

**M. TECH. –III (CHEMICAL ENGINEERING) (CBCS – 2015
COURSE) : SUMMER - 2018**

SUBJECT: ELECTIVE – I: c) INDUSTRIAL WASTE WATER TREATMENT

Day: **Tuesday**
Date: **29/05/2018**

S-2018-3162

Time: **11.00 AM TO 02.00 PM**
Max. Marks: 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.

SECTION-I

Q.1 Discuss one method that can be used to calculate BOD for waste water. How (10)
chemical oxidation is useful for disinfection of waste water?

OR

Q.1 What are the major sources and characteristics of industrial waste water? (10)
Explain the removal mechanism of waste water from chemical industries.

Q.2 Determine the removal efficiency for a sedimentation basin with a critical (10)
overflow velocity of $2 \text{ m}^3/\text{m}^2\text{h}$. in treating a waste water containing particles
whose settling velocity are distributed as given in below table

Setting velocity m/h	No. of particles per lit.
0.0 – 0.5	30
0.5 - 1.0	50
1.0 -1.5	90
1.5 -2.0	110
2.0-2.5	100
2.5-3.0	70
3.0-3.5	30
3.5- 4.0	20
Total	500

OR

Q.2 Describe types of gravitational phenomena utilized in waste water treatment (10)
with applications?

Q.3 Describe the difference between the recycling in the activated sludge and (10)
trickling filter processes. Draw a neat sketch of a trickling filter and label all
the essential parts.

OR

Q.3 Design an aerated grit chamber installation for an avg. waste water flow rate of (10)
 $0.3 \text{ m}^3/\text{s}$ and a peak flow rate of $1.0 \text{ m}^3/\text{s}$. The average depth is 3 m, the width
to depth ratio is 1.5: 1 and the detention time at peak flow is 3.5 min. The
aeration rate is $0.4 \text{ m}^3/\text{min}$ per m of tank length. Determine the dimension of
the grit chambers and the total air required. Use two chambers.

P. T. O.

SECTION -II

Q.4 Explain anaerobic digestion with example. (10)

OR

Q.4 Explain in detail aerobic digestion with example. (10)

Q.5 Which are the advanced membrane process for waste water Treatment? Explain any one in detail. (10)

OR

Q.5 A fixed bed activated carbon adsorber has a fast mass transfer rate and the mass transfer zone is essentially a sharp wave front. Assuming the following data applies, determine the carbon requirement to treat a flow of 1000 lit/min and the bed life. (10)

Data given

- i) Compound = Trichloro ethylene
- ii) Initial concentration = $C_0 = 1.0$ mg/L
- iii) Final concentration = $C_e = 0.005$ mg/L
- iv) GAC density = 450g/L
- v) Freundlich capacity factor $k_f = 28$ (mg/g) (L/mg)
- vi) Freundlich intensity parameters = $1/n = 0.62$
- vii) EBCT = 10min.

Q.6 Write a detail note on 'Hazardous waste management and Risk assessment'. (10)

OR

Q.6 What are the characteristics of solid waste? Explain its collection and transportation. (10)

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