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BCE-033

DIPLOMA IN CIVIL ENGINEERING
DCLE(G) / DCLEVI
Term-End Examination

00343

December, 2016

BCE-033 : ENVIRONMENTAL ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **five** questions in all. Question no. 1 is **compulsory**. All questions carry equal marks. Assume any missing data suitably.*

1. (A) Choose the most appropriate alternative in the following questions : *6×1=6*

(a) The average domestic water consumption per capita per day for an Indian city provided with piped water supply and sewage system is taken as

(i) 135 *l*/c/d

(ii) 210 *l*/c/d

(iii) 240 *l*/c/d

(iv) 270 *l*/c/d

(b) Ground water is usually free from

(i) Suspended impurities

(ii) Dissolved impurities

(iii) Both (i) and (ii)

(iv) None of these

(c) The usual life of cast iron pipes under normal conditions is about

(i) 25 years

(ii) 50 years

(iii) 100 years

(iv) 75 years

(d) Hardness of water is caused due to

(i) Calcium sulphates

(ii) Magnesium sulphates

(iii) Calcium bicarbonates

(iv) All of the above

(e) Disinfection of water helps in

(i) Removing turbidity

(ii) Removing hardness

(iii) Killing pathogenic bacteria

(iv) Complete sterilisation

(f) The suitable layout for a water supply distribution system, for a city with roads laid in a rectangular pattern, is

(i) Dead end system

(ii) Grid system

(iii) Ring system

(iv) Radial system

(B) Fill in the blanks. $4 \times 2 = 8$

(a) _____ is used to determine the colour of water.

(b) The most widely used coagulant for water treatment is _____ .

(c) Water-tap used in the houses is also known as _____ .

(d) The sewer which transports the sewage to the point of treatment is called _____ sewer.

2. (a) Enumerate the guidelines to be followed while collecting a water sample. 7

(b) List the commonly used surface and ground water sources. How will you select a source of water for a water supply scheme ? 7

3. (a) Explain, in brief, the water treatment processes followed for pre-treatment. 7

(b) Calculate the diameter and depth of the settling tank to treat a flow of 25,000 m^3/d. The maximum SOR is 15 m^3/m^2-d and the detention period is 3 hours. 7

4. (a) List the various types of layout used in a water distribution system. Explain any one, with a sketch, in detail. 7

(b) List the joints used for connecting water main or sub-main in water supply pipes. Explain with a neat sketch a flanged joint for connecting water pipes. 7

5. (a) Discuss the various types of manholes and point out their respective advantages. 7

(b) Discuss the impact of inadequate management of waste water and storm water. 7

6. An activated sludge system is to be used for secondary treatment of 10000 m^3/d of municipal waste water. After primary clarification, the BOD is 150 mg/*l* and it is desired to have not more than 5 mg/*l* of soluble BOD in the effluent. A completely mixed reactor is to be used; and the pilot plant analysis has established the following kinetic values :

$$Y = 0{\cdot}5 \text{ kg/kg}, k_d = 0{\cdot}05 \text{ d}^{-1}.$$

Assuming MLSS concentration of 3000 mg/*l* and an underflow concentration of 10000 mg/*l* from secondary clarifier, determine

(a) the volume of the reactor, and

(b) the mass and volume of solids that must be wasted each day. 14

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Ion-Exchange Method of Water Softening

(b) Water-borne Diseases

(c) Hydraulic Ram

(d) Break Point Chlorination

(e) Underground Water Sources

(f) Coagulation