

ENVIRONMENTAL ENGG PROCESSES & MANAGEMENT

Time: Three Hours

Maximum Marks: 100

Answer five questions, taking ANY TWO from Group A, any two from Group B and all from Group C.

All parts of a question (a, b, etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches.

Unnecessary long answer may result in loss of marks.

Any missing or wrong data may be assumed suitably giving proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. (a) What is Environmental Engineering? What are the important fields in environmental engineering? 10
- (b) Enumerate general purposes of physical, chemical and biological monitoring in environmental engineering. 10

2. (a) Draw the flow diagram of a conventional modern sewage treatment plant describing in brief functions of each treatment unit. 10
- (b) Derive a relationship for BOD₅ and ultimate BOD with a neat sketch. A 6.0 mL sample of wastewater is diluted to 300 mL with distilled water in a standard BOD bottle. The initial dissolved oxygen in the bottle is determined to be 8.5 mg/l, and the same after 5 days at 20⁰C is found to be 5.0 mg/l. Determine the BOD of the wastewater and compute its ultimate BOD. Assume the constant representing the rate of BOD reaction as $k = 0.1/\text{day}$. 10

3. (a) Differentiate between aerobic and anaerobic processes. Name some of the (i) suspended growth processes (ii) attached growth processes used in a biological treatment. 10
- (b) Describe the activated sludge process employed in sewage treatment. Design a conventional activated sludge plant to treat settled domestic 10

sewage with diffused air aeration system for the following data:

Population = 1.2 lakh

Per capita sewage contribution = 160 lpcd

Settled sewage BOD₅ = 200 mg/L

Effluent BOD₅ required = 15 mg/L

4. (a) What is a septic tank? How is effluent disposed off? Where it is used? 10
Design a septic tank for 100 users by rational method.
- (b) Describe the design and operational considerations for upflow anaerobic 10
sludge blanket reactor for treatment of wastewater.

Group B

5. (a) Write about municipal solid waste management describing classification of 10
wastes, the collection system, method of transportation and different
disposal procedures.
- (b) Describe in brief four different methods of solid waste disposal. 10
6. (a) Describe various types of stack plumes with neat sketch under different 10
ambient lapse rate conditions. Also, explain the impact of air pollution for
each case.
- (b) Describe various methods adopted for prevention and control of air 10
pollution.
7. (a) Explain any three air pollution control devices used for removal of 10
particulate emissions with the help of neat sketches.
- (b) Describe the adverse effects of noise pollution and methods of control for 10
the same.
8. (a) Describe the sources of noise pollution. What are the adverse effects of 10
noise pollution? State the maximum permissible noise levels in different
zones.
- (b) Describe the method of preparation of "Environment Impact Assessment" 10
for a proposed new project.

Group C

9. Answer the following in brief: 20
- (i) Which one is not used for dust control from industries?
 - (a) trickling filter
 - (b) bag house
 - (c) cyclone
 - (d) wet scrubber
 - (ii) Near the earth surface for every 100 m rise in the altitude, temperature falls down by about
 - (a) 0.1 °C
 - (b) 0.66 °C
 - (c) 2.0 °C
 - (d) 5.0 °C
 - (iii) The effective measures of solid wastes include the principle of
 - (a) 4 R
 - (b) 4 R includes reduction, recycling, reuse and recovery.
 - (c) none of the above
 - (d) both (a) and (b)
 - (iv) In oxidation pond, the most effective biological agent is
 - (a) green algae
 - (b) protozoa
 - (c) Fungi
 - (f) All of the above.
 - (v) Fly ash can be used
 - (a) in brick manufacturing
 - (b) as fertilizer
 - (c) in water disinfectant
 - (d) All of the above
 - (vi) In activated sludge plant, the ratio between MLVSS to MLSS is
 - (a) 0.1
 - (b) 0.2

- (c) 0.4
 - (d) 0.8
- (vii) BOD loading in standard rate trickling filters (in $\text{g}/\text{m}^3/\text{day}$) may be
- (a) 20
 - (b) 200
 - (c) 2000
 - (d) None of the above
- (viii) In activated sludge plant, the solid retention time may range (in days)
- (a) 1 to 2
 - (b) 2 to 5
 - (c) 5 to 15
 - (d) 30 to 60
- (ix) After required treatment, sewage can be disposed of
- (a) on land
 - (b) to natural water bodies
 - (c) in the Ocean
 - (d) All of the above
- (x) Which one of the following equipment can be used for desulphurization of flue gas?
- (a) Cyclone separator
 - (b) Venturi scrubber
 - (c) trickling filter
 - (d) tray tower

(Refer our course material for answers)