



UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION PAPER
2013

PROGRAMME: B.SC. AGRICULTURAL AND BIOSYSTEMS ENGINEERING

COURSE CODE: ABE 303

TITLE OF PAPER: FLUID MECHANICS AND HYDRAULICS

ALLOWED TIME: TWO (2) HOURS

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER QUESTIONS

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THE CHIEF INVIGILATOR**

FLUID HYDRALICS SUPLEMENTARY

QUESTION 1

COMPULSORY

(a) Describe the following water measuring structures with diagrams and the Formulas used to calculate the flow throw them.

- (i) Sluice gate [10 marks]
- (ii) Sharp crested weir [10 marks]
- (iii) Trapezoidal weir [10 marks]

(b) A pump discharges 100 litres per second and the crops Need 80 litres per second to sustain their needs, calculate The pump efficiency. [10 marks]

QUESTION 2.:

Briefly describe the use of pump performance curves (characteristics), outlining clearly how they are used to select a pump. (Give a sketch of the pump curves for a single impeller pump) [30 marks]

QUESTION 3.:

- (a) State two characteristics of flow in open channels [5 marks]
- (b) What does the term fluid mean in fluid mechanics?
Give two types of fluids. [15 marks]
- (c) Describe Bernoulli's Equation as used in fluid hydraulics
And give it expression. [10 marks]

QUESTION 4:

(a) Describe The difference between the following types of Fluid flow:-

- (i) Steady and unsteady flow [5 marks]
- (ii) Uniform and non-uniform flow [5 marks]
- (iii) Laminar and turbulent flow [5 marks]

(b) A pipe with 50mm with water flowing at velocity of 2 m/s Branches to 60mm and 40mm. The 40mm pipe take 30% of The flow.

- (i) Calculate the flow rate in each pipe. [10 marks]
- (ii) Calculate the velocity in the 40mm and 60mm pipes. [5 marks]