1. The energy that will be ideally radiated by a 100 kW transmitter in 1 hour is: **(2022)**
(a) $36 \times 10^4\ J$ (b) $36 \times 10^5\ J$
(c) $1 \times 10^5\ J$ (d) $36 \times 10^7\ J$

2. A cup of coffee cools from 90°C to 80°C in t minutes, when the room temperature is 20°C. The time taken by a similar cup of coffee to cool from 80° C to 60°C at a room temperature same at 20°C is: **(2021)**
(a) $\frac{13}{5}t$ (b) $\frac{10}{13}t$
(c) $\frac{5}{13}t$ (d) $\frac{13}{10}t$

3. The quantities of heat required to raise the temperature of two solid copper sphere of radii r_1 and $r_2(r_1 = 1.5\ r_2)$ through 1 K are in the ratio : **(2020)**
(a) 9/4 (b) 3/2
(c) 5/3 (d) 27/8

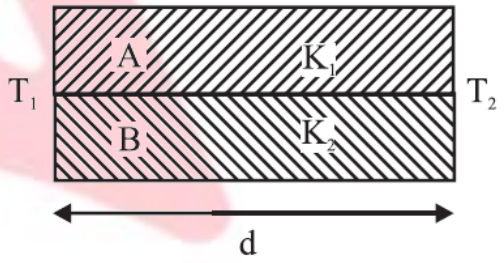
4. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is : **(2020)**
(a) Adiabatic (b) Isochoric
(c) Isobaric (d) Isothermal

5. A copper rod of 88 cm and an aluminium rod of unknown length have their increase in length independent of increase in temperature. The length of aluminium rod is : **(2019)**
($\alpha_{Cu} = 1.7 \times 10^{-5}K^{-1}$ and $\alpha_{Al} = 2.2 \times 10^{-5}K^{-1}$)
(a) 6.8 cm (b) 113.9 cm
(c) 88 cm (d) 68 cm

6. The unit of thermal conductivity is : **(2019)**
(a) $J\ m\ K^{-1}$ (b) $J\ m^{-1}\ K^{-1}$
(c) $W\ m\ K^{-1}$ (d) $W\ m^{-1}K^{-1}$

7. The power radiated by a black body is P and it radiates maximum energy at wavelength, λ_0. If the temperature of the black body is now changed so that it radiates maximum energy at wavelength $\frac{3}{4}\lambda_0$, the power radiated by it becomes nP. The value of n is: **(2018)**
(a) 256/81 (b) 4/3
(c) ¾ (d) 81/256

8. Two rods A and B of different material are welded together as shown in figure. Their thermal conductivities are K_1 and K_2. The thermal conductivity of the composite rod will be: **(2017-Delhi)**



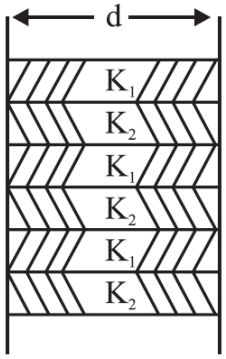
(a) $\frac{3(K_1+K_2)}{2}$ (b) $K_1 + K_2$
(c) $2(K_1 + K_2)$ (d) $\frac{K_1+K_2}{2}$

9. A spherical black body with a radius of 12 cm radiates 450 watt power at 500 K. If the radius were halved and the temperature doubled, the power radiated in watt would be: **(2017-Delhi)**
(a) 450 (b) 1000
(c) 1800 (d) 225

10. In a certain planetary system, it is observed that one of the celestial bodies having a surface temperature of 200 K, emits radiation of maximum intensity near the wavelength 12μm. The surface temperature of a nearby star which emits light of maximum intensity at a wavelength $\lambda =$ 4800 Å, is: **(2017-Gujarat)**
(a) 7500 K (b) 5000 K
(c) 2500 K (d) 10000 K

11. A wall consists of alternating blocks of length 'd' and coefficient of thermal conductivity K_1 and K_2 respectively as shown in figure. The cross sectional area of the blocks are the same. The equivalent coefficient of thermal conductivity of the wall between left and right is:

(2017-Gujarat)



(a) $\frac{K_1+K_2}{2}$ (b) $\frac{2K_1K_2}{K_1+K_2}$

(c) $\frac{K_1+K_2}{3}$ (d) $\frac{3K_1K_2}{K_1+K_2}$

12. Two identical bodies are made of a material for which the heat capacity increases with temperature. One of these is at 100°C, while the other one is at 0°C. If the two bodies are brought into contact, then, assuming no heat loss, the final common temperature is:

(2016-II)

(a) Less than 50°C but greater than 0°C

(b) 0°C

(c) 50°C

(d) More than 50°C

13. Coefficient of linear expansion of brass and steel rods are α_1 and α_2. Lengths of brass and steel rods are l_1 and l_2 respectively. If ($l_2 - l_1$) is maintained same at all temperatures, which one of the following relations holds good? **(2016-I)**

(a) $\alpha_1 l_2 = \alpha_2 l_1$ (b) $\alpha_1 l_2^2 = \alpha_2 l_1^2$

(c) $\alpha_1^2 l_2 = \alpha_2^2 l_1$ (d) $\alpha_1 l_1 = \alpha_2 l_2$

14. A black body is at a temperature of 5760 K. The energy of radiation emitted by the body at wavelength 250 nm is U_1, at wavelength 500 nm is U_2 and that at 1000 nm is U_3. Wien's constant, b = 2.88×10^6 nmK. Which of the following is correct? **(2016-I)**

(a) $U_1 = 0$ (b) $U_3 = 0$

(c) $U_1 > U_2$ (d) $U_2 > U_1$

15. The two ends of a metal rod are maintained at temperatures 100°C and 110°C. The rate of heat flow in the rod is found to be 4.0 J/s. If the ends are maintained at temperatures 200°C and 210°C, the rate of heat flow will be: **(2015)**

(a) 16.8 J/s (b) 8.0 J/s

(c) 4.0 J/s (d) 44.0 J/s

16. The value of coefficient of volume expansion of glycerin is 5×10^{-4}/K . The fractional change in the density of glycerin for a rise of 40°C in its temperature, is: **(2015 Re)**

(a) 0.010 (b) 0.015

(c) 0.020 (d) 0.025

17. Certain quantity of water cools from 70°C to 60°C in the first 5 minutes and to 54°C in the next 5 minutes. The temperature of the surroundings is: **(2014)**

(a) 45°C (b) 20°C

(c) 42°C (d) 10°C

18. Steam at 100°C is passed into 20 g of water at 10°C. When water acquires a temperature of 80°C, the mass of water present will be: **(2014)**

[Take specific heat of water = $1 cal/g/°C$ and latent heat of steam = $540 cal\ g^{-1}$]:

(a) 24 g (b) 31.5 g

(c) 42.5 g (d) 22.5 g

19. A piece of iron is heated in a flame. It first becomes dull red then becomes reddish yellow and finally turns to white hot. The correct explanation for the above observation is possible by using: **(2013)**

(a) Newton's Law of cooling

(b) Stefan's Law

(c) Wien's displacement Law

(d) Kirchoff's Law