

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), April-May 2016

B. Tech in Civil Engineering, Semester IV

Roll No.....

CE407: ENVIRONMENTAL ENGINEERING I

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark) 10

- i. BOD criteria for Drinking Water Source without conventional treatment but after disinfection is :
 - (a) Biochemical Oxygen Demand 5 days 20°C , 20 mg/l or less
 - (b) Biochemical Oxygen Demand 5 days 20°C , 30 mg/l or less
 - (c) Biochemical Oxygen Demand 5 days 20°C , 2 mg/l or less
 - (d) Biochemical Oxygen Demand 5 days 20°C , 10 mg/l or less
- ii. Distribution mains (Generally for population over 50,000) of any water supply, is normally designed for its average daily requirement:
 - (a) 100%
 - (b) 150%
 - (c) 200%
 - (d) 225%
- iii. The organic loading ($\text{kg BOD}/\text{m}^3\cdot\text{d}$) in high rate trickling filter is :
 - (a) 0.08-0.32
 - (b) 0.32-1.0
 - (c) 1.8-3.0
 - (d) 0.9-2.5
- iv. The fire demand of a city may be worked out by:
 - (a) Kuichling's formula
 - (b) Darcy Formula
 - (c) Chazy equation
 - (d) Weisbach equation
 - (e) All the above
- v. Assertion (A): Direct application of equation of terminal velocities is seldom possible in water treatment.
Reason (R): Size of particles and a correction factor to account for departure from sphericity must be known.
 - (a) Both A and R true and R is the correct explanation of A.
 - (b) Both A and R true but R is NOT the correct explanation of A.
 - (c) A is true but R is false.
 - (d) A is false but R is true.
 - (e) Both A and R are false



- vi The National Green Tribunal (NGT) has been established in:
 - (a) 2009
 - (b) 2000
 - (c) 2010
 - (d) 2013
- vii Van der waals force acting between the colloidal particles is :
 - (a) force of repulsion
 - (b) force of attraction
 - (c) sometimes repulsive & sometimes attractive
 - (d) gravitational force
- viii Design period for "Storage by Dams":
 - (a) 50 years
 - (b) 15 years
 - (c) 30 years
 - (d) 100 years
- ix Water distribution system suitable for cities with rectangular type layout :
 - (a) Tree system
 - (b) Ring system
 - (c) Radial system
 - (d) Grid iron system
- x Unit of odor measurement in drinking water is:
 - (a) TPU
 - (b) TCU
 - (c) JIU
 - (d) TON

Q.2 Short answer type questions (4 questions @ 2.5 marks)

10

i. Explain the following term w.r.t. Desalination :

- a. Reverse osmosis (RO)
- b. Electro-dialysis

Write Brief note on the following :

- i. Turbidity of Water
- ii. Design Period

Q.3A Define water demand. How will you categorize the water requirements for different usage? 05

Q.3B Write the various steps in designing a water distribution system. 05

Q.4A Explain the different types of joints provided in C.I. pipes with the help of suitable diagram. 05

Q.4B Explain the processes adopted for the reduction of hardness from the water. 05

Q.5A Write the short note on the following : 05

- i. Reciprocating Pumps
- ii. Air lift pumps

Q.5B Classify and explain the Cement Concrete pipes as per Indian Standard (IS: 458-1961). 05

- Q.6A Write the C.I. pipes manufacturing processes in detail. 05
- Q.6B Write the " Water Quality Criteria " prescribed by Central Pollution Control Board(CPCB) as per following headings : 05
- i. Designated-Best-Use
 - ii. Class of water
 - iii. Criteria

OR

- Q.6B What are the objectives of Primary and Secondary treatment of wastewater? 05
- Q.7A In water treatment plants, chemical coagulation is usually accomplished by the addition of metallic salts, than explain the various theories behind this coagulation process. 05
- Q.7B Derive the Stokes Equation during settling process of discrete particles in dilute suspension. 05

OR

- Q.7B Find the terminal settling velocity of a spherical particle with diameter 0.5 mm and specific gravity of 2.65 settling through water at 200 C. 05
- Given : Density of water = 998.2 kg/m³
Dynamic viscosity of the water = 1.002 x 10⁻³ N.s/m² at 200 C.

- Q.8A Explain the various "Water distribution network "to supply a community with the appropriate quantity and quality of water. 10
- Q.9A Explain the different "Multiple Pump System" in order to achieve variable discharge at maximum efficiency. 10
- Q.9B If the fluoride concentration in water is found to be more than 1-1.5 ppm than what will be the possible measures that you will take for removal of fluoride from water? 10

OR

- Q.9B What is the significance of population forecasting in designing a water distribution system for a particular locality? Explain in detail the following methods of population forecasting: 10
- i. Zoning Method or Master Plan Method
 - ii. Growth Composition Analysis Method
 - iii. Graphical Comparison Method
 - iv. Graphical extension method

