No. of Printed Pages : 6

**ET-507(B)**

# B.Tech. Civil (Water Resources Engineering)

## Term-End Examination

00551 **June, 2015**

## ET-507(B) : WASTE WATER TREATMENT

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *Attempt **six** questions in all. Question No. **1** is **compulsory**. Use of calculator is permitted.*

**1.** (a) The sewer which transports the sewage to the point of treatment is called *10×1=10*

(i) House sewer

(ii) Outfall sewer

(iii) Branch sewer

(iv) Main sewer

(b) The manhole covers are made circular

(i) for architectural reasons

(ii) for strengthening the cover

(iii) to make the entry convenient

(iv) None of these

(c) The facultative bacteria survive in

(i) the presence of oxygen

(ii) the absence of oxygen

(iii) both (i) and (ii)

(iv) None of these

(d) Gases normally evolved in anaerobic decomposition of sewage are

(i) $CO_2 + NH_3 + H_2S$

(ii) $CO_2 + NH_3 + H_2S + CH_4$

(iii) $CO_2 + NH_3 + SO_2$

(iv) $CO_2 + NH_3 + SO_2 + CH_4$

(e) The detention period adopted for grit chamber is of the order of

(i) 1 minute

(ii) 2 – 4 hours

(iii) 4 – 8 hours

(iv) 24 – 36 hours

(f) A conventional activated sludge plant involves a mixing regime of

(i) plug flow type

(ii) completely mixed type

(iii) both (i) and (ii)

(iv) None of these

(g) The term 'Sludge Age' is associated with

(i) sedimentation

(ii) coagulation

(iii) anaerobic digestion

(iv) activated sludge process

(h) Sanitary landfills may cause problems during the

(i) peak summer

(ii) peak winter

(iii) peak monsoon

(iv) None of these

(i) Between BOD and COD, following is true :

(i) BOD > COD

(ii) BOD = COD

(iii) No definite relation

(iv) COD > BOD

(j) If 10 ml of raw sewage is diluted to 250 ml, the dilution factor is

(i) 2·5

(ii) 250

(iii) 1/25

(iv) 25

2. (a) What is Trap ? Discuss the classification of traps based on their use. *6*

(b) The $BOD_5$ of a wastewater is determined to be 200 mg/litre at 20°C. The k is known to be 0·23 per day (base e). What would be $BOD_5$, if the tests were run at 15°C ? *6*

3. (a) Discuss the working of pneumatic ejector, with the help of a neat sketch. *6*

(b) Explain the principle and operation of Grit Chamber. Why is constant velocity maintained in a grit channel ? *6*

4. (a) What is meant by the term 'floatation' ? With the help of a neat sketch, describe the working of dissolved air floatation unit. *6*

(b) Design a circular settling tank unit for primary treatment of sewage at 12 million litres per day. Assume suitable value of detention period and surface loading. *6*

5. (a) Differentiate between aerobic fixed film and aerobic dispersed growth system of wastewater treatment units. Also give any two examples of treatment units under each category. *6*

(b) The average daily waste flow from a factory is 50 $m^3$ of stearic acid ($C_{17}H_{35}COOH$) of concentration 120 mg/lit. Find out the theoretical oxygen demand and 5-day BOD. (Assume BOD = 0·7 ThOD and atomic weights H = 1, C = 12 and O = 16). *6*

**6.** (a) Describe the working of anaerobic sludge digesters, with the help of a schematic diagram. *6*

(b) Differentiate between anaerobic and facultative ponds. *6*

**7.** (a) List the various criteria which are generally considered in the selection of sludge treatment/disposal and elaborate any one of these. *7*

(b) Discuss the advantages and disadvantages of re-using wastewater for irrigation purposes. *5*

**8.** Discuss in detail the system approach to the problem of reuse of wastewater. *12*

**9.** Write short notes on any ***four*** of the following : *4×3=12*

(i) Bio – Tower

(ii) Catch Basins

(iii) Sewer Rehabilitation

(iv) Eutrification

(v) Conservative Pollutants

(vi) Sludge Conditioning