TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of Mechanical & Automotive Engineering
UNIVERSITY EXAMINATION FOR:
Diploma in Mechanical Engineering (Plant Option, Y3S2)
EPL 2305 : Plant Technology & Practice IV (Paper 2)
SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: SEPTEMBER 2018
TIME: 2 HOURS
DATE: Sep 2018

Instruction to Candidates:

You should have the following for this examination

- *Examination Pass & Student ID Card*
- *Answer booklet*
- *Non-Programmable scientific calculator*

This paper consists of **FIVE** questions. Attempt any **THREE** questions.
Maximum marks for each part of a question are as shown.
Do not write on the question paper.

Question ONE

a) State TWO causes for each of the following type of water hardness: (5 marks)

(i) Temporary hardness
(ii) Permanent hardness

b) **(8 marks)**

i. Describe the process of water treatment of feed water using sodium zeolite.
ii. State the advantage of the process mentioned in (b) (i) above against the use of hot lime process.

c) Explain the effect of air in a steam distribution circuit. **(4 marks)**

d) State THREE tests to be carried out on boiler feed water during operation. **(3 marks)**

Question TWO

a) Explain the working principle of a differential flow meter used to measure quantity of water flowing through a pipe. **(4 marks)**

b) **(6 marks)**

i. List THREE main classes of pipes used in water distribution systems

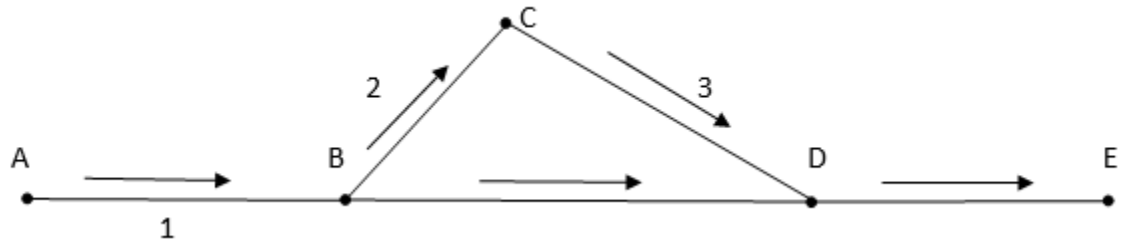
ii. State the considerations to be made in the selection of pipes used in water distribution.

c) Determine the length of a single pipe that has a diameter of 20 cm for a flow rate of 3.63×10^3 litres. **(10 marks)**

Apply Hazen William equation

Assume C_{HW} = 120 for all pipes

	Pipe 1	Pipe 2	Pipe 3	Pipe 4	Pipe 4
Length (cm)	1270	1270	2032	2540	1778
Diameter	30.48	15.20	20.32	25.40	30.48



Question THREE

a) Draw a steam main indicating the following: **(6 marks)**

i. Steam trapping

ii. Expansion valve

iii. Separator

iv. Steam lifting

b) **(6 marks)**

i. Explain with the aid of a sketch how water hammer arises in a steam main.

ii. State TWO effects of water hammer.

c) **(8 marks)**

i. Explain the operation of a reaction turbine.

ii. State TWO problems associated with wet steam in reaction turbines.

Question FOUR

a) **(6 marks)**

i. Define the term lubrication.

ii. Explain FOUR properties of a good lubricant.

b) Explain the principle of boundary layer lubrication. **(4 marks)**

c) Describe with aid of a sketch the principle of lubrication used in steel rolling mills bearing journals. **(10 marks)**

Question FIVE

a) **(10 marks)**

i. Explain the term "Plant Life".

ii. State the importance company policy on maintenance of equipment and facility in a company.

b) Explain the principles of planned maintenance. **(6 marks)**

c) Differentiate between breakdown and emergency maintenance. **(4 marks)**