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: JANUARY 2025	**PAPER:** 2
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY/SUPPLEMENTARY 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

Explain the four major types of water pollution with examples of each with a help of a diagram. (10)

QUESTION 2

What are the determinants of water quality? (3)

QUESTION 3

Name 10 water quality indices used to calculate irrigation water quality. (10)

QUESTION 4

Assume as the size of the roof-top is 15m by 80m, the total amount of rainfall in the area is 300mm per annum and the runoff coefficient is 0.9. Calculate how many litres of water will be harvested per year. (5)

QUESTION 5

What are the main economical tools of IWRM and why are they necessary? (6)

QUESTION 6

Explain how the human impacts the hydrologic cycle. (10)

QUESTION 7

What are the elements that need to be covered in river basin management plan? (7)

QUESTION 8

What are the three planning steps you should perform when auditing your farm water requirements? (3)

QUESTION 9

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

QUESTION 10

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

QUESTION 11

Calculate the livestock drinking water quality index by using water value, assigned weight and livestock standard for drink water as indicated in the table below. Please interpret the answer. (30)

		Water	Assigned	Livestock
Parameter	Unit	Value	Weight	Standard
p H		9.2	2.7	10
Conductivity	mS/m	262.9	2.9	1000
TDS (determined)	mg/l	1697	4.6	1000
Turbidity	NTU	0.95	2.9	30
Sulphate as SO_4	mg/l	152	3.3	125
Chloride as Cl	mg/l	170	4.5	15000
Fluoride as F	mg/l	3.3	2	2
Nitrate as N	mg/l	30	2.57	11
Nitrite as N	mg/l	0.1	2	10
T-Alkalinity as $CaCO_3$	mg/l	880	2.5	500
T-Hardness as $CaCO_3$, cal.	mg/l	5	2	100
Calcium as Ca	mg/l	658	2	1000
Magnesium as Mg	mg/l	6.7	2	2
Sodium as Na	mg/l	0.6	2.5	400
Potassium as K	mg/l	1	2	20
Iron as Fe	mg/l	0.01	1	0.3
Manganese as Mn	mg/l	0.05	2	2

QUESTION 12

Answer the following statement whether they are true or false.

12.1 The governmental role is to create a framework in which management, determination of the politics, planning, waters distribution, monitoring, law application, and solving of conflicts should occur. (2)

12.2 The governments have to create conditions so that all acting persons who are interested in the problems of water resources use and their conservation are allowed to participate in the process of their solving and to make contracts for achievement of suitable solutions for all. (2)

12.3 In the present conditions of free market economy, the local communities must play the reduced role of deliverance of services and to concentrate more efforts on its role of regulator and control on the deliverance of the specialized services. (2)

12.4 Government and their members are frequently involved in water resource management and conservation activities. (2)

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END OF QUESTION PAPER