Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(New) • EXAMINATION – WINTER 2016

Subject Code: 2151303 **Date:24/11/2016**

Subject Name: Physico - Chemical Treatment Technologies

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 Short Questions **14**

1 Primary treatment of sewage consist of removal of
(a) Oil & grease (b) large suspended organic solids (c) sand & grit (d) none of these.

2 The spacing of bars of perforations of fine screens used for the treatment of sewage is.
(1)5-8 mm (2) 3-5 mm (3) 2-3 mm (4) 8-10 mm

3 In detritus tanks,
(a)Flow velocity is kept 0.09m/s (b) detention period is kept 3-4 min.
(c) organic & inorganic materials are separated (d) all of above

4 The settlement of particle in sedimentation tank is affected by
(a) velocity of flow (b) viscosity of water (c) specific gravity of solids (d) all of above

5 The coagulants which is generally not used for treating the sewage is
(a)Alum (b) ferric sulphate (c) ferric chloride (d) chlorinated copper

6 Dry weather flow is
(a)Average daily rate of flow (b) average monthly rate of flow (c) average annual rate of flow (d) water supply allowance per capita

7 Chlorination of water is done for the treatment of
(a) Bacteria (b) sediments (c) suspended solids (d) hardness

8 The discharge per unit plan area of a sedimentation tank is generally called
(a) over flow rate (b) surface loading rate (c) over flow velocity (d) all of above

9 Rapid gravity filters can remove bacterial impurities up to maximum of
(a) 50 % (b) 30 % (c) 99% (d) 80 %

10 In rapid sand filter, air binding is caused due to excessive
(a) Negative pressure (b) water pressure (c) turbidity (d) all of above

11 Turbidity of water may be caused due to
(a) Suspended clay (b) suspended slit (c) finely divided organic matters (d) all of above

12 The process of passing water through bed of granular material is called .
(a) Screening (b) sedimentation (c) filtration (d) none of above .

13 Alkalinity in water may be caused due to
(a) Calcium & magnesium bicarbonate (b) sodium carbonate (c) calcium hydroxide (d) all of above

14 Detention time for plain sedimentation tank usually range from
(a) 2-4 hrs (b) 4-8 hrs (c) 8-12 hrs (d) 12-16 hr

Q.2	**(a)**	What is unit process? List down different unit processes used for waste water treatment.	**03**
	(b)	Explain the procedure for statistical analysis of waste water flow rate data.	**04**
	(c)	Explain with neat sketch: dissolved air flotation for surface water treatment.	**07**
		OR	
	(c)	Explain with neat sketch: ion exanchange softening for ground water.	**07**
Q.3	**(a)**	Give detail classification of screen.	**03**
	(b)	Enlist the phenomena which promote stability to the colloids.	**04**
	(c)	Explain jar test procedure for determining the optimum dose of chemical coagulant. What is the relation between pH, alkalinity & alum?	**07**
		OR	
Q.3	**(a)**	List down the various methods used for particle destabilization.	**03**
	(b)	Write a short note on grit removal mechanism.	**04**
	(c)	Prepare a list of different chemical coagulants & explain the chemical reaction when alum is used as a coagulant.	**07**
Q.4	**(a)**	Derive the Newton's law for settling velocity of a discrete particle.	**03**
	(b)	Write a note on operational difficulty of backwashing in RSF.	**04**
	(c)	Enlist the different types of mixing equipments & explain any one with sketch.	**07**
		OR	
Q.4	**(a)**	Explain the terms: (1)Effective size of sand (2) uniformity coefficient (3) Scour velocity for filtration.	**03**
	(b)	Explain the settling phenomena observed in a sedimentation tank.	**04**
	(c)	Differentiate between (1) rapid mixture & flocculator (2) coagulation & flocculation	**07**
Q.5	**(a)**	What is disinfection? How is it different from the sterilization?	**03**
	(b)	Write a note on: High rate anaerobic digester.	**04**
	(c)	Why sludge treatment is required? Enlist & explain sludge thickening with types.	**07**
		OR	
Q.5	**(a)**	Enlist the factors which effect chlorination.	**03**
	(b)	Describe the methods normally use to process the sludge before its final disposal.	**04**
	(c)	What are the advantages of dual media filter as compare to single media filter?	**07**

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