Q1. 21 January Shift 1

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

(1) 120.20   (2) 120.15   (3) 120.06   (4) 120.03
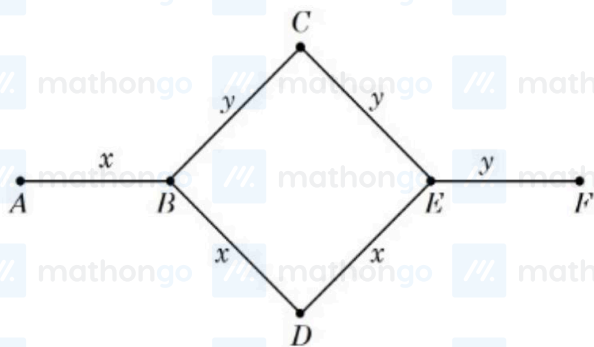
Q2. 21 January Shift 1

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 $= 5.0 \times 10^4$ J/g) specific heat capacity of water $= 4200$ J/kg $\cdot °C$

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

Q3. 22 January Shift 1

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 temperature at junction points B and E are (close to):

(1) $80°C$ and $70°C$ respectively

(2) $80°C$ and $60°C$ respectively

(3) $60°C$ and $45°C$ respectively

(4) $89°C$ and $73°C$ respectively
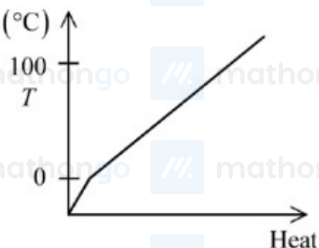
Q4. 24 January Shift 1

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 _____ $°C$.
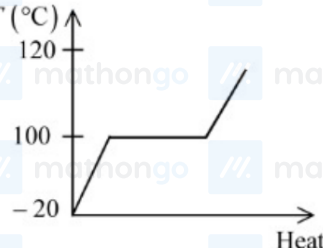
(1) -86   (2) -65   (3) -71   (4) -80

Q5. 28 January Shift 1

Which of the following best represents the temperature versus heat supplied graph for water, in the range of $-20°C$ to $120°C$?
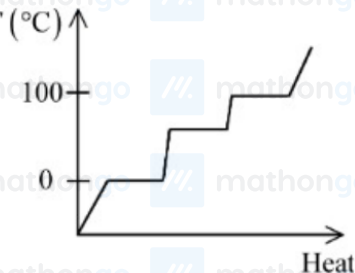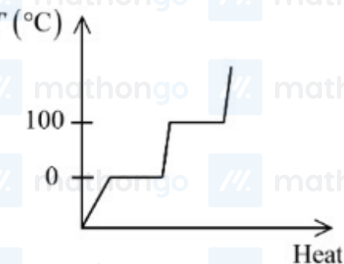
(1)

(2)

(3)

(4)

Q6. 28 January Shift 1

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 _____ °C.

(specific heat of ice $= 2100$ J/Kg. °C, specific heat of water $= 4200$ J/Kg. °C, latent heat of fusion of ice $= 3.36 \times 10^5$ J/Kg)

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

ANSWER KEYS

1. (2)   **2.** (1)   **3.** (4)   **4.** (3)   **5.** (4)   **6.** (4)