JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST I EXAMINATION (February- 2018)
M. Tech. (II- SEM.)/B.Tech. (VIII- SEM.)

COURSE CODE: 14M31CE214   MAX. MARKS: 15

COURSE NAME: Process Design in Environmental Engineering

COURSE CREDIT: 3   MAX. TIME: 1 HR

Note: Attempt all Questions. Carrying of mobile phones during exams will be treated as case of unfair means. Assume suitable data if required.

1. Design a waste stabilization pond for a population of 150,000 having wastewater flow requirement of 300 lpcd. The BOD_5 consumption is 70gm/capita/day and SO_4^{-2} concentration is 130 mg/l. The pH value varies between 7.5-8.0 and coliform measured is $10^6/1000$ ml. The effluent BOD_5 should not be greater than 50 mg/l. The latitude of the location is the 30^0N and average radiation in Jan is 140 $cal/cm^2/day$. The ambient winter and summer temperature is 17^0C and 35^0C respectively. The temperature of wastewater is 20^0C. The oxygen production is 1.3 times algal production and unit heat of combustion is 6000 cal/gm. The value of η is 8%. Assume L = 150 kg O_2/hect/day and K_p at 20^0C is 0.11. Assume pond temperature of 12^0C. **(8)**

2. Design an aerated lagoon for a flow of 15000 m^3/day having an influent $SBOD_5$ and suspended solids of 250 mg/l. The overall first order BOD_5 removal rate constant is $2d^{-1}$ at 20^0C. The ambient summer and winter temperature is 35^0C and 15^0C and the temperature of wastewater is 15^0C. Assume θ =1.07, α = 0.90, β = 1.01. The elevation is 1500 m and oxygen concentration to be maintained is 3 mg/l. The lagoon depth is 3 m and HRT is 12 days. Assume f=0.5. The effluent $SBOD_5$ is 20 mg/l. Take K_s = 100, K_d = 0.07, Y = 0.5 and K =5. **(7)**