Question: Instructions: 1. Solve the following questions with a complete ...

Instructions: 1. Solve the following questions with a complete solution.
2. Use 3 decimal places for the final answer.
3. Copy and answer

1. The absolute pressure at the bottom of the ocean is 120 kPa. How deep is the water at this point (**S G s e a w a t e r = 1.03**)?

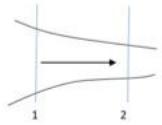
2. At what temperature is the °C and °F numerically the same?

3. A 40 kN tank weighs 64 kN when filled with kerosene and 70 kN when filled with the same volume of water. Find the specific gravity of kerosene.

4. What is the mass in grams and the weight in dynes and in gram forces of 12 oz of salt? Local g is 9.65 m/s^2 1 lb_m = 16 oz.

5. Two liquids of different densities(ρ_1=1500 kg/cu.m, ρ_2= 500 kg/cu.m) are poured together into a 100-L tank, filling it. If the resulting density of the mixture is 800 kg/cu.m. find the respective quantities of liquids used.

6. Air flows in a steady flow manner through a converging tube. At the inlet the pressure is 690kPaa and the density is 0.838 kg/m^3. If 125 m^3/min of air enters at the rate of 94 m/min and the exit section has a diameter of 350 mm, determine a) the mass flow rate (kg/min); b) the diameter of the entrance section (mm); c) the exit velocity(m/min). Assume that the density is constant.



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Expert Answer

Vengalarao Gandla answered this
527 answers

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(1.) The formula for absolute pressure is;

$$P_{ab} = P_o + \rho g h$$

where, P_o → atmospheric pressure

ρ → specific gravity.

g → gravitation.

h → height / depth.

given, $P_{ab} = 120$ KPa

and we know that,

$P_o = 101.325$ KPa.

and $g = 9.81\ m/s^2$

and given that $(\rho) = 1.03$.

