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CE 131606

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2019

B.Tech. 6th Semester End-Term Examination

ENVIRONMENTAL ENGINEERING — I

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer Question No. 1 and any *six* from the rest.

1. Fill in the blanks : (10 × 1 = 10)
- (i) The turbidity is the measure of resistance to the passage of _____ through the water.
 - (ii) Bio-chemical oxygen demand of safe drinking water must be _____
 - (iii) The residual chlorine _____ at break point.
 - (iv) The most commonly used disinfectant for drinking water throughout the world is _____

[Turn over

- (v) The process of purifying water by passing it through a bed of fine granular material is called _____.
- (vi) Activated carbon is used for control of taste and odour of water resulting from _____.
- (vii) Temporary hardness of water can be removed by _____ and by _____.
- (viii) The theoretical time taken by a particle of water to pass between entry and exit of a settling tank is called _____.
- (ix) To detect and assess the degree of excremental pollution in the source of supply _____ of water is carried out.
- (x) Application of chlorine to raw water supply as it enters the distribution system is called _____.

2. (a) Discuss various factors affecting rate of water demand. (5)
- (b) The following data shows the variation in population of a town from 1922 to 1972. Estimate the population of the city in the year 2002 using the arithmetical increase method, Geometrical increase method and incremental increase method. (10)

Year	1922	1932	1942
Population	50,000	72,000	85,000
Year	1952	1962	1972
Population	1,10,000	1,44,000	2,21,000

3. (a) Enlist the principal methods of laying of distribution system. Briefly discuss any two systems with proper sketch. (2+2+2=6)
- (b) Why chemical tests are carried out for water? Describe in brief the tests carried out for Total solids and Chlorides. (1+2+2=5)
- (c) What do you mean by sewage disposal by dilution? State the conditions under which it is suitable. (1+3=4)
4. (a) What are the purposes of water treatment? Draw a schematic layout of a treatment plant. (3+3=6)
- (b) Design a plain rectangular sedimentation tank to treat 3 million litres water per day. Take a detention period of 4 hours and assume a working depth of 3 m and velocity of flow 10 cm per minute. (5)
- (c) What do you understand by flocculation? Why it is necessary? (2+2=4)
5. (a) What are the factors that affect coagulation? Describe two commonly used coagulants. (2+4=6)
- (b) Explain the working of a pressure filter. (5)
- (c) What is double filtration? Discuss. (4)
6. (a) What do you understand by break point chlorination? What are its advantages? (2+1=3)
- (b) Explain the effectiveness of iodine and bromine treatment for disinfecting water. (3+3=6)
- (c) Explain the lime soda method of removing hardness of water. What are its disadvantages? (4+2=6)

7. (a) Why removal of iron and manganese from water is necessary? Explain the methods of their removal. (2+4=6)
- (b) What is de-fluoridation? Briefly discuss reverse osmosis method. (1+3=4)
- (c) What do you understand by most probable number (MPN)? Discuss the presumptive test for determining MPN number of coliform organism. (1+4=5)
8. (a) Derive an equation for settling velocity of discrete particles freely falling in the sedimentation tank. (5)
- (b) A city has a population of 21000 with an average rate of demand of 160 litres per head per day. Design a rapid sand filter with L/B ratio as 3/4. Assume necessary data. (5)
- (c) Find out the pH of the mixture of the two solutions, A and B. A has a volume of 500 ml with pH = 7 and B has a volume of 500 ml with pH 5. (5)
9. (a) At a water treatment plant, 12 million litres of water is treated daily, using alum dosage of 16 mg per litre. Find (i) total quantity of alum used daily (ii) amount of carbon dioxide released. (3+3=6)
- (b) Differentiate dry and wet feeding of coagulants. (2+2=4)
- (c) What are the causes of objectionable taste and odour of water? Discuss the methods used for their removal. (2+3=5)
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