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A complete Practice Exam for Setting Yourself up for Success on the Engineer In Training Exam

THE EIT | OTHER PRACTICE EXAM

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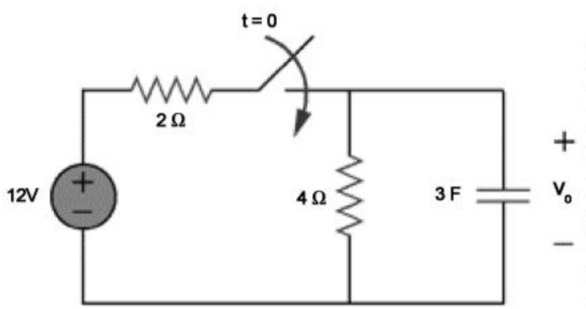
(D) 12V

30. In the circuit shown below, the switch has been closed for time t, subjecting the capacitor to a charge. Assuming at $t = 0$ that $V = 0$, determine the expression that gives voltage across the capacitor as it relates to t.



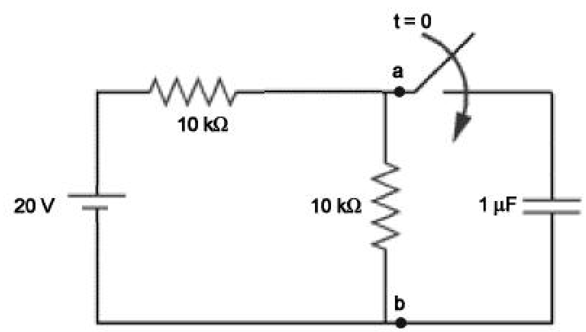
(A) $V_o(t) = 8 - 8e^{\frac{-t}{4}}$

(B) $V_o(t) = 8 + 8e^{\frac{-t}{4}}$

(C) $V_o(t) = 8e^{\frac{-t}{4}}$

(D) $V_o(t) = -8e^{\frac{-t}{4}}$

31. Given the circuit below, the 20V source is connected to the capacitor at $t = 0$. Knowing that the charge is complete after 5τ, determine the time (in seconds) when the $1\mu F$ capacitor will be fully charged:



(A) 25 ms

(B) 32 ms

(C) 10 ms

(D) 110 ms

43. A perfect gas enters a frictionless, insulated passage with a supersonic speed. It is desired to increase the static pressure of the gas as it flows through the passage. The passage area should:

(A) Decrease

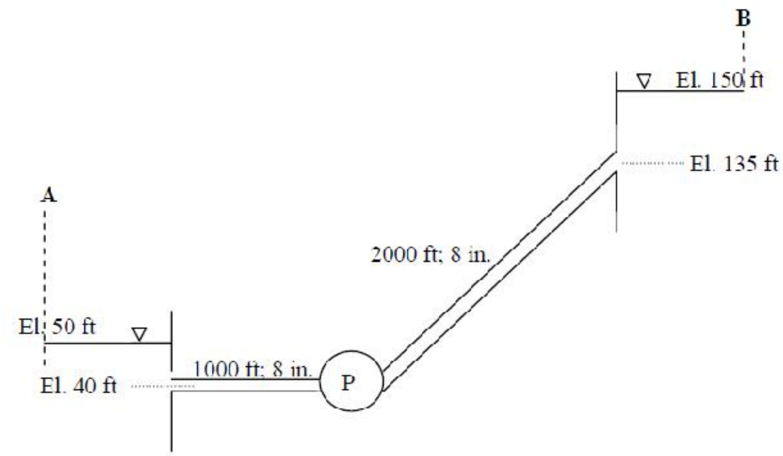
(B) Remain Constant

(C) Increase

(D) Be converging-diverging

44. Refer to the diagram.

The owners of the system wish to have the system pump water $(v = 1.06 \times 10^{-5} \frac{ft^2}{s}, \gamma = 62.4 \frac{lb}{ft^3})$ at a flow rate of $2.5 \frac{ft^3}{s}$. The pipes in the system have an absolute roughness of $6.6 \times 10^{-4}\ ft$. The horsepower needed to be delivered to the water is most close to:



(A) 971 HP

(B) 5.2 HP

(C) 49.7 HP

(D) 174.3 HP

34. Assuming the system is subjected to peak load of 800 lbs, the safety factor under these working conditions is most close to:

(A) .75

(B) 1

(C) 1.3

(D) 2

35. Aluminum foil is manufactured using pure aluminum with a density of $2.7\times10^{6}\,\frac{g}{m^{3}}$. A box of this aluminum foil is sold at a store and advertises that it contains $75\,ft^{2}$ of material per roll (304mm wide, 22.8 m long). If the foil is $.5\,\mu m$ thick, the number of atoms of aluminum in a roll is most close to:

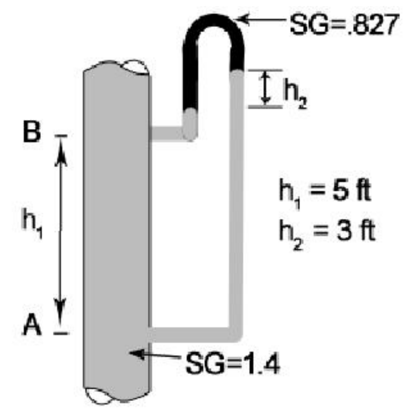
(A) 4.26×10^{24}

(B) 4.89×10^{24}

(C) 5.31×10^{24}

(D) 6.22×10^{24}

36. [The following data applies to problems 36 and 37] A fluid with a specific gravity of 1.4 is flowing in a vertical pipe. A monometer with a gauge fluid having a specific gravity of .827 is attached as shown in the diagram.



108. (D), 20,000 lb-in

There are two limits that need to be addressed to determine the maximum torque:

$\tau_{MAX} = 6000 psi$ and $\Phi = .02 radians$

Analyze both limits:

$$\tau_{MAX} = 6000 psi = \frac{Tr_o}{J}$$

$$T = \frac{6000 psi(J)}{r_o} = \frac{6000 psi(6in^4)}{(1.5in)} = 24,000 lb \cdot in$$

$$\Phi = .02 radians = \frac{TL}{JG}$$

$$T = \frac{.02 radians(JG)}{L} = \frac{.02 radians(6in^4)(10 \times 10^6 psi)}{60in} = 20,000 lb \cdot in$$

The lowest torque of the two is the most critical limit, and the maximum torque that can be applied to the system.

$$T = 20,000 lb \cdot in$$

109. (D), $59.2 MPa$

The fundamental equations used to solve the problem are:

$$\sigma_s = \frac{\sigma_c E_s}{E_c}$$

$$\sigma_c = \frac{FE_c}{A_s E_s + A_c E_c}$$

The surface area subjected to the load for each component:

$$A_c = (.18m)^2 = .0324m^2$$

$$A_s = (.2m)^2 - (.18m)^2 = .0076m^2$$

Therefore:

$$\sigma_c = \frac{(750\times10^3 N)(32.4\times10^9 Pa)}{(.0076m^2)(207\times10^9 Pa) + (.0324m^2)(32.4\times10^9 Pa)}$$

$$\sigma_c = 9.26\times10^6 Pa$$

And

$$\sigma_s = \frac{(9.26\times10^6 Pa)(207\times10^9 Pa)}{32.4\times10^9 Pa}$$

$$\sigma_s = 59.2\times10^6 Pa$$