Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name : Water And Wastewater Engineering

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

Semester : 6 **Date: 29/04/2019** **Time: 10:30 To 01:30** **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) Which of these is an example of wastewater recycling: (01)
a. Discharge of treated sewage to agricultural fields
b. Discharge of untreated sewage to a river
c. Discharge of treated sewage to a river
d. None of the abov

b) Which of the following statements is true about pollutants and contaminants? (01)
a. Both pollutant and contaminant always have harmful effects on the surroundings.
b. A pollutant always has harmful effects on the surroundings while a contaminant may or may not have the same.
c. A pollutant may be a component of the system while a contaminant is usually introduced from the outside.
d. Both b and c

c) Which one of the following method gives the better estimate of population growth of an area with limited resources for future expansion: (01)
a. Geometric increase method
b. Arithmetic increase method
c. Incremental increase method
d. Logistic growth method

d) There are two wastewater samples of same composition namely A and B. Sample A has a temperature of 20^0C and sample B has a temperature of 30^0C. Which sample can be assumed to have more Dissolved Oxygen? (01)
a. Sample A
b. Sample B
c. Both have the same amount of DO
d. Data insufficient

e) For a river receiving wastewater stream, the DO levels drops to minimum in: (01)
a. Clean zone
b. Decomposition zone
c. Septic zone
d. Recovery zone

f) The ratio of the design discharge to the surface area of a sedimentation tank is known as its: (01)
a. Surface loading
b. Overflow velocity
c. Overflow rate
d. All of these

g) Which of the following types of settling phenomenon can be analysed by the classic sedimentation laws of Newton and Stokes? (01)
a. Discrete settling
b. Flocculent settling
c. Hindered settling
d. Compression settling

h) Provision of an equalization tank helps in: (01)
a. Balancing fluctuating flows
b. Balancing fluctuating concentrations
c. promoting self-neutralization
d. All of the above

i) Which one of the following bioreactor configurations is the basis for a Trickling Filter? (a) Stirred tank suspended growth (01)
(b) Packed bed attached growth
(c) Fluidized bed attached growth
(d) Fluidized bed suspended growth

j) Which of the following determines the settling characteristics of sludge? (01)
(a) Solid Retention Time (SRT)
(b) Food to microorganism (F/M) ratio
(c) Sludge Volume Index (SVI)
(d) Organic Loading Rate (OLR)

k) Performance of Activated Sludge Process depends on (01)
(a) BOD loading
(b) F/M ratio
(c) Aeration period
(d) All of these

l) In a Rotating Biological Contractor: (01)
(a) Water is passed through the packed bed media
(b) Packed bed media is passed through the water
(c) Both water and media rotate in countercurrent directions
(d) None of the above

m) ASP and RCB are typical examples of: (01)
(a) Aerobic treatment of wastewater
(b) Anaerobic treatment of wastewater
(c) Both, a and b
(d) Neither a nor b

n) The most important type of species involved in the degradation of organic matter in the case of Biological Treatment Processes is (01)
(a) Photoautotrophs
(b) Chemoheterotrophs
(c) Photo-heterotrophs
(d) Chemo-autotrophs

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

Q-2 Attempt all questions (14)

(a) Describe design period of water supply project along with factors affecting it. What should be the design period of distribution system as recommended by GOI? (07)

(b) The following data have been noted from the census department of a city of moderate size and age. Estimate the probable population for the year 2010, 2025 and 2040 (07)

Year	Population
1961	6848
1971	13308
1981	36747
1991	58242
2001	82149

Q-3 Attempt all questions (14)

(a) Enlist the methods of Population forecasting. (03)

(b) Explain Logistic Growth Method (04)

(c) Describe various types of water carriage system in brief with advantages and disadvantages. (07)

Q-4 Attempt all questions (14)

(a) What is Discrete particle? Find the settling velocity of discrete particle in water, having particle diameter d=4 x 10^{-3} cm and specific gravity 2.65. Assume Reynold's number less than 0.5. Water temperature 20^0C. and kinematic viscosity of water at 20^0C is 1.01×10^{-2} cm^2/s (07)

(b) Enlist types of Pipe Network. Describe any two in detail. (07)

Q-5 Attempt all questions (14)

(a) Explain design criteria of the Grit Chamber. (07)

(b) Design the coagulation cum sedimentation tank for the water work supplying water to a town having population of 1.20 lac and demand of 135 litre/capita/day. The maximum demand may be taken as 1.5 times the average demand. Assume detention period of 5 hours and 30 minutes for settling tank and floc chamber respectively. Assume the flow rate as 950 lit/hour/m^2/s of plan area. (07)

Q-6 Attempt all questions (14)

(a) Explain in "Water Carriage System of Sanitation" in detail.

(b) Differentiate self-cleaning velocity and limiting velocity in sewers. Design a circular sewer, running half full, to carry waste water at a velocity of 1.5 m/s with a slope of 1 in 500. Take manning's n as 0.012.

Q-7 Attempt all questions (14)

(a) Explain sludge digestion and its stages. Also describe factors affecting sludge digestion. (07)

(b) Discuss the low cost sanitation system and design a septic tank with soak pit for 200 users. Take loading of 150 litre/capita/day for septic tank and percolation rate of 1250 lit/m^3/day for soak pit. Assume suitable data if required. (07)

Q-8 Attempt all questions (14)

(a) Differentiate between (07)

1. Activated sludge and Trickling filter
2. Attached growth process and Suspended growth process

(b) How unit operations differ with unit process? Design a rectangular grit chamber for 6 MLD of sewage. (07)