ERRATA for

FE Environmental Practice Exam

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Errata posted 03/01/2024

Revisions are shown in red.

Question 5, p. 9

Given the function *f(x)* = 1/(*x* – 2), the linear approximation of *f(x)* around *x* = –1 is most nearly:

Question 50, p. 27

A system is designed to allow at least 10,000 Btu/min of heat to be transferred (*Q*) from the system to the air as air flows through it. The system can be operated so that air (c_p = 0.26 Btu/lb-F) flowing at 500 lb/min will exit at 100°F. The minimum temperature (°F) the air can enter the system is _______________.

Question 68, p. 36

Match the treatment technology that will best achieve the treatment objective for the potable reuse of water. Use each technology only once.

Treatment Objective	Treatment Technology
A. Remove suspended solids	1. UV/H_2O_2
B. Reduce dissolved nutrients	2. Media filtration
C. Degrade trace organics	3. Biologically active filtration

Solutions Table, p. 52

50: The correct answer is: 23 to 24°F

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Solution 24, p. 63

Refer to the *FE Reference Handbook,* Environmental Engineering chapter, Steady-State Reactor Parameters.

$C_t = C_0[\exp(-k\,\theta)]$

Given: $k = 0.1\text{ min}^{-1}$
$\theta = 1\text{ hour} = 60\text{ min}$

Let $C_0 = 100\%$

$C_t = 100\% [\exp(-0.1\text{ min}^{-1} \times 60\text{ min})] = 100\% [\exp(-6)] = 100\% (0.00248) = 0.248\%$

Removal efficiency, $\eta = 100\% - 0.248\% = 99.752\%$, which is most nearly 99.9%.

THE CORRECT ANSWER IS: C

Solution 25, p. 64

Refer to the Cylindrical Pressure Vessel section in the Mechanics of Materials chapter of the *FE Reference Handbook*.

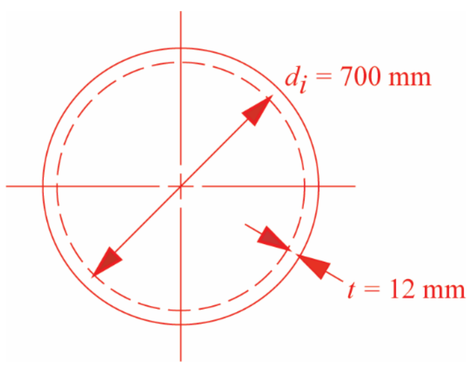
The cylinder can be considered thin-walled if $\dfrac{t}{\frac{d_i}{2}} \le 0.10$. In this case, $t = 12$ mm and $d_i = 700$ mm.

Since $\dfrac{t}{\frac{d_i}{2}} = \dfrac{12}{350} = 0.034$ which is ≤ 0.10, the pipe is thin-walled.

Thus $\sigma_t = \dfrac{P_i r}{t}$

where $r = \dfrac{r_i + r_o}{2} = \dfrac{350 + 362}{2} = 356\text{ mm}$

$$\sigma_t = \frac{(1.680\text{ MPa})(356\text{ mm})}{12\text{ mm}} = 49.8\text{ MPa}$$



THE CORRECT ANSWER IS: B

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Solution 50, p. 75
Refer to the Compressors section in the Fluid Mechanics chapter of the *FE Reference Handbook*.

$Q = m\ c_p\ (T_2 - T_1)$

Solve for T_1

$-T_1 = [Q/m\ c_p] - T_2$

$T_1 = T_2 - [Q/m\ c_p]$

Substitute and solve

T_1 = 100°F – [10,000 Btu/min/(500 lb/min)(0.26 Btu/lb-°F)]

T_1 = 100°F – (76.9°F)

T_1 = 23.1°F

~~Since the negative is showing a loss of heat, the initial temperature = 669°F.~~

THE CORRECT ANSWER IS: 23°F to 24°F

Solution 68, p. 82
Examinees are expected to be familiar with various treatment technologies.

Treatment Objective	Treatment Technology
A. Remove suspended solids	2. Media filtration
B. Reduce dissolved nutrients	3. Biologically active filtration
C. Degrade trace organics	1. UV/H_2O_2

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Solution 56, p. 78

Refer to the Streeter Phelps equation in the Stream Modeling section in the Environmental Engineering chapter of the *FE Reference Handbook*.

$$t_c = \frac{1}{k_r - k_d} \ln\left[\frac{k_r}{k_d}\left(1 - D_a \frac{(k_r - k_d)}{k_d L_a}\right)\right]$$

$$D = \frac{k_d L_a}{k_r - k_d}\left[\exp(-k_d t) - \exp(-k_r t)\right] + D_a \exp(-k_r t)$$

$$DO = DO_{\text{sat}} - D$$

From the question statement:

k_r = 0.4 day^{-1}
k_d = 0.2 day^{-1}
D_a = $DO_{\text{sat}} - DO_{\text{initial}}$ = 9.2 – 7.0 = 2.2 mg/L
L_a = 15 mg/L

t_c = 2.67 days
Dt_c = 4.39 mg/L
DO = $DO_{\text{sat}} - D_{t_c}$ = 9.2 – 4.39 = 4.8 mg/L

THE CORRECT ANSWER IS: C