53 (CE 602) ENEN

2014

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.*

1. *(a)* Describe in brief various types of water carriage system. Stating advantages and disadvantages of each. 6

(b) An impervious area of 20 *hectares* is to be served by a sewer line. The area is subjected to three storms P_1, P_2, P_3 with equal frequency of occurrence. The duration of the three storms is 20 *min,* 30 *min*, 35 *min* respectively, taking the time of concentration equal to 30 *min.* Determine the maximum runoff from each storm. 10

(c) What do you understand by the term self cleansing velocity and limiting velocity in sewer ? 4

2. (a) What do you understand by activated sludge process ? Explain with the help of a flow diagram, the essential of activated sludge process. 10

(b) Calculate the velocity of flow and corresponding discharge in a sewer of circular section having diameter equal to 1*m*, laid at a gradient of 1 in 500 the sewer runs at 0·6 depth. Use Mannings formula, taking $N=0{\cdot}012$. 10

3. (a) Design an Imhoff tank to treat the sewage from a small town with a population of 20,000 persons with sewage flow rate of 180 *litre* per day. Assume the missing data. 15

(b) Write a note on different types of sewer and the function of each. 5

4. (a) Describe the procedure for laying and testing of sewers. 15

(b) Design a septic tank for the following data :

No. of person = 100,

Sewage / Capita /day = 120 *litres*

Desludging period = 1 year 5

5. (a) What do you understand by sewer appurtenances. Explain the necessity of providing a manhole in a sewer line. Describe with the help of a neat sketch the component of a manhole. 10

(b) Enumerate various treatment technique used for Biological treatment. 5

(c) Determine ultimate BOD for a sewage having 5 day BOD at 20°*C* as 160 *ppm.* Assume the deoxygenation constant as 0·2 per day. 5

6. (a) Differentiate between : 2×4=8

(i) Volatile and fixed solid

(ii) BOD and Oxygen demand

(iii) COD and ThOD

(iv) Organic and inorganic solids.

(b) Write short notes on : 3×4=12

(i) Zone of pollution in a stream

(ii) Oxygen Sag Curve

(iii) Stabilisation pond.

7. (a) Explain with the help of flow diagram various operations employed in conventional waste water treatment. 8

(b) A waste water effluent of 560 *litre/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_1 for waste is 0·10 per day at 20°*C* the velocity of water in the river down stream is 0·18 *m/sec* and depth of 1·2 *m*. Determine the following after mixing of waste water with the river water *(i)* Combined discharge *(ii)* BOD *(iii)* DO *(iv)* temperature. 12