

PYQSide

JEE MAIN THERMAL PROPERTIES OF MATTER — PYQS

Max. Marks: 64

Questions: 16

Section A (MCQ)

- Q.1** The temperature of a metal strip having coefficient of linear expansion α is increased from T_1 to T_2 resulting in increase of its length by ΔL_1 . The temperature is further increased from T_2 to T_3 such that the increase in its length is ΔL_2 . Given $T_3 + T_1 = 2T_2$ and $T_2 - T_1 = \Delta T$, the value of ΔL_2 is _____.

[JEE Main 2026 (Online) 4th April Evening Shift]

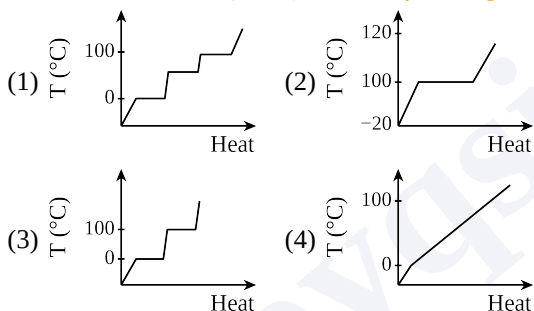
- (1) $\Delta L_1[1 + 2\alpha^2(\Delta T)^2]$ (2) $\Delta L_1[1 + \alpha^2(\Delta T)^2]$
 (3) $\Delta L_1[1 + 2\alpha\Delta T]$ (4) $\Delta L_1[1 + \alpha\Delta T]$

Scan or tap for the full solution



- Q.2** Which of the following best represents the temperature versus heat supplied graph for water, in the range of -20°C to 120°C ?

[JEE Main 2026 (Online) 28th January Morning Shift]



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- Q.3** 10 kg of ice at -10°C is added to 100 kg of water to lower its temperature from 25°C . Consider no heat exchange to surroundings. The decrement to the temperature of water is _____ $^\circ\text{C}$.
 (specific heat of ice = $2100 \text{ J/kg } ^\circ\text{C}$, specific heat of water = $4200 \text{ J/kg } ^\circ\text{C}$, latent heat of fusion of ice = $3.36 \times 10^5 \text{ J/kg}$)

[JEE Main 2026 (Online) 28th January Morning Shift]

- (1) 15 (2) 10 (3) 6.67 (4) 11.6

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- Q.4** A brass wire of length 2 m and radius 1 mm at 27°C is held taut between two rigid supports. Initially it was cooled to a temperature of -43°C creating a tension T in the wire. The temperature to which the wire has to be cooled in order to increase the tension in it to $1.4T$, is _____ $^\circ\text{C}$.

[JEE Main 2026 (Online) 24th January Morning Shift]

- (1) -71 (2) -80 (3) -65 (4) -86

Scan or tap for the full solution



- Q.5** An air bubble of volume 2.9 cm^3 rises from the bottom of a swimming pool of 5 m deep. At the bottom of the pool water temperature is 17°C . The volume of the bubble when it reaches the surface, where the water temperature is 27°C , is _____ cm^3 .
 ($g = 10 \text{ m/s}^2$, density of water = 10^3 kg/m^3 , and 1 atm pressure is 10^5 Pa)

[JEE Main 2026 (Online) 23rd January Evening Shift]

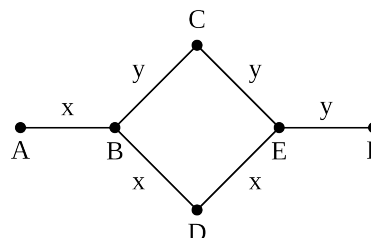
- (1) 2.0 (2) 4.2 (3) 3.0 (4) 4.5

Scan or tap for the full solution



- Q.6** Rods x and y of equal dimensions but of different materials are joined as shown in figure. Temperatures of end points A and F are maintained at 100°C and 40°C respectively. Given the thermal conductivity of rod x is three times of that of rod y, the temperatures at junction points B and E are (close to):

[JEE Main 2026 (Online) 22nd January Morning Shift]



- (1) 60°C and 45°C respectively
 (2) 80°C and 70°C respectively
 (3) 89°C and 73°C respectively
 (4) 80°C and 60°C respectively

Scan or tap for the full solution



- Q.7** An aluminium and a steel rod having same lengths and cross-sections are joined to make total length of 120 cm at 30°C. The coefficients of linear expansion of aluminium and steel are $24 \times 10^{-6}/^\circ\text{C}$ and $1.2 \times 10^{-5}/^\circ\text{C}$, respectively. The length of this composite rod when its temperature is raised to 100°C, is _____ cm.

