 1
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER:	DR. GABRIEL NGUNGAA HANGARA
MODERATOR:	DR. VALENTINE Y. KATTE

INSTRUCTIONS
1. Answer all the questions. 2. Write neatly and clearly. 3. Mark all answers clearly with their respective question numbers. 4. All written work MUST be done in blue or black ink. 5. No books, notes and other additional aids are allowed.

PERMISSIBLE MATERIALS

1. Calculator
2. Examination paper
3. Examination script

THIS QUESTION PAPER CONSISTS OF 2 PAGES
(Excluding This Front Page)

QUESTION 1

Illustrate and explain the hydrologic cycle. [20]

QUESTION 2

Differentiate and explain the two major types of health effects resulting from contaminated water. [10]

QUESTION 3

3.1 How do you understand rainwater harvesting? (4)

3.2 What are the benefits of rainwater harvesting? (4)

QUESTION 4

What are the 3 goals of water conservation and define each. (6)

QUESTION 5

Calculate the SAR, KR, Na%, MAR, TH, SSP and PS by using the water parameter in the table below.

Use the following conversion factor to mg/l as follows (Ca: 0.0499; Mg: 0.0823; Na: 0.0435; K:0.0256; HCO_3:0.0164; CO_3: 0.033; Cl:0.0282; SO_4:0.0208; NO_3:0.0161; NH_4: 0.0554) (21)

Water parameters	Unit	Value
pH		7.1
Conductivity	mS/m	230.0
TDS (determined)	mg/l	1292
Turbidity	NTU	1.2
Colour	Pt	10.0
Sulphate as SO_4^{2-}	mg/l	93
Chloride as Cl	mg/l	382
Fluoride as F	mg/l	3.7
Nitrate as N	mg/l	17
Nitrite as N	mg/l	0.1
Silica as SiO_2	mg/l	54
P-Alkalinity as $CaCO_3$	mg/l	0
T-Alkalinity as $CaCO_3$	mg/l	451
T-Hardness as $CaCO_3$, cal.	mg/l	501
Calcium as Ca	mg/l	118
Magnesium as Mg	mg/l	50
Sodium as Na	mg/l	295
Potassium as K	mg/l	7.4
Iron as Fe	mg/l	0.07
Manganese as Mn	mg/l	0.01

QUESTION 6
What types of information are included in the water legislation? (10)

QUESTION 7
Give 8 methods of Water Conservation. (8)

QUESTION 8
What are the four main sources of water common in rural community? (4)

QUESTION 9
What are the four general areas of water use to consider on the farmland? (4)

QUESTION 10
What are the 3 biological contaminants that occur in water and give 2 examples of diseases resulting from each. (9

END OF QUESTION PAPER