

**MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL**

Paper Code : CE(PC)505 Environmental Engineering - II

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following :

[1 x 10 = 10]

- (i) The growth of huge amounts of algae and other aquatic plants leading to the deterioration of the water quality is called... ?
- (ii) The inclination of bars to the horizontal in a manually cleaned screen is
a) 30 to 45 b) 15 to 30 c) 45 to 60 d) 60 to 90
- (iii) Pathogens in the sludge may be destroyed by
a) Mechanical means b) Thermophilic condition c) Chemical treatment d) Aeration
- (iv) In the two pipe system for the drainage of buildings, the discharge from the waste pipe is disconnected from the drain by using
a) Gully trap b) Silt trap c) Floor trap d) Grease trap
- (v) The waste can be classified as hazardous when
a) It does not cause any mortality. b) It increases mortality. c) It decreases mortality. d) It decomposes itself without any aid.
- (vi) Theoretical oxygen demand (ThOD) value of 1000 mg/L lactose ($C_{12}H_{22}O_{11}$, H_2O) solution is
a) 1000 mg/L b) 1027 mg/L c) 1067 mg/L d) 1097 mg/L
- (vii) When rainy season is confined to a few months of a year, the preferred sewerage system would be?
- (viii) What is lateral sewer?
- (ix) If we increase the diameter of a sewer, then the self cleansing velocity will _____
- (x) In a BOD determination, 6 ml of wastewater is mixed with 294 ml of dilution water containing 8.4 mg/L of dissolved oxygen. After 5-day incubation at $20^{\circ}C$, the dissolved oxygen content of the mixture becomes 5.4 mg/L. The BOD_5 at $20^{\circ}C$ of the wastewater is _____
- (xi) In a city drainage system, having drainage to sewage ratio 20, what will be the peak dry weather flow?
- (xii) With increase in its duration, the intensity of rainfall will _____

Group-B (Short Answer Type Question)

Answer any three of the following

[5 x 3 = 15]

2. Discuss the fundamental processes of anaerobic digestion [5]
3. What will be the provision of freeboard in sewers and sw drains? [5]
4. a) What is the function of a grit chamber in a wastewater treatment plant? [5]
b) Why maximum flow of wastewater is considered for designing of grit chamber?
5. What are the purpose of design period? [5]
6. Discuss about the presence of sulphur in wastewater. What is crown corrosion? How does it happen? [5]

Group-C (Long Answer Type Question)

Answer any three of the following

[15 x 3 = 45]

7. a) Discuss the different phases of treatment of municipal wastewater. [5+10]
b) Draw the complete flow diagram of a conventional activated sludge plant including sludge treatment. [15]
8. Source of sanitary water. [15]
9. How estimate the design sewage discharge. [15]

10. a) In determining BOD5 of a sample, an analyser added 2 ml of a sample to a 300 ml BOD bottle and filled it with dilution water. The analyst also prepared one blank bottle with same dilution water and incubated both at 20°C for 5 days. Dissolved oxygen measurements were made on the samples before and after incubation with the following results: 7

Sample size ml	Initial DO mg/l	Final DO mg/l
2 ml sample	8.1	5.6
Blank Bottle	8.2	8.0

What is the BOD5 for the sample?

- b) The BOD5 of a wastewater is determined to be 150 mg/L at 20°C. The K1 value at 20°C is known to be 0.23/day. What would be the BOD8 value if the tests were run at 15°C?

11. a) What do you mean by activated sludge process with respect to biological treatment of wastewater? What is activated sludge? 5

b) A conventional activated sludge plant processes 40,000 m³/d of wastewater with an influent BOD5 of 230 mg/l. The total volume of the aeration basin is 8500 m³ and the MLSS concentration is 3000 mg/l. Calculate aeration period, BOD5 loading in gm/m³/d and in g BOD5/d/g of MLSS.

*** END OF PAPER ***

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