# Code : 011723

## B.Tech 7th Semester Examination, 2016

## Environment Engineering-II

*Time : 3 hours* *Full Marks : 70*

***Instructions :***

*(i)* *There are **Nine** Questions in this Paper.*

*(ii)* *Attempt **Five** questions in all.*

*(iii)* ***Question No. 1 is Compulsory.***

*(iv)* *The marks are indicated in the right-hand margin.*

*(v)* *Assume data suitably, if not given.*

1. Choose the correct answer (any seven) 2×7=14

(a) The sewer pipes have to be designed and checked for:

(i) only maximum flow

(ii) only minimum flow

(iii) both maximum and minimum flow

(iv) none of them







(b) Standard 5 day BOD at 20°C, when compared to ultimate BOD is about:

(i) 58%

(ii) 68%

(iii) 98%

(iv) 0%

(c) In septic tank, decomposition of organic matter is done by:

(i) Anacrobic bacteria

(ii) Aerobic bacteria

(iii) Facultative bacteria

(iv) None of these

(d) Soluble organics in domestic waste waters include:

(i) Carbohydrates

(ii) Proteins

(iii) Lipids

(iv) All of these

(e) The specific gravity of sewage is:

(i) Zero

(ii) Slightly less than 1

(iii) Equal to 1

(iv) Slightly greater than 1

(f) The appropriate percentage of water in sewage is:

(i) 90%

(ii) 99%

(iii) 99.9%

(iv) 99.99%

(g) Manhole covers are generally located:

(i) at all changes of direction of sewer

(ii) at all changes of gradient of sewer

(iii) at all junctions of different sewers

(iv) all of the above

(h) The relative stability of a sewage sample. Whose D.O. equals the total oxygen required to satisfy its BOD, is:





(i) Zero

(ii) 1%

(iii) 100%

(iv) infinity

(i) The correct statement of comparison of ultimate BOD, COD, Theoretical oxygen demand (ThOD) and 5-day (BOD ) is:

(i) $BOD_u > COD > ThOD > BOD_s$

(ii) $COD > ThOD > BOD_u > BOD_s$

(iii) $ThOD > COD > BOD_u > BOD_s$

(iv) $COD > BOD_u > BOD_s > ThOD$

(j) Most of the bacteria in sewage are :

(i) Anaerobic

(ii) parasitic

(iii) Saprophytic

(iv) pathogenic

2. (a) Describe in order the various stages followed in the construction of sewers.

(b) What are the various types of storm water regulators used in the sewerage system? Explain briefly each of these with sketches. 7×2=14

3. (a) What is the object of sewage treatment ? Distinguish between fresh, stale and septic sewage.

(b) Five day BOD of a wastewater sample at 20°C was found as 150 mg/L. Then 8-day BOD of the same wastewater sample at 25°C (Given that deoxygenation constant at 20°C (base 10) = 0.1 $d^{-1}$, will be ? 7×2=14

4. (a) Explain the importance of determination of quality of sewage. Describe the physical characteristics of sewage.

(b) Distinguish clearly between the working of an 'oxidation pond' and 'oxidation ditch'. 7×2=14

5. Design a conventional activated sludge plant to treat domestic sewage with diffused air aeration system, given the following data:

(i) Population = 50,000

(ii) Average sewage flow = 180 lpcd





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(iii) BOD of sewage = 250 mg/l

(iv) BOD removed in primary treatment = 35%

(v) Overall BOD reduction desired = 85%

6. A single stage filter is A single stage, high rate trickling filter is to treat a flow of 3.5 mld of raw sewage with BOD of 240 mg/l. It is to be designed for a loading of 12,000 kg of BOD in raw sewage per hectare meter and the recirculation ratio is to be 1.1. What will be the strength of the effluent ? Use NRC formula. Assume that 40% of BOD is removed in primary clarifier. 14

7. (a) What do you understand by "Digestion of Sludge"? How will compute the quantity of sludge gas and its fuel value.

(b) Compare and contrast septic tank and Imhoff tank in function and performance. 7×2=14

8. (a) Explain the various process/operation involve in solid waste management with the help of flow chart.

(b) What do you understand by "E-Waste:? Explain the various methods of solid waste disposal? 7×2=14

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9. Short notes on (Any four) $3.5 \times 4 = 14$

a) Incineration

b) Hydraulic loading

c) Detritus Tank

d) Aero-filter

e) Sketch of Imholff tank

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