53 (CE 602) EVEN

2017

ENVIRONMENTAL ENGINEERING–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.*

1. *(a)* Differentiate between : 8

   (i) Domestic sewage, industrial sewage and sanitary sewage

   (ii) Combined and separate system of sewage.

(b) The drainage area of one sector of a town is 12 hectres. The classification of the surface of this area is as follows :

% of total surface area	Type of surface	Coefficient of run off
20%	Hard Pavement	0·85
20%	Roof Surface	0·80
15%	Unpaved Street	0·20
30%	Garden	0·20
15%	Wooded area	0·15

If the time of concentration for the area is 30 minutes, find the maximum run off. Use the formula

$$R = \frac{900}{t + 60}$$

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2. (a) Determine the size of a circular sewer for a discharge of 600 litres per second running half full.

Assume bed slope = 0·0001 and $n = 0{\cdot}015$. 6

(b) Draw a neat sketch of a drop manhole and indicate where it is used.

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(c) Write short notes on : 8

(i) Testing of new sewers

(ii) Types of sewer.

3. (a) Calculate 1 day 37°C BOD of sewage sample whose 5 day 20°C BOD is 100*mg/L*. Assume K_D at 20°C as 0·1. 5

(b) Distinguish between aerobic, anaerobic and facultative microorganism and their role in the decomposition of sewage. 5

(c) Explain in brief various methods of disposal of effluent from septic tank. 10

4. (a) Design a circular settling tank unit for a primary treatment of sewage at 12 million litres per day. Assume detention as 2*hrs* and surface loading as 40,000 *litres/m²/day*. 8

(b) A waste water effluent of $560 L/sec$ with a BOD = $50 mg/L$, DO = $30 mg/L$ and temperature of $23°C$ enters a river where the flow is $28 m^3/sec$ and BOD = $4 \cdot 0 mg/L$, DO = $8 \cdot 2 mg/L$ and temperature of $17°C$. K_D of the waste is 0·10 per day at $20°C$. The velocity of water in the river downstream is $0 \cdot 18 m/s$ and depth of $1 \cdot 2 m$. Determine the following after mixing of WW with the river water :

(i) Combined discharge

(ii) BOD

(iii) DO

(iv) Temperature. 8

(c) Explain briefly the zones of pollution in a River-Stream. 4

5. Describe in order the various stages followed in the construction of sewer. 20

6. Design an Imhoff tank to treat the sewage from a small town with 35,000 population. The rate of sewage may be assumed as 150 litres per head per day. Assume the necessary data. 20