∴ from $P_{ab} = P_o + \rho g h$

$\Rightarrow 120 = 101.325 + (1.03)(9.81)(h)$

$\Rightarrow 18.675 = (10.104)\,h$

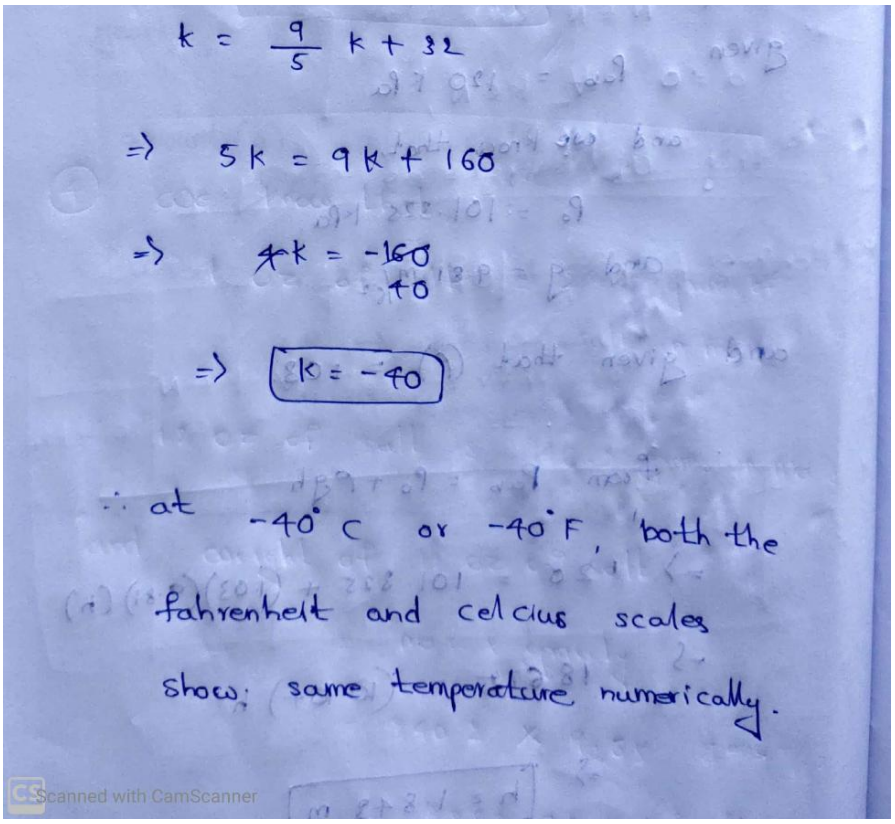
$\Rightarrow \boxed{h = 1.848\ m}$

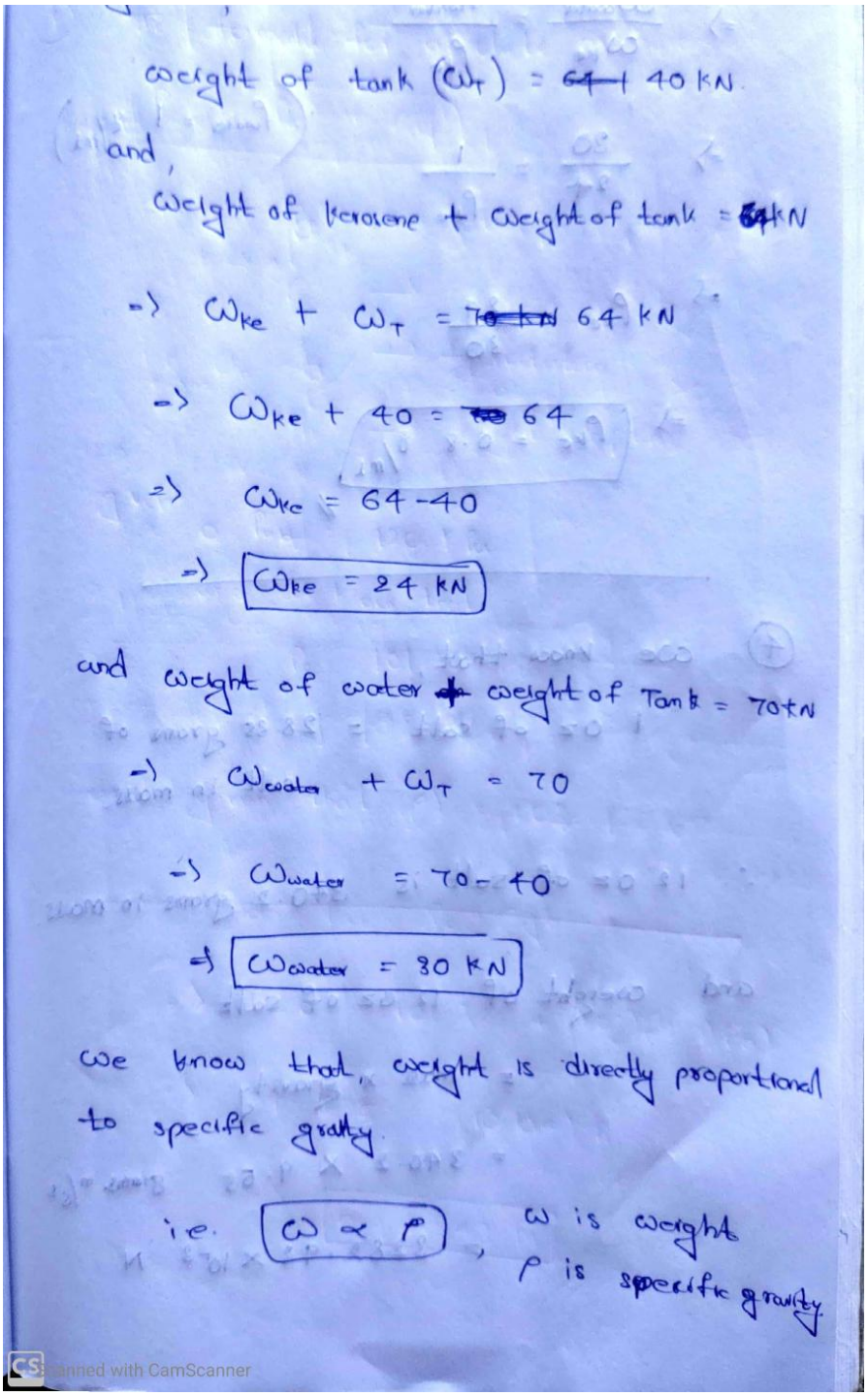
(2.) we know that relationship between Fahrenheit and Celcius scales is

