No. of Printed Pages : 3

ET-507(B)

B.Tech. Civil (Water Resources Engineering)

Term-End Examination

00780

June, 2016

ET-507(B) : WASTE WATER TREATMENT

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **five** questions. All questions carry equal marks. Use of scientific calculator is allowed. Assume any missing data suitably.*

1. (a) Briefly describe the principle of Gas Transfer and its applications in waste water treatment. 7

(b) With the help of neat sketches, briefly describe dissolved air flotation process. 7

2. (a) How would you estimate the quantity of storm sewage from an area ? 7

(b) Find the relation between the side of a square section of one sewer and the diameter of a circular section of another sewer when both are hydraulically equivalent. 7

3. (a) What are manholes ? Explain with the help of a diagram. 7

(b) When is pumping of sewage required to be done ? Draw a sketch of a typical sewage pumping station. 7

4. (a) The B.O.D. of a sewage incubated for one day at 30°C has been found to be 120 mg/*l*. What will be its 5-day 20°C B.O.D., if the values of the reaction constant k are 0·1 and 0·16 at 20°C and 30°C respectively ? $L_{a,30} = L_{a,20}\ [(0{\cdot}02\ T) + 0{\cdot}6]$, T is temperature. 7

(b) Explain the following : 7

(i) B.O.D.

(ii) C.O.D.

5. (a) A sewage outfall is serving a part of a city having a population of 50,000. The quantity of sewage is 136 lpcd and its 5-day 30°C B.O.D. is 300 ppm. The sewage is to be disposed off by dilution in a river having a flow of 2·83 m^3/sec in summer season. The minimum dissolved oxygen (after mixing) in stream cannot be lower than 3 ppm and its average temperature in summer is 30°C. Find out whether treatment is necessary to be given (i.e., primary or secondary ?). 7

(b) Draw a sketch of a trickling filter and describe its working. 7

6. (a) What is sludge thickening ? Explain any one method. 7

(b) Write a note on thermal reduction of sludge. 7

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Sludge Dewatering

(b) Anaerobic Digester

(c) Step Aeration

(d) Grit Chamber

(e) Waste Water Reuse

(f) Inverted Siphon