

Department of Civil Engineering-I.I.T. Delhi
 CVL100: Environmental Science (1st Semester 2016-17)/Minor 2 Exam (60 minutes; 20 points)

Name Sukant Koul Entry no 2015CH10190 Gp no 2 Serial no. 180

Section A. Write "Yes" or "No" (50% negative marking) [10 points]

1	Effluent turbidity of secondary sedimentation tank is always high due to poor settling of MLSS.	Yes	✓
2	High F/M gives lower treatment efficiency.	Yes	✓
3	Organic matter degradation is always conducted after killing pathogens.	No	✓
4	pH adjustment in coagulation is always done using alum.	No	✓
5	Settling velocity of nanoparticles is always higher than that of bacteria.	Yes	✓
6	Nutrient removal from wastewater is achieved during primary treatment.	No	✓
7	Oxygen requirement during anaerobic oxidation of organic matter is always higher than that during aerobic oxidation of organic matter.	No	✓
8	Recirculation in biological unit process is done to decrease oxygen requirement of the process.	No	✓
9	Oxygen requirement during nitrification of 1mole/L ammonium ions is higher than that during denitrification stage.	Yes	✓
10	Dewatering of sludge is done to decrease solid content of sludge.	No	✓

Section B. Fill in the blanks

Q1. Select pathogenic organism rotavirus [options: fecal coliforms, total coliforms, rotavirus] [1 point]

Q2. Total risk is defined as (in terms of background risk and incremental risk):
 $R_{total} = R_{background} + R_{incr}$ [1 point]

Q3. During forced uptake of phosphorus, bacteria are forced to consume oxygen in excess. [1 point]

Q4. Effective pH range for alum or ferric chloride for phosphorous removal is: 5.5 - 7 [1 point]

Q5. How many moles/L of $FeCl_3$ required for removing one mole/L of HPO_4^{2-} ?
1 [1 point]

Q6. A field is irrigated with wastewater effluent containing chromium, fecal coliforms, and antibiotic. Spinach, grown in the field, can adsorb fecal coliforms (loading: 50 MPN/100mg spinach leaf) as well as accumulate chromium (loading: 1 mg chromium/g spinach leaf). If Ram consumes 100mg spinach per day (only activity leading to exposure), answer the following: [2+1+1+1=5 points]

(i) Toxic constituents in wastewater effluent: antibiotics, chromium (fecal coliforms: antibiotics, chromium)

(ii) Hazard to Ram chromium (wastewater; spinach; fecal coliforms; chromium)

(iii) Exposure medium (for Ram) spinach (wastewater; spinach; fecal coliforms; chromium)

(iv) Exposed quantity of hazard every day 0.1 mg chromium / day (50 MPN fecal coliforms/day; 0.1 mg chromium/day)