CVL100

Time: 1 hour **Total marks: 30**

NOTE: All answers should be written on answer sheet only. Nothing should be written on the question paper, calculator exchange is not allowed.

Q. No.		Marks
1.	Brief the following [200 words each]	8
	(a) DO sag curve	
	(b) COD Vs BOD	
	(c) Scouring	
	(d) Basis for total coliform test	
2.	Bacterial cells have been represented by the chemical formula $C_5H_7NO_2$ compute the theoretical oxygen demand assuming the following reactions apply: $C_5H_7NO_2 + 5O_2 \rightleftharpoons 5CO_2 + 2H_2O + NH_3$ $NH_3 + 2O_2 \rightleftharpoons NO_3^- + H^+ + H_2O$	4
3.	The BOD_5 of a waste is 220 mg/L and the ultimate BOD is 320.0 mg/L, what is the rate constant (base 10)?	2
4.	If the water has a carbonate alkalinity of 120.0 mg/L as the ion and pH of 10.30, what is the bicarbonate alkalinity in mg/L as ion and as $CaCO_3$?	3
5.	The following mineral analysis was reported for water sample taken from a well.	3

	mg/L as the ion		mg/L as the ion
Iron	0.2	Silica (SiO_2)	20.0
Manganese	0.0	Fluoride	0.35
Ammonium	0.5	Boron	0.1
Sodium	4.7	Nitrate	0.0
Potassium	0.9	Chloride	4.5
Calcium	67.2	Sulfate	29.0
Magnesium	40.0	Alkalinity	284.0 as CaCO3
Barium	0.5	pH as recorded	7.6 units

Determine the total, carbonate and non-carbonate hardness in mg/L as $CaCO_3$.

6.	(a) Draw the unit process required to treat the river water. The lab analysis showed that suspended solid concentration in raw water is 1250 mg/L, and water also contains large debris, wood logs and pathogens. What would be the type of settling occur in settling basins?	2+2
	(b) If it is required to mix the ground water to dilute the river water what changes would you propose in water treatment process? Explain with neat diagram.	
7.	Brief the following: (a) Coagulation, name two coagulants and give one reaction to illustrate the process. (b) Disinfection, list the disinfectant and explain the chlorination through reactions (c) Break point chlorination with diagram	6