

# MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

### VI SEMESTER B.TECH. (BIOTECHNOLOGY)

### **END SEMESTER EXAMINATIONS, APRIL 2017**

## SUBJECT: DESIGN OF BIOLOGICAL TREATMENT PROCESSES [BIO 4002] (29/04/2017)

#### Time: 3 Hours

### MAX. MARKS: 50

### Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.

| 1A.          | Draw layout of conventional water treatment plant and explain the function of each in detail.  | 6 |
|--------------|--|---|
| 1B.          | Explain the removal of suspended solids by the dissolved air floatation method and also the design considerations.   | 4 |
| 2A.          | Determine the amount of liquid alum required to precipitate phosphorus in a wastewater that contains 7.5 mg P/L. Also determine the required alum storage capacity if a 60 day supply is to be stored at the treatment facility. Based on laboratory testing, 1.5 mole of Al will be required per mole of P. The flow rate is 10500 m <sup>3</sup> /d. The following data are for the liquid alum [Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> .18H <sub>2</sub> O] supply. Alum strength is 55 % and the density of liquid alum solution is 1.35 kg/L. Molecular weight of alum is 666.5, Al is 26.98 and P is 30.97. | 6 |
| 2B.          | Describe the process for the removal of BOD and nitrification together in the secondary treatment processes.   | 4 |
| 3A.          | How to find out the optimum dose of coagulant?   | 5 |
| 3B.          | What do you mean by sludge wasting in sequencing batch reactors?   | 5 |
| 4A.          | Write note on ventilation and air flow through a trickling filter, and discuss<br>how the ventilation rate can be calculated? Further, state how the ventilation<br>rate is related to the BOD loading rate in trickling filters?  | 5 |
| 4B.          | Discuss about the physical facilities importance in the Rotating Biological Contactors for the treatment of wastewater.  | 5 |
| 5A.          | What is break point chlorination?  | 2 |
| ED           | Brief the applications of treated wastewater   | ٨ |
| Э <b>D</b> . | Dher the applications of treated wastewater.   | - |