

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E -IVth SEMESTER-EXAMINATION – MAY- 2012****Subject code: 741801****Date: 12/05/2012****Subject Name: Anaerobic Biotechnologies****Time: 02:30 pm – 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) (i) Differentiate between aerobic and anaerobic treatment of wastewaters. Cite appropriate examples to differentiate. **05**
(ii) Define “anaerobic process”. **02**
(b) Enlist the environmental conditions to be maintained for optimum reactor performance and describe in detail any two. **07**

- Q.2** (a) With the help of a neat diagram explain ‘anaerobic process as a multi step process’. **07**
(b) Identify and explain the most important sources of methane in anaerobic process. **07**

OR

- (b) Prove from first principles, with the help of an example, that 0.35 m³ methane is produced per KG of COD removed. **07**

- Q.3** (a) Enlist and explain the merits and demerits of anaerobic treatment. **07**
(b) With the help of COD mass balance for complex organic waste, show that acetic acid is the most important intermediate Volatile Acid in anaerobic treatment. **07**

OR

- Q.3** (a) (i) Highlight the role of ‘Acetogenic’ bacteria in the formation of methane during anaerobic digestion. **05**
(ii) Enlist at least five facultative bacteria in anaerobic treatment. **02**
(b) (i) With the help of an appropriate example establish the relationship between reactor efficiency in terms of COD reduction and biogas produced. **04**
(ii) Why anaerobic treatment is more suitable for strong wastes? **03**

- Q.4** (a) (i) Reason out what makes the sludge treatment and disposal a complex problem. **04**
(ii) Enlist the sludge treatment processes and explain the objectives of stabilization in detail. **03**
(b) Write a brief note on ‘Stuck Reactors’ highlighting the reasons for the same. **07**

OR

- Q.4** (a) Enlist and explain the indicators of imbalance in anaerobic reactors. **07**

- (b) (i) Differentiate between Low rate and High rate anaerobic reactors. Cite appropriate examples **05**
(ii) Define “Anoxic” treatment. **02**
- Q.5** (a) Describe and differentiate between Expanded Granular Sludge Blanket Reactor and Internal Circulation reactor. Draw neat sketches. **07**
- (b) Determine the dimensions for industrial wastewater of UASB using following data: **07**
(i) Volumetric flow rate :200m³/d
(ii) Inlet COD : 5000 mg/L
(iii) Outlet COD : 1000 mg/L.
Assume suitable design criteria. Design of GLSS not required. Draw a neat sketch indicating the GLSS arrangement and reactor dimensions.
- OR**
- Q.5** (a) Describe and differentiate between Anaerobic Blanket Reactor (ABR) and Anaerobic Migrating Blanket Reactor(AMBR). Draw neat sketches. **07**
- (b) (i) Using the following PST data, determine the daily sludge production : **05**
(i) Flow Rate :0.25 m³/s.
(ii) Influent SS:400 mg/L
(iii) Removal efficiency:65%
(iv) Percent solids : 5%
(v) Percent Volatile Solids:60 %,
(ii) Give a list of attached growth and suspended growth anaerobic reactors. **02**
