Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (New) EXAMINATION – WINTER 2018

Subject Code:2134004 Date:12/12/2018

Subject Name:Green Chemistry & Technology

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q 1	i	Define aeration and flocculation	1
	ii	Name any three coagulants used for the water treatment process.	1
	iii	A circular primary clarifiers processes an average flow of 5005 m^3/day of municipal waste water. The overflow rate is 35 m^3/m^2/d. The diameter of clarifier will be……	2
	iv	The reoxygenation coefficient K of stream is 0.30 at 20^{O}C. Its K value at 32^{O}C likely to be…….	2
	v	Define BOD.	1
	vi	Chemical oxygen demand of a sample is always greater than Biochemical Oxygen Demand Since it represent…	1
	vii	A single rapid test to determine the pollution status of river water is…….	1
	viii	Hardness of water is caused by the presence of ……	1
	ix	The Ca^{2+} and Mg^{2+} concentration of water sample are 160 mg/lit and 40 mg/lit as their ions respectively. The total hardness of water in terms of $CaCO_3$ in mg/lit is approximately equal to…….	2
	x	Methaemoglobinemia in children is caused by the presence of excess….	1
	xi	The microbial quality of treated piped supplies is monitered by…….	1
Q2	a	What do you mean by Indoor pollution give example? How you can save yourself from indoor pollution.	4
	b	Write the tabular form of national ambient air quality standards.	3
	c	Using the given information find the population of city in 2010 and 2030 using geometrical increase method and incremental increase methods	7

Year	1940	1950	1960	1970	1980	1990
Population	23400	65700	92800	102760	130900	187970

OR

Q2	a	What are the pH of acid rains, normal rains, pure water, battery acid and ocean water, lemon juice, vinegar and milk?	4
	b	What do you mean by greenhouse effect. Enlist the gases responsible for greenhouse gas.	3

	c	What is acid rain and what is its effects on the environment? Enlist the gases responsible for the acid rains.	7
Q 3	a	Find the settling velocity of spherical silica particle of pecific gravity 2.67, in water at 25^0C, if the diameter of particles is 0.004 cm.	4
	b	Describe briefly about turbidity.	3
	c	Write short notes on (a) Flouride content (b) chloride content and (c) Nitrate content into the drinking water.	7
		OR	
Q3	a	In continuous flow settling tank 3.5 m deep and 65 m long. Flow velocity of water is observed as 1.22 cm/sec. What size of particle of specific gravity 2.65 may be effectively removed in this tank, if kinematic viscosity of water is 0.01cm^2/sec.	4
	b	Write the standard value of following parameters for the drinking water. (i) Hardness (ii) Chloride (iii) Calcium (iv) pH (v) Flouride (vi) Nitrite	3
	c	The capacity of a water treatment plant is to treat 18 MLD of raw water and the dose of required alum $(Al_2SO_4)_3.18H_2O$ is 25 PPM. Find (a) Total quantity of alum required per year (b) Total quantity of CO_2 gas produced per year (c) Total quantity of floc generated per year (d) Total quantity of hardness per year	7
Q 4	a	Comment on the challenges for sustainable development in our country and suggest a way to overcome the same.	4
	b	It is said "prevention is better than cure". Justified this statement in context to green chemistry.	3
	c	A rapid sand filter proposed for a water supply treatment plant of town having population of 75000, average water supply in the town is 150 lpcd, rate of filtration is 100 lit/m^2/min. Find the size and no of filter bed required. Design the lateral and manifold under drainage system. Compute the washwater discharge required if rate of washing is 45 cm/min.	7
		OR	
Q 4	a	The BOD_5 of a waste has been measured as 500 mg/lit. If the rate constant K' = 0.26/day (base e), what is the ultimate BOD of waste? What proportion of BOD_u would remain unoxidaised after 20 days.	4
	b	Mention various methods used to dispose solid wastes along with their merits and demerits	3
	c	The following data refers to an ASP: (i) sewage discharge = 3500 m^3/day (ii) volume of tank 10900 m^3 (iii) Influent BOD = 250 PPM (iv) Effluent BOD = 20 PPM (v) MLSS = 2500 PPM (vi)	7

Effluent suspended solids = 30 PPM (vii) Waste sludge suspended solids = 9700 PPM (viii) quantity of waste sludge = 220 m^3/day.
Find (i) HRT (ii) F/M ratio (iii) Efficiency (iv) Residence time (v) SVI if settled volume is 150 mL/litre (vi) sludge return ratio

Q5	a	Explain the construction of solar panel with the utilization of solar energy for various purposes.	4
	b	Describe the tidal energy with advantage and disadvantage.	3
	c	What would be your suggestion towards 21st century energy resources?	7

OR

Q5	a	Design a wind turbine and estimate the required wind turbine power rating using following data: (i) Annual energy requirement – 25000 kWh (ii) coefficient of perfoemance – 0.40 (iii) density of air – 1 kg/m^3 (iv) capacity factor – 0.30 (v) number of hours in a year 8760 hours (vi) wind speed at 15 m height is 7 m/sec.	7
	b	Design a sedimentation tank for the city of Stillwater treatment plant expansion using high-rate settlers. The maximum day design flow is 0.5 m^3/s. Assume a well settling alum floc, a water temperature of 10^{O}C, that the angle of settler tube is 60^O, and that the tubes have a hydraulic diameter of 50 mm and surface overflow rate is 150 m^3/m^2/day. Assume suitable necessary data.	7

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