7th foundation

ws-12 Heat

Thank

(1)

Freezing point = melting point of ice = 0°C → B

(2)

water boils at 100°C.

∴ Temperature on kelvin scale = 273.15+C

= 273.15+100

= 373.15 K

(3)

The temperature scale used in everyday life is celsius scale

(4)

Boiling point of water = 100°C in celsius scale on Fahrenheit scale it is 212°F

From $C = \frac{5}{9}(F-32)$

$\Rightarrow \frac{20}{100} = \frac{5}{9}(F-32)$

$\Rightarrow 20 = \frac{1}{9}(F-32) \Rightarrow 9\times 20 = F-32$

$\Rightarrow 180 = F-32$

$\Rightarrow F = 180+32 = 212°F$

(5)

Absolute zero on kelvin scale = -273.15 k.

(6)

Given $C = F$

From $C = \frac{5}{9}(F-32)$

$\Rightarrow C = \frac{5}{9}(C-32)$

$\Rightarrow 9C = 5C - 160$

$\Rightarrow 4C = -160 \Rightarrow C = -40^\circ$

(7)

Temperature in centigrade scale equal to 68°F is

$C = \frac{5}{9}(F-32)$

$= \frac{5}{9}(68-32) = \frac{5}{9} \times 36^4 = 5 \times 4 = 20^\circ C$

Temp difference between 20°c and 68°c is 48°c

(9) (10)

Relation between celsius and fahrenheit

$\Rightarrow \frac{C-L.F.P_1}{U.F.P_1 - L.F.P_1} = \frac{F-L.F.P_2}{U.F.P_2 - L.F.P_2}$

$\Rightarrow \frac{C-0}{100-0} = \frac{F-32}{212-32}$

$\Rightarrow \frac{C}{100} = \frac{F-32}{180}$

$\Rightarrow C = (F-32) \times \frac{100}{180}$

$\Rightarrow C = \frac{5}{9}(F-32)$

(2)

$C = 50^\circ C$

$K = 273 + C = 273 + 50 = 323\,K.$

We know $\frac{C}{100} = \frac{R}{80} \Rightarrow \frac{50}{100_2} = \frac{R}{80_{40}}$

$\Rightarrow R = 40^\circ R$

From $C = \frac{5}{9}(F-32)$

$\Rightarrow \frac{10}{50} = \frac{5}{9}(F-32)$

$\Rightarrow 10 = \frac{1}{9}(F-32) \Rightarrow F-32 = 90$

$\Rightarrow F = 90+32 = 122^\circ F$

(4)

There are 100 divisions between ice point (273k) and steam point (373k).

Each part value $= \frac{1}{100}$ of difference.

In Reaumur scale = 80 division are there between ice point ($0^\circ R$) and steam point ($80^\circ R$).

Each division $= \frac{1}{80}$ of difference.

(7)

Given $k = 200\,k$

We know that $k = 273 + C$

$\Rightarrow 200 = 273 + C$

$\Rightarrow C = 200 - 273 = -73^\circ C.$

(8)

Given $C = 37^\circ C$

$K = 273 + C$

$= 273 + 37 = 310\ K.$

(9)

Given $F = 100^\circ F$

From $\frac{R}{80} = \frac{(F-32)}{180}$

$\Rightarrow \frac{R}{4} = \frac{(100-32)}{9} = \frac{68}{9}$

$\Rightarrow R = 4 \times \frac{68}{9} = 30.2\ R.$

(10)

$100^\circ C$ equal to

$K = 273 + C = 273 + 100 = 373\ K$

From $\frac{C}{100} = \frac{R}{80} \Rightarrow \frac{100}{100} = \frac{R}{80} \Rightarrow R = 80^\circ R$

From $C = \frac{5}{9}(F-32)$

$\Rightarrow 20 = \frac{5}{9}(F-32)$

$\Rightarrow 20 = \frac{1}{9}(F-32)$

$\Rightarrow 20 \times 9 = F - 32$

$F = 180 + 32 = 212^\circ F$

2 Tank

Advanced

(3)

Mercury is a good conductor of liquids.
It can easily obtained in pure state.
It does not stick to glass tube thermometer.
It has very high density. It has low freezing point and a very high boiling point

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(9)

As altitude increases, the amount of air over a unit area decreases. Therfore, the atmospheric pressure will reduce due to lower air molecules.

(10)

The pressure exerted by a liquid increases with depth. This is due to an increase in hydrostatic pressure, the force per unit area exerted by a liquid on an object. As you go deeper, the area of liquid exerting pressure increases, thus it also increases the pressure.

(11)

Four forces affect things that fly.

1. weight is the force of gravity. It acts in downward
2. Lift is the force that acts at a right angle to the direction of motion through air. Lift is created by difference in air Pressure.
3. Thrust is the force that propels a flying machine in the direction of motion. Engine produce thrust.
4. Drag is the force that acts opposite to the direction of motion. Drag is caused by friction and differences in air Pressure.

(12)

Atmospheric Pressure decreases when air descends due to the increase in volume.

(13)

According to Pascal's law, For same level in different containers P = same [Even surface area is different]

$F = P \times$ Area.

less will be surface area then more will be force.

(15), (16), (17)

(14)

$P_{Liquid} = P_{water}$

$\Rightarrow \rho_L g h_L = \rho_w g h_w$

$\Rightarrow 0.8 \times h_L = 1 \times 50$

$\Rightarrow h_L = \frac{50}{0.8} = \frac{500}{8}$

$\Rightarrow h_L = 62.5\,cm$

(15)

$P_L = P_w$

$= \rho_w g h_w$

$= 1 \times 1000 \times 50$

$= 50,000\ dyn/cm^2$

(17)

Atmospheric Pressure depends on temperature and altitude

(18)

(19)

~~$h = 10^3\ m$; $P_w = \rho_w g h$~~

Task
CUQ's

(6)

Sudden fall in barometer is indication of storm because atmospheric pressure decreases all of a sudden during storm.

(7)

Static fluid refers to the fact that there is no motion in the fluid, which has equal pressure from every direction, and it only responds through an accelerating force, depending on the depth

(8)

Pressure is a scalar quantity. Pressure acts normal on a surface and it is always compressive in nature Therefore, only its magnitude is required for it's complete description

(10)

In all containers level of liquid is same

we know variation of pressure with depth is

$$P = \rho g h$$

Here ρ, g, h are same for all so P = same

Jee mains level

(2)

Rockets produce thrust through the expulsion of mass. In this case the hot exhaust gases from burning fuel. The rocket engine serves as the powerhouse where fuel combustion occurs. with the resulting gases being directed out

(3)

$\frac{F}{W}$ is thrust to weight ratio, and it is directly proportional to the acceleration of the aircraft. An aircraft with a high thrust to weight ratio has high acceleration. For most flight conditions, an aircraft with a high thrust to weight ratio will also have a high value of excess thrust.

(4)

There is a control, usually a level the pilot can move, for each engine. By regulation this moves forward for maximum thrust and backward for minimum thrust. This either sends an electrical signal or a mechanical input to the engine fuel controller which then does whatever it needs to adjust the engine thrust.

(5)

Thrust generation is in the rocket propulsion rocket engines, jet engines and deflating balloons. Principle is Newton's third law

(6)

when we suck using a straw, we create a pressure difference at the ends of the straw. which drives the liquid up the straw. liquid travels from high → low pressure. This is Bernoulli's Principle

(7)

when F constant since $P = \frac{F}{a} = \frac{\text{Force}}{\text{area}}$

$$\text{Pressure} \propto \frac{1}{\text{area}}$$

As area increases, Pressure decreases.