Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 2711808

Date: 09-01-2015

Subject Name: Water and Wastewater Technologies Time: 02:30 pm - 05:00 pm

Total Marks: 70

Instructions:

0.3

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) The hourly variation in wastewater flow for a given town along with 14 corresponding average concentrations of BOD and SS are given in Table. Compute the average and weighted average concentrations of BOD and SS, average hourly flow rate and mass loading data.

| U | | | | U | | | |
|--------|------------|--------|--------|--------|------------|--------|--------|
| Time | Flow | BOD | SS | Time | Flow | BOD | SS |
| (Hours | (m^3/hr) | (mg/L) | (mg/L) | (Hours | (m^3/hr) | (mg/L) | (mg/L) |
|) | | | |) | | | |
| 0 | 16.50 | 171 | 193 | 12 | 19.20 | 223 | 281 |
| 1 | 15.20 | 142 | 163 | 13 | 19.50 | 218 | 269 |
| 2 | 13.70 | 103 | 125 | 14 | 18.60 | 210 | 246 |
| 3 | 13.40 | 74 | 97 | 15 | 18.20 | 205 | 245 |
| 4 | 12.60 | 51 | 67 | 16 | 17.60 | 192 | 181 |
| 5 | 12.40 | 55 | 60 | 17 | 17.50 | 166 | 167 |
| 6 | 12.30 | 69 | 62 | 18 | 17.60 | 160 | 165 |
| 7 | 13.50 | 118 | 105 | 19 | 18.20 | 189 | 189 |
| 8 | 16.60 | 149 | 216 | 20 | 18.90 | 240 | 218 |
| 9 | 18.40 | 190 | 271 | 21 | 19.20 | 315 | 226 |
| 10 | 19.20 | 212 | 283 | 22 | 18.80 | 272 | 221 |
| 11 | 19.60 | 221 | 294 | 23 | 17.80 | 213 | 200 |

- Q.2 (a) Prepare a list of conventional coagulants in water treatment and with the help of 07 equations explain the chemistry of each.
 - (b) How much alkalinity (as CaCO₃) is consumed by a dose of 40 mg/L each of the following coagulants-Al₂(SO₄)₃.18H₂O,FeSO₄.7H₂O,Fe Cl₃,and Fe(SO₄)₃?

OR

(b) Enlist and explain the mechanisms of coagulation.

- 07
- Q.3 (a) Differentiate between Slow Sand Filter and Rapid Sand Filter giving at least 7 07 points of difference.
 - (b) Enlist and explain the different types of settling phenomena giving examples of 07 each.

OR

- (a) Explain the terms
 (i) Mean cell residence time
 (ii) Yield
 (iii) Specific growth rate
 (vi) Specific substrate utilization rate
 (vii) Oxygen uptake rate
- (b) Differentiate between aerobic and anaerobic process.

07

| Q.4 | (a) | Differentiate between | | | | |
|-----|------------|---|----|--|--|--|
| - | . / | (i) Suspended growth process and attached growth process | | | | |
| | | (ii) Extended aeration and tapered aeration | | | | |
| | (b) | Describe the experimental procedure to determine the biokinetic constants in | 07 | | | |
| | | laboratory | | | | |
| | | OR | | | | |
| Q.4 | (a) | With a neat diagram, describe the removal mechanism of a trickling filter. | | | | |
| - | (b) | Enlist the modification of Activated Sludge Process and explain any two with neat sketches. | 07 | | | |
| 0.5 | (a) | With the help of a neat sketch, explain the components & working of UASB. | | | | |
| - | (b) | Enlist & Explain the environmental factors affecting anaerobic treatment process. | 07 | | | |
| | () | OR | | | | |
| Q.5 | (a) | a) Differentiate between: | | | | |
| | () | (i) Standard rate & high rate digesters | | | | |
| | | (ii) Single stage & two stage anaerobic digester | | | | |
| | (b) | Explain the terms: | 07 | | | |
| | () | (i) SOR (ii) WOR (iii) Scour Velocity (iv) Organic Loading rate | | | | |
| | | (v)Flow through velocity (vi) settling velocity (vii) detention time | | | | |
| | | | | | | |
