



Exam of New Economic systems for wastewater Collection and treatment
for 4th Civil Eng.

Answers the following questions

Any data missing can be reasonably assumed

1- The following Sentences True or False and give the correction answer: (8 Marks)

- The BOD₅ rate constant depend on the temperature and nature of the waste only.
- NBOD = 2.67 gm O₂/gm of C oxidized
- Water quality management is concerned with the control of pollution from human activity.
- The main function of maturation is the destruction of pathogens.

2- Write brief notes on the following :

- Hybridized Anaerobic Reactor (HABR). (2Marks)
- Wet lands for wastewater treatment in Small communities. (2Marks)

b) Calculate the DO at a point 2.8 km downstream from a waste discharge point for the following conditions. Rate constants are already temperature adjusted. DOs (17 °C)= 9.70 mg/l.

Parameters	Stream
K _d	1.911 d ⁻¹
K _r	4.59 d ⁻¹
Flow	2.4 m ³ /s
Speed	0.2 m/s
D _a	1.5 mg/l
T, °C	17
BOD _L	2400 kg/d

$$D = \frac{K_d \cdot L_a}{K_r - K_d} (10^{-K_d t} - 10^{-K_r t}) + D_a (10^{-K_r t}) \quad (10 \text{ Marks})$$

3-a) Explain the difference between eutrophic and oligotrophic lakes in terms of productivity and water quality. (4 Marks)

b) Aerated lagoons is used to treat 20000 m³/d of domestic wastes: the BOD₅ is 400 mg/l, the SS of the raw waste is 300 mg/l and the effluent SS is to be < 50 mg/l. The required BOD reduction is 90% and the design temperature is 20 °C, Y = 0.6, b= 0.07 d⁻¹, retention time= 4 days. Calculate F_e, X, L_e and A. (8 Marks)

4-a) List the major advantages and disadvantages of stabilization ponds. (3 Marks)

b) Sketch the symbiosis of algae and bacteria in stabilization ponds (3 Marks)

c) Design a stabilization pond system to treat 25000 m³/d of Starch waste which has a BOD₅ of 500 mg/l. The design temperature is 20 °C and the required effluent standards are: BOD₅ < 30 mg/l and FC 4000 /100 ml . give comment about using anaerobic ponds for industrial wastes. (10 Marks)

With best wishes

Examiners: Assoc. Prof. Kamal Radwan