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**Nonquantitative Problems
for FE Examination Review**

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Problem-79

The length, l , of a column divided by r is one of the terms in the equation for the buckling of a column under compression loads. What does r stand for in the l/r ratio?

- (a) radius of the column
- (b) radius of gyration
- (c) moment of inertia
- (d) slenderness

The answer is (b)

Problem-80

The buckling load of intermediate columns (too tall to be piers, but too short to be slender columns) can be determined by

- (a) the Euler load with fixed-end conditions.
- (b) computing allowable stress from the yield strength.
- (c) computing allowable stress from the ultimate strength.
- (d) the secant formula.

The answer is (d)

Problem-81

Which of the following gives the equivalent (composite) spring constant for a number of springs in series?

- (a) $\frac{1}{k_{\text{eq}}} = \frac{1}{k_1} + \frac{1}{k_2} + \dots + \frac{1}{k_n}$
- (b) $k_{\text{eq}} = k_1 + k_2 + \dots + k_n$
- (c) $k_{\text{eq}} = \frac{1}{n} \sum_{i=1}^n k_i$
- (d) $k_{\text{eq}} = \prod_{i=1}^n k_i$

The answer is (a)

Problem-82

Which of the following gives the equivalent (composite) spring constant for a number of springs in parallel?

- (a) $\frac{1}{k_{\text{eq}}} = \frac{1}{k_1} + \frac{1}{k_2} + \dots + \frac{1}{k_n}$
- (b) $k_{\text{eq}} = k_1 + k_2 + \dots + k_n$
- (c) $k_{\text{eq}} = \frac{1}{n} \sum_{i=1}^n k_i$
- (d) $k_{\text{eq}} = \prod_{i=1}^n k_i$

The answer is (b)

Problem-83

Which of the following gives the hoop stress (σ_h) of a thin-walled cylindrical tank?

- (a) $\sigma_h = \frac{pr}{t}$
- (b) $\sigma_h = \frac{pr}{2t}$
- (c) $\frac{t}{2r} < 0.1$
- (d) $\sigma_r = \frac{p_i r_i^2}{(r_o + r_i)t}$

The answer is (a)

Problem-84

Which of the following gives the hoop stress (σ_h) of a thin-walled spherical tank?

- (a) $\sigma_h = \frac{pr}{t}$
- (b) $\sigma_h = \frac{pr}{2t}$
- (c) $\frac{t}{2r} < 0.1$
- (d) $\sigma_r = \frac{p_i r_i^2}{(r_o + r_i)t}$

The answer is (b)

Problem-13

A process that is adiabatic and reversible is also

- (a) isobaric.
- (b) isothermal.
- (c) isentropic.
- (d) isometric.

The answer is (c)

Problem-14

The volume of an ideal gas is halved, while its temperature is doubled. What happens to the pressure?

- (a) The pressure doubles.
- (b) The pressure is halved.
- (c) The pressure is unchanged.
- (d) The pressure is multiplied by 4.

The answer is (d)

Problem-15

A liquid boils when its vapor pressure equals

- (a) the gage pressure.
- (b) the critical pressure.
- (c) the ambient pressure.
- (d) one standard atmosphere.

The answer is (c)

Problem-16

A system composed of ice and water at 0°C is said to be

- (a) a multiphase material.
- (b) in thermodynamic equilibrium.
- (c) in thermal equilibrium.
- (d) all of the above

The answer is (d)

Problem-17

Let Q = heat entering a system

S = entropy

T = temperature

W = work

P = pressure

U = internal energy

V = volume

All of the following relations are true except

(a) $H = U + PV$

(b) $Q = \Delta U + W$

(c) $W = \int PdV$

(d) $S = \int QdT$

The answer is (d)

Problem-18

The heat of fusion for a pure substance is

- (a) the change in phase from solid to gas.
- (b) the change in phase from liquid to gas.
- (c) the energy released in a chemical reaction.
- (d) the energy required to melt the substance.

The answer is (d)

Problem-19

The heat of vaporization involves the change in enthalpy due to

- (a) the change in phase from solid to gas.
- (b) the change in phase from liquid to gas.
- (c) the energy released in a chemical reaction.
- (d) the change in phase from solid to liquid.

The answer is (b)