

PHYSICS · JEE MAIN

Heat Transfer

Chapter-wise previous year questions, with answer key

15

PYQS

2020–2025

PAPERS

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TOPICS

Newton's Law of Cooling

Radiation and Stefan-Boltzmann Law

Conduction

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

Practise this chapter online with instant answer checking: prepwiser.in/learn · No signup needed to browse

Newton's Law of Cooling · 10 PYQs

Q1 JEE Main 2025 · 29 Jan · Shift 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 the similar cup of coffee to cool from 80°C to 60°C at the same room temperature is:

- (A) $\frac{13}{5}t$
- (B) $\frac{10}{13}t$
- (C) $\frac{5}{13}t$
- (D) $\frac{13}{10}t$

[Step-by-step solution ► prepwisser.in/questions/ATboud1ZRF](https://www.prepwisser.in/questions/ATboud1ZRF)

Q2 JEE Main 2025 · 24 Jan · Shift 2

The temperature of a body in air falls from 40°C to 24°C in 4 minutes. The temperature of the air is 16°C . The temperature of the body in the next 4 minutes will be :

- (A) $\frac{28}{3}^{\circ}\text{C}$
- (B) $\frac{56}{3}^{\circ}\text{C}$
- (C) $\frac{42}{3}^{\circ}\text{C}$
- (D) $\frac{14}{3}^{\circ}\text{C}$

[Step-by-step solution ► prepwisser.in/questions/HpB0ZzYdbU](https://www.prepwisser.in/questions/HpB0ZzYdbU)

Q3 JEE Main 2023 · 12 Apr · Shift 1

A body cools from 80°C to 60°C in 5 minutes. The temperature of the surrounding is 20°C . The time it takes to cool from 60°C to 40°C is :

- (A) 500 s
- (B) $\frac{25}{3}\text{S}$
- (C) 450 s
- (D) 420 s

[Step-by-step solution ► prepwisser.in/questions/LiIGI1Llat](https://www.prepwisser.in/questions/LiIGI1Llat)

Q4 JEE Main 2023 · 6 Apr · Shift 2

A body cools in 7 minutes from 60°C to 40°C . The temperature of the surrounding is 10°C . The temperature of the body after the next 7 minutes will be:

- (A) 34°C
- (B) 28°C
- (C) 32°C
- (D) 30°C

[Step-by-step solution ► prepwisser.in/questions/g-UA_ea_PM](https://www.prepwisser.in/questions/g-UA_ea_PM)

Q5 JEE Main 2023 · 29 Jan · Shift 1

A body cools from 60°C to 40°C in 6 minutes. If, temperature of surroundings is 10°C . Then, after the next 6 minutes, its temperature will be _____ $^{\circ}\text{C}$.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/NBkinBm9WE](https://www.prepwisser.in/questions/NBkinBm9WE)

Q6 JEE Main 2023 · 25 Jan · Shift 1

A bowl filled with very hot soup cools from 98°C to 86°C in 2 minutes when the room temperature is 22°C . How long it will take to cool from 75°C to 69°C ?

- (A) 2 minutes (B) 0.5 minute
(C) 1.4 minutes (D) 1 minute

Step-by-step solution ► [prepwisser.in/questions/VUCB5K0HZs](https://www.prepwisser.in/questions/VUCB5K0HZs)

Q7 JEE Main 2022 · 27 Jul · Shift 1

Read the following statements :

- A. When small temperature difference between a liquid and its surrounding is doubled, the rate of loss of heat of the liquid becomes twice.
B. Two bodies P and Q having equal surface areas are maintained at temperature 10°C and 20°C . The thermal radiation emitted in a given time by P and Q are in the ratio 1 : 1.15.
C. A Carnot Engine working between 100K and 400K has an efficiency of 75%.
D. When small temperature difference between a liquid and its surrounding is quadrupled, the rate of loss of heat of the liquid becomes twice.

Choose the correct answer from the options given below :

- (A) A, B, C only (B) A, B only
(C) A, C only (D) B, C, D only

Step-by-step solution ► [prepwisser.in/questions/m6EPAhO6FN](https://www.prepwisser.in/questions/m6EPAhO6FN)

Q8 JEE Main 2021 · 27 Jul · Shift 1

A body takes 4 min. to cool from 61°C to 59°C . If the temperature of the surroundings is 30°C , the time taken by the body to cool from 51°C to 49°C is :

- (A) 4 min. (B) 3 min.
(C) 8 min. (D) 6 min.

