53 (CE 602) ENEN

2019

ENVIRONMENTAL ENGINEERING–II

Paper : CE 602

Full Marks : 100

Time : Three hours

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

Answer Q. No. **1** *and* ***any four*** *questions from the remaining.*

1. Define/Explain the following : 10×2=20

   (i) Chemical Oxygen Demand and Theoretical Oxygen Demand.

   (ii) Activated Sludge Process.

   (iii) Obligate Aerobes and Dissolved Oxygen.

   (iv) Flocculation.

   (v) Unit operation and Unit process.

Contd.

(vi) First-stage BOD and Second-stage BOD.

(vii) Time of concentration.

(viii) Sewage and Sullage.

(ix) Turbidity and Total solids.

(x) Dry weather flow and storm water flow.

2. Describe the various performance criteria for Wastewater Management System. Describe the three constituents and interrelated aspects of Wastewater Management. 20

3. (a) Describe the various components of Sewerage system. Differentiate between Conservancy and Water carriage System. 10

(b) Analyse Oxygen Sag with the help of Deoxygenation and Reoxygenation Curve. 10

4. (a) What is BOD ? Deduce expression for First-stage BOD formulation. 3+7=10

(b) Find the rate constant (to the base 10) at a temperature of 30°C, if its value at 20°C is 0.12 per day. 3

(c) The 5-day BOD (20°C) of a sewage sample was found to be 100mg/L. Calculate 2-day BOD at 30°C for the same sample. Assume $K_{20} = 0.1/day$. Also determine the ultimate BOD for the sewage. 7

5. (a) Describe in detail, the different types of characteristics of Wastewater. Mention each type and discuss all the subtypes present in them. 15

(b) Describe the various actions involved in self-purification of natural stream. 5

6. A stream saturated with DO has a flow of 1500 L/s BOD of 4mg/L and deoxygenation rate constant of 0.13/day. It receives an effluent discharge of 560L/s having BOD of 50mg/L, DO 8.2mg/L and reoxygenation rate constant of 0.3/day. The average velocity of flow of the stream is 0.18 m/s. Calculate DO deficit at point 20km downstream and 40km downstream. Assume that the temperature is 20°C throughout and BOD is measured at 5 days. Take saturation DO at 20°C as 9.17 mg/L. 20
