53 (CE 602) EVEN

2018

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 out of* ***six.***

1. *(a)* Define the following : 8

   (i) Sanitation

   (ii) Domestic sewage

   (iii) Industrial sewage

   (iv) Sanitary sewage.

(b) The drainage area of one sector of a town is 15 hectares. The classification of the surface of this area is as follows : 12

% of total surface area	Type of surface	Co-efficient of run off
20%	Hard Pavement	0·85
20%	Roof Surface	0·80
20%	Unpaved Street	0·20
30%	Garden	0·20
10%	Wooden area	0·15

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

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

2. (a) 5 day 20°*C* BOD of an industrial waste is 200 *mg/L*. Calculate 1 day 37°*C* BOD of that waste. Assume K_D at 20°*C* as 0·15. 5

(b) Distinguish clearly between the following bacteria : 6

(i) Aerobic bacteria

(ii) Anaerobic bacteria and

(iii) Facultative bacteria.

(c) Explain the term 'BOD' and describe briefly how it is determined. 4

(d) Explain the following terms : 5

(i) Population Equivalent

(ii) Nitrogen Cycle in the decomposition of sewage.

3. (a) Design a circular settling tank unit for a primary treatment of sewage at 12 million litres per day. Assume detention as 2·5 *hrs.* and surface loading as 40,000 litres / m^2 / 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 = 4·0 *mg / L*, DO = 8·2 *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 0·18 *m / s* and depth of 1·2 *m*. Determine the following after mixing of WW with the river water :

(i) Combined discharge

(ii) BOD

(iii) DO

(iv) Temperature. 8

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

4. Design an Imhoff tank to treat the sewage from a small town with 40,000 population. The rate of sewage may be assumed as 150 litres per head per day. Assume the necessary data. 20

5. (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) Write short notes on : 8

(i) Testing of new sewers

(ii) Sewer types.

(c) Draw a neat sketch of a drop manhole and indicate where it is used. 6

6. Explain in order the various stages followed in the construction of sewer. 20