$$F = \frac{9}{5}C + 32$$

Let, $F = k°F$ where, k is const

$C = k°C$





weight of tank (W_T) = ~~64~~ 40 kN

and,

weight of kerosene + weight of tank = ~~64~~ kN

$\Rightarrow W_{ke} + W_T = $ ~~70 kN~~ 64 kN

$\Rightarrow W_{ke} + 40 = $ ~~70~~ 64

$\Rightarrow W_{ke} = 64 - 40$

$\Rightarrow \boxed{W_{ke} = 24 \text{ kN}}$

and weight of water ~~+~~ weight of Tank = 70 kN

$\Rightarrow W_{water} + W_T = 70$

$\Rightarrow W_{water} = 70 - 40$

$\Rightarrow \boxed{W_{water} = 30 \text{ kN}}$

We know that, weight is directly proportional to specific gravity.

i.e. $\boxed{W \propto \rho}$, W is weight, ρ is specific gravity

$$\Rightarrow \frac{\omega_{oil}}{\omega_{ke}} = \frac{\rho_{water}}{\rho_{ke}}$$

$$\Rightarrow \frac{30}{24} = \frac{1}{\rho_{ke}} \quad \left(\because \rho_{water} = 1\ g/ml\right)$$

$$\Rightarrow \rho_{ke} = \frac{24}{30}$$

$$\Rightarrow \boxed{\rho_{ke} = 0.8\ g/ml}$$

(4) We know that,

1 oz of salt = 28.35 grams of salt in mass

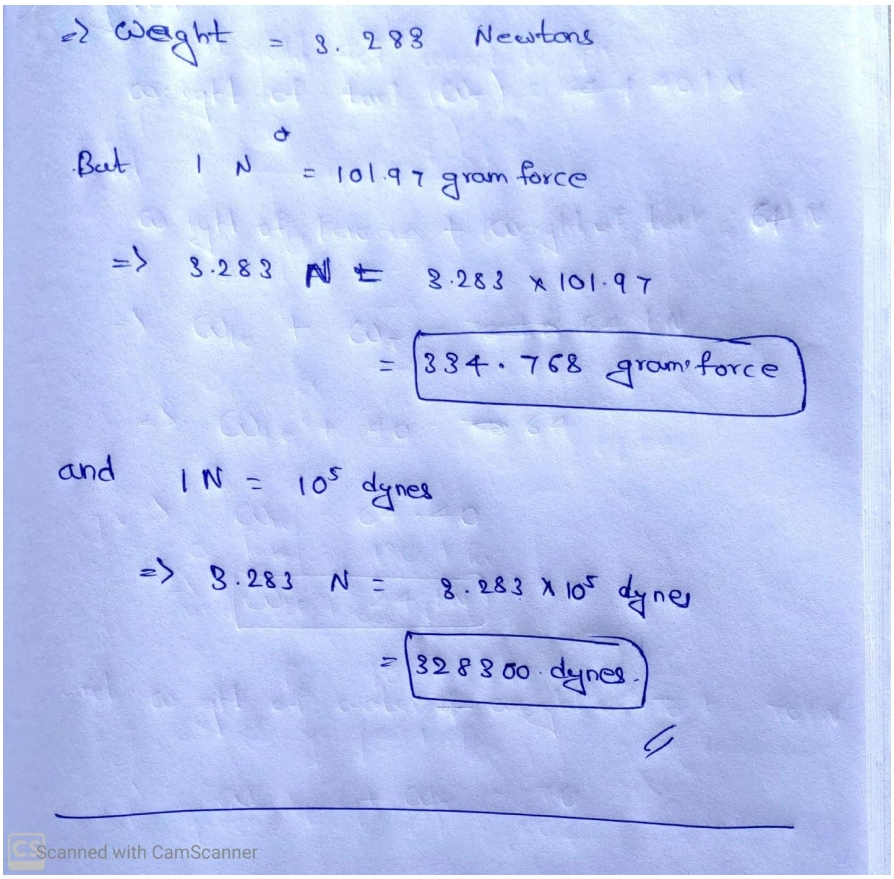
∴ 12 oz of salt is 340.2 grams in mass.

and weight of 12 oz of salt

= mass × gravity

= 340.2 × 9.65 grams. m/s^2

= 3282.93 × 10^{-3} N



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