

**ENVIRONMENTAL ENGINEERING & POLLUTION CONTROL
(CHEN 4243)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.*

Candidates are required to give answer in their own words as far as practicable.

**Group – A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) As per the CPCB standard for Type B water signifies
 - (a) Untreated Sewage
 - (b) Water having requisite Bathing Standard
 - (c) Drinking Water
 - (d) Treated wastewater for irrigation purpose
 - (ii) Identify the methodology of Solid Waste Management which is mostly practised in Bidhannagar Municipal Corporation
 - (a) Landfill
 - (b) Incineration
 - (c) Compaction followed by dumping
 - (d) Anaerobic Digestion
 - (iii) Which of the following is not a primary air pollutant?
 - (a) NO_x
 - (b) SPM
 - (c) PAN
 - (d) SO_x
 - (iv) Black water is also termed as
 - (a) Sullage
 - (b) Grit
 - (c) Moss
 - (d) Sewage
 - (v) Rotating Biological Disk Contactor is
 - (a) an attached growth system
 - (b) a suspended growth system
 - (c) an anaerobic system
 - (d) synonymous with venturi scrubber
 - (vi) Identify the methodology of Solid Waste Management which is most abundantly practised in India
 - (a) Landfill
 - (b) Incineration
 - (c) Open dumping
 - (d) Composting
 - (vii) A permit which allows a country to produce a certain amount of carbon emissions and which can be traded if the full allowance is not used is known as:
 - (a) Carbon Footprint
 - (b) Carbon Flip Bond
 - (c) Carbon Credit
 - (d) None of the above

- (viii) Which of the following is the most efficient for removal of very finely divided suspended solids and colloidal matter from the polluted water stream?
 (a) Sedimentation tank (b) Circular clarifier
 (c) Mechanical flocculation (d) Chemical coagulation
- (ix) Typha Elephantiana class of plants are used in
 (a) Activated Sludge Process (b) Extended Aeration System
 (c) Root-zone Treatment (d) Trickling Filter
- (x) As per the CPCB standard for discharge of liquid waste into inland surface water the values of COD in mg/l for treated waste water is
 (a) Less than or equal to 150 (b) 0
 (c) 30 (d) >150

Group – B

2. (a) What is the oldest Environmental legislation in our country? State its importance.
 (b) A factory uses 2,00,000 litres of furnace oil (specific density 0.97) per month. If for one million litres of oil used per year, the particulate matter emitted is 3.0 tonnes per year, SO₂ emitted is 59.7 tonnes per year, NO_x emitted is 7.5 tonnes per year, hydrocarbons emitted are 0.37 tonnes per year, and carbon monoxide is 0.52 tonnes per year, calculate the height of the chimney required to be provided for safe dispersion of the pollutants.

(2 + 3) + 7 = 12

3. (a) What do you mean by Grab sampling? How does it differ from Composite sampling?
 (b) Calculate the Ambient SPM concentration from the field data obtained in a High Volume sampler:
 Average pressure of the day at station level = 712.59 mm of Hg
 Average temperature = 30.6°C; Sampling rate = Clean filter: 1.6 Cu m/min
 Filter after exposure = 1.5 cu. m/min;
 Tare weight of filter before exposure = 3.417 g
 Tare weight of filter after exposure = 3.925 g
 N. B. 1) Sampling time is round the clock; 2) Assume Air as ideal gas.

4 + 8 = 12**Group – C**

4. Find L₀ from industrial BOD Data using Fujimoto method.

t (day)	0	1	2	3	4	5	6	7
BOD mg/l	0	57	102	134	160	184	199	207

12

5. (a) Discuss the principle of a Trickling Filter with a neat sketch.

B.TECH/CHE/8TH SEM/CHEN 4243/2021

- (b) Design a trickling filter with recirculation using a suitable empirical method for data supplied: Sewage flow= 5000 m³/day; Raw settled BOD= 200 mg/l; Filter depth D=1.8m; Media= 7.5 -10 cm diameter stones. The efficiency of the filter would be about 85%.

5 + 7 = 12

Group – D

6. (a) Define Bio-remediation and explain its basic principles.
(b) Discuss the Monod model for studying Phenol degradation kinetics by bacteria stating its basic assumptions.

(2 + 3) + 7 = 12

7. Discuss the purification methodology of industrial sludge containing Mercury pollution. Suggest a suitable method of disposal of Ferro-Chrome slag.

8 + 4 = 12

Group – E

8. Delineate a case study on pollution control in a Tannery mentioning: (i) Target Pollution Loads, (ii) Treatment Technologies and (iii) Key Issues

(3 + 5 + 4) = 12

9. Write Technical notes on: (i) Root Zone/Reed Bed treatment (ii) Extended Aeration system

(6 + 6) = 12

Department & Section	Submission Link
CHE	https://classroom.google.com/c/Mjk4ODA5ODI1ODk1/a/MzYwMDY2MjM5Mjk0/details