[JEE Main 2026 (Online) 21st January Morning Shift]

- (1) 120.20 (2) 120.06 (3) 120.15 (4) 120.03

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- Q.8** A gas based geyser heats water flowing at the rate of 5.0 litres per minute from 27°C to 87°C. The rate of consumption of the gas is _____ g/s.

(Take heat of combustion of gas = 5.0×10^4 J/g, specific heat capacity of water = 4200 J/kg·°C)

[JEE Main 2026 (Online) 21st January Morning Shift]

- (1) 4.2 (2) 2.1 (3) 0.21 (4) 0.42

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- Q.9** Water falls from a height of 200 m into a pool. Calculate the rise in temperature of the water assuming no heat dissipation from the water in the pool.

(Take $g = 10$ m/s², specific heat of water = 4200 J/(kg K))

[JEE Main 2025 (Online) 8th April Evening Shift]

- (1) 0.36 K (2) 0.23 K (3) 0.48 K (4) 0.14 K

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- Q.10** Consider a rectangular sheet of solid material of length $l = 9$ cm and width $d = 4$ cm. The coefficient of linear expansion is $\alpha = 3.1 \times 10^{-5} \text{ K}^{-1}$ at room temperature and one atmospheric pressure. The mass of sheet $m = 0.1$ kg and the specific heat capacity $C_v = 900 \text{ J kg}^{-1} \text{ K}^{-1}$. If the amount of heat supplied to the material is 8.1×10^2 J then change in area of the rectangular sheet is :

[JEE Main 2025 (Online) 4th April Evening Shift]

- (1) $2.0 \times 10^{-6} \text{ m}^2$ (2) $6.0 \times 10^{-7} \text{ m}^2$
(3) $3.0 \times 10^{-7} \text{ m}^2$ (4) $4.0 \times 10^{-7} \text{ m}^2$

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- Q.11** Pressure of an ideal gas, contained in a closed vessel, is increased by 0.4% when heated by 1°C. Its initial temperature must be:

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 2500 K (2) 25°C (3) 250°C (4) 250 K

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- Q.12** Match List - I with List - II.

List - I		List - II	
A.	Heat capacity of body	I.	J kg^{-1}
B.	Specific heat capacity of body	II.	J K^{-1}
C.	Latent heat	III.	$\text{J kg}^{-1} \text{ K}^{-1}$
D.	Thermal conductivity	IV.	$\text{J m}^{-1} \text{ K}^{-1} \text{ s}^{-1}$

Choose the correct answer from the options given below : [JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)
(2) (A)-(III), (B)-(I), (C)-(II), (D)-(IV)
(3) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
(4) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

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Section B (Numerical)

- Q.13** The heat extracted out of x gram of water initially at 50 °C to cool it down to 0 °C is sufficient to evaporate $(1000 - x)$ gram of water also initially at 50 °C. The value of x (closest integer) is _____.
(Take latent heat of water 2256 kJ/kg, specific heat capacity of water 4200 J/kg. K)

[JEE Main 2026 (Online) 5th April Evening Shift]

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- Q.14** A gas of certain mass filled in a closed cylinder at a pressure of 3.23 kPa has temperature 50°C. The gas is now heated to double its temperature. The modified pressure is _____ Pa.

[JEE Main 2026 (Online) 24th January Morning Shift]

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- Q.15** 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 $x =$ _____.

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

[JEE Main 2025 (Online) 7th April Morning Shift]

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- Q.16** Two cylindrical rods A and B made of different materials, are joined in a straight line. The ratios of lengths, radii and thermal conductivities of these rods are: $\frac{L_A}{L_B} = \frac{1}{2}$, $\frac{r_A}{r_B} = 2$ and $\frac{K_A}{K_B} = \frac{1}{2}$. The free ends of rods A and B are maintained at 400 K, 200 K, respectively. The temperature of rods interface is _____ K, when equilibrium is established.

[JEE Main 2025 (Online) 7th April Evening Shift]

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full solution



ANSWER KEY

Section A (MCQ)

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	4	3	2	1	4	3	3	4	3	1	4
Ques.	12										
Ans.	4										

Section B (Numerical)

Ques.	13	14	15
Ans.	922	3730 or 6460	5
Ques.	16		
Ans.	360		