UNIVERSITY OF FORT HARE

INTRODUCTION TO SCIENTIFIC CONCEPTS

AGF 112/112F

DEGREE EXAMINATIONS

JUNE 2023

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Time: 3 HOURS

Subject: Introduction to Scientific Concepts

Marks: 100

This paper consists of 3 pages including cover page

Internal Examiner

MR TS MTHOKO

INSTRUCTIONS

ANSWER ALL QUESTIONS

QUESTION 1 **[30]**

1. Define the following concepts: [16]

   i) Measurement
   ii) Density
   iii) Relative Humidity
   iv) Porosity
   v) Pressure
   vi) Relative Density
   vii) Irrigation
   viii) Bulk volume

2. State the two goals that science seeks to achieve. [02]
3. What is the purpose of doing water estimation? [01]
4. List in chronological order the steps involved in agricultural water use planning. [03]
5. Provide four available water source with their example. [08]

QUESTION 2 **[20]**

1. Find the identity of the following unknown substances and indicate whether they will sink or float in water: [10]

Unknown Substances			**Known substances Reference**	
mass	**volume**		**Substances**	**RD**
1800kg	**2.5m^3**		**alcohol**	**0.82**
2460kg	**3m^3**		**copper**	**8.79**
2197.5kg	**0.25m^3**		**nylon**	**1.12**
3024kg	**2.7m^3**		**paraffin**	**0.80**
6528kg	**6.8m^3**		**petrol**	**0.72**
			Rubber	**0.96**

2. The UFH-Rural schools cricket project intends to build a concrete slab in one of the beneficiary primary schools. A cricket concrete slab has to be 22m long and 2.5m wide and 0.45m thick. The mixing ratio for sand, stone, and cement is 4:2:3 and 10% water. You are therefore required to determine the volumes of the different materials for the project before purchasing for budgeting purposes. [10]

QUESTION 3 **[30]**

1. A dam near Dimbaza has a wall length of 360m and a length of 110m. What is the capacity of the dam if the depth is 70m? [03]
2. Would the dam in 1.0 be able to support the population of Dimbaza if Tap stands are erected, if the population is 980? [07]
3. If it would, what would be the irrigable area that it can accommodate with the available water, if the water is only used for Domestic use only, if the GIR_a = 640 mm/yr? [05]
4. An undisclosed company intends to build a dam on the buffalo river with a capacity of 450680 m^3/yr, the area has a mean annual rainfall of 35mm/yr. You are therefore requested to assist the company in selecting the suitable site by determining the required catchment Area for the project to be successful. [15]

QUESTION 4 **[20]**

1. Convert the following figures: [05]
   i) 250mm to m
   ii) 4.9ha to m^2
   iii) 4.8m^3 to litres
   iv) 75500m^2 to ha
   v) 0.0532kg to grams
2. As an extension officer you are required to assist an emerging farmer to do his budgeting for the upcoming summer season herbicide spraying of his 2ha farm. The farmer is going to apply a herbicide known as Basagran with a mixing ratio of one litre Basagran (1L) in every ten litres (10L) of water using a boom sprayer. The Boom sprayer has a 200L tank and a boom width of 6m.

   Determine the amount and cost of Basagran to spray the whole field, if one full tank of the boom sprayer covers a distance of 75m and One litre of Basagran costs R35.00. [15]

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MAY GOD ALMIGHTY BLESS YOU