Step-by-step solution ► [prepwisser.in/questions/sGQH_pK56V](https://www.prepwisser.in/questions/sGQH_pK56V)

Q9 JEE Main 2021 · 22 Jul · Shift 2

In 5 minutes, a body cools from 75°C to 65°C at room temperature of 25°C . The temperature of body at the end of next 5 minutes is _____ $^{\circ}\text{C}$.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisser.in/questions/APffeyhMTm](https://www.prepwisser.in/questions/APffeyhMTm)

Q10 JEE Main 2020 · 3 Sep · Shift 2

A metallic sphere cools from 50°C to 40°C in 300 s. If atmospheric temperature around is 20°C , then the sphere's temperature after the next 5 minutes will be close to :

- (A) 35°C
(B) 31°C
(C) 33°C
(D) 28°C

Step-by-step solution ► [prepwisser.in/questions/dmS27qyIRx](https://www.prepwisser.in/questions/dmS27qyIRx)

Radiation and Stefan-Boltzmann Law · 3 PYQs

Q11 JEE Main 2025 · 7 Apr · Shift 1

A wire of length 10 cm and diameter 0.5 mm is used in a bulb. The temperature of the wire is 1727°C and power radiated by the wire is 94.2 W. Its emissivity is $\frac{x}{8}$ where $x = \underline{\hspace{2cm}}$.

(Given $\sigma = 6.0 \times 10^{-8} \text{Wm}^{-2}\text{K}^{-4}$, $\pi = 3.14$ and assume that the emissivity of wire material is same at all wavelength.)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/ebBoIku0Yf](https://www.prepwiser.in/questions/ebBoIku0Yf)

Q12 JEE Main 2025 · 22 Jan · Shift 1

Two spherical bodies of same materials having radii 0.2 m and 0.8 m are placed in same atmosphere. The temperature of the smaller body is 800 K and temperature of the bigger body is 400 K. If the energy radiated from the smaller body is E, the energy radiated from the bigger body is (assume, effect of the surrounding temperature to be negligible),

(A) 64 E

(B) 16 E

(C) E

(D) 256 E

[Step-by-step solution ► prepwiser.in/questions/nUa8jdisgH](https://www.prepwiser.in/questions/nUa8jdisgH)

Q13 JEE Main 2022 · 29 Jul · Shift 2

Nearly 10% of the power of a 110W light bulb is converted to visible radiation. The change in average intensities of visible radiation, at a distance of 1m from the bulb to a distance of 5m is $a \times 10^{-2} \text{W/m}^2$. The value of 'a' will be $\underline{\hspace{2cm}}$.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/VtskxcWNYb](https://www.prepwiser.in/questions/VtskxcWNYb)

Conduction · 2 PYQs

Q14 JEE Main 2023 · 13 Apr · Shift 2

Two plates A and B have thermal conductivities $84 \text{Wm}^{-1}\text{K}^{-1}$ and $126 \text{Wm}^{-1}\text{K}^{-1}$ respectively. They have same surface area and same thickness. They are placed in contact along their surfaces. If the temperatures of the outer surfaces of A and B are kept at 100°C and 0°C respectively, then the temperature of the surface of contact in steady state is $\underline{\hspace{2cm}}$ $^{\circ}\text{C}$.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/IxkixZYdfX](https://www.prepwiser.in/questions/IxkixZYdfX)

An ice cube of dimensions $60\text{cm} \times 50\text{cm} \times 20\text{cm}$ is placed in an insulation box of wall thickness 1cm . The box keeping the ice cube at 0°C of temperature is brought to a room of temperature 40°C . The rate of melting of ice is approximately :

(Latent heat of fusion of ice is $3.4 \times 10^5 \text{Jkg}^{-1}$ and thermal conducting of insulation wall is $0.05 \text{Wm}^{-1}\text{C}^{-1}$)

(A) $61 \times 10^{-3} \text{kg s}^{-1}$

(B) $61 \times 10^{-5} \text{kg s}^{-1}$

(C) 208kg s^{-1}

(D) $30 \times 10^{-5} \text{kg s}^{-1}$

Step-by-step solution ► prepwiser.in/questions/immgt5nJSk

Answer key — Heat Transfer

Numbers match the question numbers above. For full working, open the solution link under each question.

1	A	2	B	3	A	4	B	5	28	6	C	7	A	8	D
9	57	10	C	11	5	12	C	13	84	14	40	15	B		

Want the next chapter?

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