NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF INDUSTRIAL TECHNOLOGY
BACHELOR OF ENGINEERING (HONS) DEGREE
DEPARTMENT OF CIVIL AND WATER ENGINEERING
PART III SUPPLEMANTARY EXAMINATIONS- AUGUST 2014

HYDRAULIC DESIGN I -TCW3203

Instructions:
Answer <u>ALL</u> questions   Total marks: 100

All questions carry equal marks   Time: 3 hours

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QUESTION 1

   a. Describe how a pump is selected for use in a water supply project.   (5 marks)
   b. A pump is required to deliver a discharge of 70l/sec of water between two reservoirs 1km
       apart with an elevation difference of 20m. Steel pipes 200mm in diameter were used for
       the project. Determine the total pumping head and the systems characteristics curve that
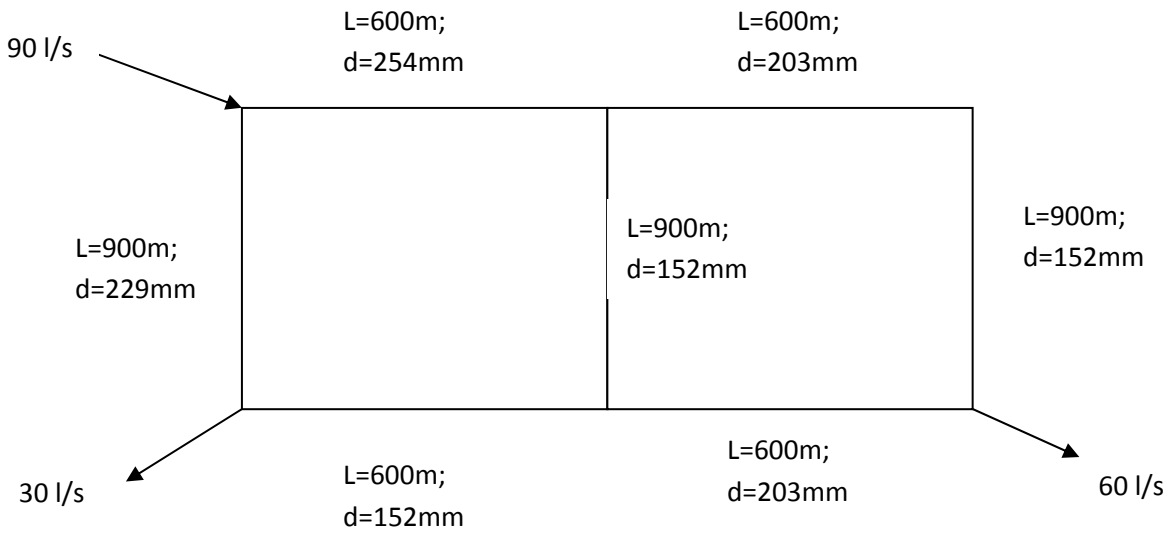   would aid in pump selection.   (20 marks)

[25 marks]

QUESTION 2

   a. Discuss the factors to be considered when designing a water distribution system.
       (5marks)

   b. Jotsholo village had a population of 10000 in 2011 and 15000 in 2021. A water supply
       scheme with design life of 20years was constructed in 2021. This scheme consisted of a
       clear water reservoir located at elevation 1200m connected by 80km PVC gravity main to
       a distribution reservoir in the village at an elevation of 1000m. If the per capita
       consumption rate is 38 l/day estimate the diameter of the gravity main to ensure adequate
       transmission capacity up to the end of the design life.   (20 marks)

[25 marks]

QUESTION 3
Use the Hardy- Cross method to determine the flow in the various pipes of the network below.
Assume $C_H= 100$. Use 'r= $2.44 \times 10^6 (L \backslash d^{4.87})$ for the Hazen-William formula.

90 l/s

L=600m; d=254mm

L=600m; d=203mm

L=900m; d=229mm

L=900m; d=152mm

L=900m; d=152mm

30 l/s

L=600m; d=152mm

L=600m; d=203mm

60 l/s

[25 marks]

QUESTION 4

a. Explain the different methods of population projection. (10 marks)

b. Discuss the factors influencing water demand in a public water supply system. (10 marks)

c. Describe 5 types of water demand in the design of a public water supply system. (5 marks)

[25 Marks]