

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- February 2020

B. Tech 8th Semester

COURSE CODE: 14M31CE214

MAX. MARKS: 15

COURSE NAME: Process Design in Environmental Engg.

COURSE CREDITS: 03

MAX. TIME: 1Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. (Assume any other necessary data suitably)

1. Design a facultative stabilization pond to treat 50000 m³/day of municipal wastewater for a town (latitude 12 °N, elevation 400 m above MSL). Influent BOD₅ concentration 750 mg/L, influent faecal coliform concentration 10⁸ / 100 ml. Average temperature in coldest month of the year 24 °C. Desired BOD₅ removal efficiency 97 %. Desired effluent faecal coliform concentration 1000 / 100 ml. (7)
2. Design a flow through aerated lagoon to treat a wastewater flow of 3800 m³/d, including the number of surface aerators. The treated liquid is to be held in a settling basin with a 2 day detention time before being discharged. Assume the following conditions. Influent TSS 200 g/m³, influent sBOD 200 g/m³, effluent sBOD 30 g/m³, effluent suspended solids after settling 20 g/m³, Y = 0.65 g/g, K_s = 100 g/m³, k = 6.0 g/g.d, k_d = 0.07 g/g.d for T = 20 to 25 °C. Total solids produced are equal to computed volatile suspended solids divided by 0.85. Soluble BOD removal rate constant k₂₀ = 2.5 day⁻¹ at 20 °C. BOD removal rate, k_T = k₂₀ (1.06)^{T-20}, Summer air temperature = 30 °C, winter air temperature during coldest month = 6 °C, wastewater temperature during winter = 16 °C, wastewater temperature during summer = 22 °C. aeration constant: α = 0.85, β = 1.0, aerator oxygen transfer rate = 1.8 kg O₂/ kWh, oxygen saturation concentration = 8.0 g/m³ (no temperature correction needed), oxygen concentration to be maintained in liquid = 1.5 g/m³, lagoon depth = 3.3 m, design SRT = 5 day, power required for mixing = 8 kW/10³/m³. Conversion factor for BOD to COD = 1/1.6. (8)