TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN APPLIED CHEMISTRY &

BACHELOR OF TECHNOLOGY IN INDUSTRIAL CHEMISTRY

ACH 4303: UNIT OPERATIONS: Type unit name.

PAPER 1

SERIES:APRIL2016

TIME:2HOURS

DATE:5 May2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of Choose No questions. AttemptChoose instruction.

Do not write on the question paper.

Question ONE

Using illustration(s) explain the difference between laminar and turbulent flow

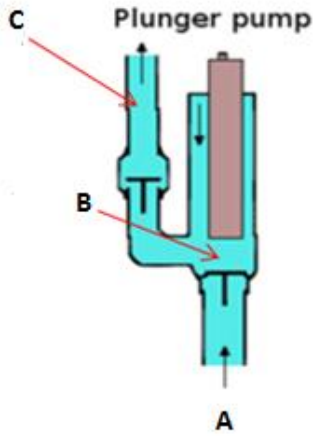
(6 Marks)

(a) With Illustrations explain how Orifice Plate works in relation to fluid flow

(6 Marks)

(b) Define Plunger Pumps, stating their applications, then label the parts A, B, and C in the drawing below

(5 Marks)



(c) Differentiate between Blinding and Blocking in relation to screening terminologies **(2 Marks)**

(d) A laboratory exercise revealed that it required 20kj/kg to reduce particles from a mean diameter of 2.5 cm to 0.4 cm. Using the Rittinger's law calculate the energy required to reduce the same particles from a diameter of 0.4 cm to 0.02 cm. (4 Marks)

(f) Name the FOUR important zones and their applications in a Sedimentation Tank **(4 Marks)**

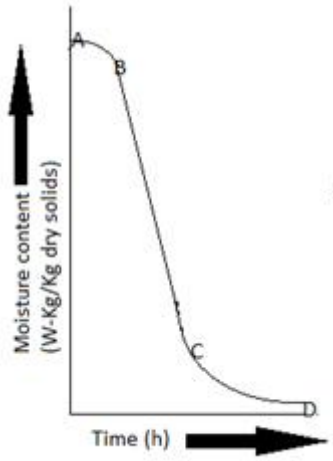
(g) Explain how Powdered Anti Foaming Agents work **(3 Marks)**

Question TWO

Using Illustration(s) discuss the **THREE** important steps involved in the process of crystallization **(20 Marks)**

Question THREE

Below is a Diagram showing the drying rate curve of a chemical product, name and discuss the stages involved **(20 Marks)**



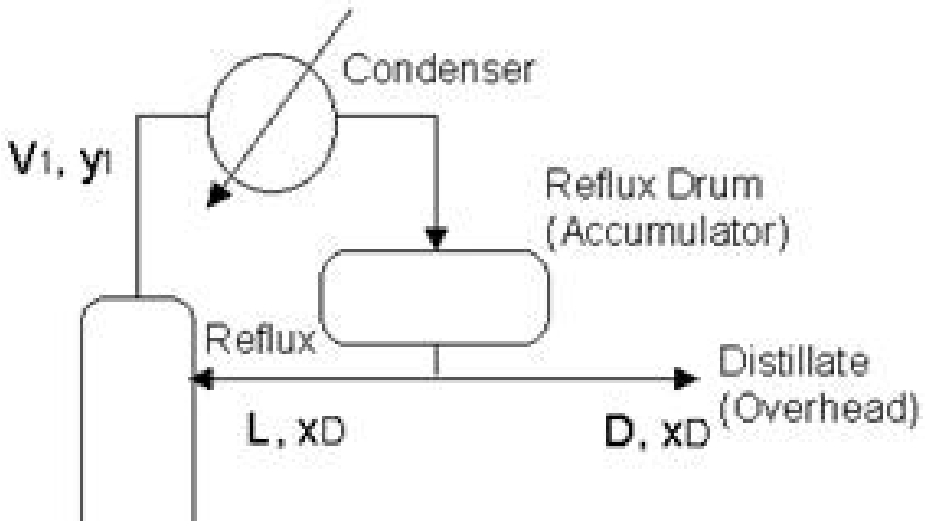
Question FOUR

Discuss Filter Aids as used in filtration including their modes of application **(20 Marks)**

Question FIVE

(a) With an aid of a labeled diagram explain how countercurrent flow in a heat exchange takes place **(4 Marks)**

(b) Below is part of the rectifying section of a distillation column. Derive the operating line of the rectifying section including interpretation of this line, by taking a material balance around the condenser and accumulator **(6 Marks)**



(c) Using the McCabe-Thiele graphical approach, draw a graph showing the Vapour Liquid Equilibrium (VLE) plot to determine the theoretical number of trays (stages) required to effect the separation of a binary mixture. The graph should show clearly the flowing:

(i) The components of X-axis and Y- axis
(ii) The operating lines of both the rectifying and stripping sections
(iii) The Bottom, Feed and Distillate Compositions
(iv) The q-line and the feed tray (plate)
(v) The Vapour –liquid equilibrium line and the x = y line

(10 Marks)