53 (CE 602) ENEN-II

2019

ENVIRONMENTAL ENGG.-II

Paper : CE 602

Full Marks : 100

Time : Three hours

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

Answer ***any five*** *questions out of* ***six.***

1. *(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

2. *(a)* What is BOD ? Deduce expression for 1st stage BOD formulation. 3+7=10

Contd.

(b) The 5 day BOD (20°C) of a sewage sample was found to be 100 *mg/L*. Calculate 2 day BOD at 30°C for the same sample. Assume $k_{20} = 0{\cdot}1$/day. Also determine the ultimate BOD for the sewage. 7

(c) 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

3. Describe / define the following : 10×2=20

(i) Turbidity and total solid.

(ii) Time of concentration.

(iii) Unit operation & unit process.

(iv) Obligate aerobes & dissolved oxygen.

(v) Chemical oxygen demand & theoretical oxygen demand.

(vi) Activated sludge process.

(vii) Floccullation.

(viii) 1st stage BOD & 2nd stage BOD demand.

(ix) Sewage, sewer & sewarage.

(x) Dry weather flow & stormwater flow.

4. A stream saturated with DO has a flow of 1500 *L/s* BOD of 4 *mg/L* and deoxygenation rate constant at 0·13/day. It receives an effluent discharge of 560 *L/s* having BOD of 50 *mg/L*, DO 8·2 *mg/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 20 *km* downstream and 40 *km* 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

5. (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

6. Describe the various performance criteria for wastewater management system. Describe the three constituents and interacted aspects of wastewater management. 20
