

Duration:-03 Hrs

Marks: 80

N.B:-

- 1) Question No 1 is compulsory
- 2) Attempt **any three** questions from the remaining **five** questions.
- 3) Assume suitable data wherever necessary.
- 4) Figures to the right indicate full marks.

Q.1] Write short notes (any four) 20

- a) Effect of pollution on lakes
- b) Classification of particulates.
- c) Physical characteristics of waste water
- d) Classification of solid waste.
- e) The Gaussian Plume Model

Q.2] a) Discuss in brief various methods for recovery of materials from process effluents. 10
 b) Discuss in brief aerodynamic effects of structures and terrain. 10

Q.3] a) Explain in detail Combustion for air pollution control. 10
 b) In a completely mixed activated sludge system determine: 10

- i) The aeration basin volume
- ii) The Hydraulic retention time
- iii) The sludge volume wasted daily
- iv) The mass of sludge wasted daily
- v) The fraction of sludge recycled
- vi) The F/M ratio

Given:

- Population equivalent 50000 (11250 m³/day)
- Influent BOD₅ = 200mg/L
- effluent BOD₅ is 10 mg/L
- Yield Coefficient Y = 0.6
- Decay rate k_d = 0.06 d⁻¹

Assume:

- MLSS in aeration basin = 3.5 kg/m³
- MLSS in clarifier sludge = 15 kg/m³
- Mean cell residence time = 10 days.

Q.4] a) Explain in brief Source correction methods for air pollution control. 10

b) What is BOD? Deduce expression for BOD with time? What are the factors on which the deoxygenation constant (K) depends? 10

Q.5] a) Explain the solid waste transfer station in detail. 10

b) Explain DO Sag curve and derive the formula for critical time and critical deficit. 10

Q.6] a) Discuss the design criteria for Activated Sludge Process in detail. Derive the necessary derivation for volume of Aeration tank. 12

b) A following data is obtained in a High volume filtration method for measurement of mass concentration of suspended particulates.

- (i) Air flow through clean filter = 1.7m³/min.
- (ii) Air flow through filter at the end of the test = 1.4m³/min
- (iii) Weight of clean filters = 5gms
- (iv) Weight of filters after exposures = 5.348 gms.

The test was carried out for 24hrs. Find the concentration of suspended particulates in µg/m³. 08