Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name : Water and Wastewater Engineering

Subject Code : 4TE06WWE1 Branch: B.Tech(Civil)

Semester : 6 Date : 21/04/2017 Time : 02:30 To 05:30 Marks : 70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 Attempt the following questions: (14)

a) Define sewer. 1

b) The per capita demand for an average Indian city is _____. 1

c) Full form of UPVC is _____. 1

d) The method in which the rate of change of population with time is considered constant is _____. 1

e) The image shown below is of _____. 1

f) The maximum permissible limit of total solids in domestic quality water is ____. 1

g) For plain sedimentation tank S.O.R is in the range _____. 1

h) What is aluminium sulphate called _____. 1

i) Rapid sand filter is also known as _____. 1

j) The sewer pipes of sizes less than 0.4m are designed for _____ condition at maximum discharge. 1

k) Minimum velocity of flow is provided in sewers to avoid _____. 1

l) The spacing between manholes depend on _____. 1

m) The detention time for primary settling tanks is _____. 1

n) Desired pH range for the efficient digestion of sludge is _____. 1

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions **(14)**

a) Design a septic tank for a hostel housing 125 persons. Also design the soil absorption system for the disposal of the septic tank effluent, assuming the percolation rate as 20min/cm. 6

b) Define the following: 4
1. Detention period
2. BOD
3. Surface loading
4. Flocculation

c) A city has following recorded population. Estimate (a) saturation population and (b) expected population in 2031. 4

Year	Population
1971	30,000
1991	1,70,000
2011	3,00,000

Q-3 Attempt all questions **(14)**

a) A town having a population of 60000 is supplied with a per capita water supply of 180 litres per day. A separate sewer from this town enters a pumping station through a low level sewer at R.L. of 120.0m. Assuming that 80% of water reaches the sewer, determine (a) size of sump well, (b) B.H.P of the pump motor required and (c) size of the rising main, if the length is 120m. Assume suitable data wherever required. 8

b) Differentiate between plain sedimentation and sedimentation with coagulants. Explain different types of settling. 6

Q-4 Attempt all questions **(14)**

a) Explain sludge digestion and its stages in digestion process. Also explain factors affecting sludge digestion. 7

b) Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60cm diameter with sand particles of 1mm diameter and specific gravity 2.66. Assume β=0.06 and f = 0.02. Assume the sewer to be half full. Take manning's constant (n) = 0.012. 7

Q-5 Attempt all questions **(14)**

a) What are the objectives of aeration in water treatment? Enlist different types of Aerators and describe any one in detail with neat sketch. 7

b) Design a primary settling tank of rectangular shape for a town having a population of 50,000 with a water supply of 180 litre per capita per day. 7

Q-6 Attempt all questions **(14)**

a) Write short note on (i) Sludge drying bed and (ii) Grit chamber. 6

b) Draw a typical layout of waste-water treatment plant. Explain the function of each unit. 8

Q-7 Attempt all questions **(14)**

a) Define and explain unit operations in detail. 8

b) A grit chamber with a proportional flow weir at its outlet to be designed to handle a sewage flow from population of 50,000 and a per capita daily consumption of water of 135 litres. Design the grit chamber. 6

Q-8 Attempt all questions **(14)**

a) Differentiate between conservancy and water carriage system. 7

b) List out the various forms of chlorination and explain break point chlorination with sketch. 7