Physicsaholics

DPP – 4

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/68

Video Solution on YouTube:- https://youtu.be/EirLXuNXWbk

Q 1. Find the rate of loss of heat to the surrounding when the ball is at 50ºC.
(A) 10 W (B) 15 W
(C) 20 W (D) 25 W

Q 2. Using Newtons law of cooling , find rate of heat loss to the surrounding when ball is at 30^0C ?
(A) $\frac{10}{3}W$ (B) $\frac{20}{3}W$
(C) $\frac{30}{3}W$ (D) $\frac{40}{3}W$

Q 3. Assume that the temperature of the ball rises uniformly from 20ºC to 30ºC in 5 minutes find the total loss of heat to the surrounding during this period –
(A) 250 J (B) 500 J
(C) 750 J (D) 1000 J

Q 4. Find the specific heat capacity of the metal
(A) 500 J/kg-K (B) 1000 J/kg-K
(C) 1500 J/kg-K (D) 2000 J/kg-K

Q 5. An object is cooled from 75°C to 65°C in 2 minutes in room at 30°C. The time taken to cool the same object from 55°C to 45°C in the same room is
(a) 5 minute
(b) 3 minute
(c) 4 minute
(d) 2 minute

Q 6. A planet having surface temperature T has solar constant S. An angle θ is subtended by the sun at planet then
(a) S $\propto T^2$
(b) S $\propto$ T
(c) S $\propto \theta^0$
(d) S $\propto \theta^2$

Q 7. Four spheres A, B, C and D of different metals but of same radius are kept at same temperature. The ratio of their densities and specific heats are 2 : 3 : 5 : 1 and 3 : 6 : 2 : 4. Which sphere will show the fastest rate of cooling (initially):
(a) A (b) B
(c) C (d) D

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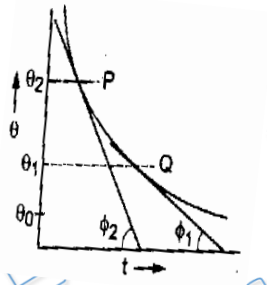
Q 8. A body cools from 50°C to 40°C in 5 minutes. The surrounding temperature is 20°C. In what further time (in minutes) will it cool to 30°C?

(a) 5 (b) 15/2
(c) 25/3 (d) 10

Q 9. A planet is at an average distance d from the sun, and its average surface temperature is T. Assume that the planet receives energy only from the sun, and loses energy only through radiation from its surface. Neglect atmospheric effects. If $T \propto d^{-n}$, the value of n is

(a) 2 (b) 1
(c) 1/2 (d) 1/4

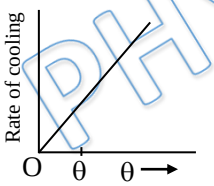
Q 10. A body cools in a surrounding which is at a constant temperature of θ_0. Assume that it obeys Newton's law of cooling. Its temperature θ is plotted against time t. Tangents are drawn to the curve at the points P($\theta = \theta_1$) and Q($\theta = \theta_2$). These tangents meet the time axis at angles of ϕ_2 and ϕ_1, as shown.

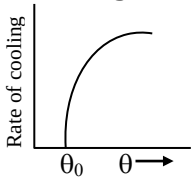


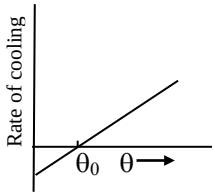
(a) $\frac{tan\,\varphi_2}{tan\,\varphi_1} = \frac{\theta_1-\theta_0}{\theta_2-\theta_0}$ (b) $\frac{tan\,\varphi_2}{tan\,\varphi_1} = \frac{\theta_2-\theta_0}{\theta_1-\theta_0}$

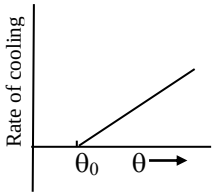
(c) $\frac{tan\,\varphi_1}{tan\,\varphi_2} = \frac{\theta_1}{\theta_2}$ (d) $\frac{tan\,\varphi_1}{tan\,\varphi_2} = \frac{\theta_2}{\theta_1}$

Q 11. If the temperature of a body (θ) is slightly more than the temperature of the surrounding (θ_0), then the rate of cooling is correctly represented by –

(A)


(B)


(C)


(d)


Q 12. Two identical spheres A and B are suspended in an air chamber which is maintained at a temperature of 50^0C. Find the ratio of heat lost per sec from the surface of A to that of B, if A and B are at temperature 60^0 and 55^0C respectively.

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Q 13. A hot body placed in air is cooled according to Newton's law of cooling, the rate of decrease of temperature being K times the temperature difference from the surroundings. Starting from t = 0, the time in which the body loses half the maximum heat is given by $\frac{lnx}{K}$, where x is equal to

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Answer Key

Q.1 c	**Q.2 b**	**Q.3 d**	**Q.4 a**	**Q.5 c**
Q.6 d	**Q.7 d**	**Q.8 c**	**Q.9 c**	**Q.10 b**
Q.11 d	**Q.12 2**	**Q.13 2**		