2025

(x) A metal piece of mass 5 g has thermal capacity 2.5 JK^{-1}. If the mass of the metal is tripled, then its **specific heat capacity** will be:

(a) 7.5 JK^{-1}

(b) 2.5 JK^{-1}

(c) 1.5 $Jg^{-1}K^{-1}$

(d) 0.5 $Jg^{-1}K^{-1}$

(xiv) Each of the substances given below is supplied with same amount of heat. Which one will attain the **highest** temperature?

Substance	Lead	Aluminium	Copper	Iron
Specific heat capacity (cal/g°C)	0.031	0.21	0.095	0.115

(a) Aluminium

(b) Copper

(c) Iron

(d) Lead

(c) Heat absorbed during **change of phase** depends on _____ *[mass / change in temperature / specific heat capacity]* of the substance.

(iv) Calcuate the amount of heat absorbed by 200 g of paraffin wax to melt completely at its melting point. [2]

[Specific latent heat of fusion of paraffin wax = 146 Jg^{-1}]

(iii) (a) Name the **radiations**: [4]

1. for which a quartz prism is used to study the spectrum.
2. which are used in remote sensing devices.
3. which are used in traffic signals in India.

(b) Name **one** property **common** to all electromagnetic radiations.

Question 9

(i) 30 g of ice at 0°C is used to bring down the temperature of a certain mass of water at 70°C to 20°C. Find the mass of water. *[Specific heat capacity of water = 4.2 $Jg^{-1}°C^{-1}$ and specific latent heat of ice = 336 Jg^{-1}.]* [3]

(ii) (a) A certain amount of heat will warm 1 g of material **X** by 10°C and 1 g of material **Y** by 40°C. Which material has **higher** specific heat capacity? [3]

(b) Which material, **X** or **Y**, would you select to make a calorimeter?

(c) The specific heat capacity of a substance remains the **same** when it changes its state from solid to liquid. State **True** or **False.**

(iii) The heat capacity of a milk cooker is 450 J/K. Calculate the rise in the temperature when it absorbs 9000 J of heat. [2]

(iii) (a) Name the electromagnetic radiations which are used for **sterilising water** in a water purifier. [4]

(b) State any one property of the radiations mentioned by you in part (a).

(c) Why are the danger signals red in colour?

(ii) State the energy conversions taking place:

(a) during photosynthesis

(b) in a thermocouple

(c) during bursting a cracker

Question 9

(i) A spirit lamp supplying heat at a rate of 50 W is used to melt 0.025 kg of ice at 0°C taken in a container. If all the ice in the container is melted in 168 s, then what is the specific latent heat of fusion of ice? [3]

(The heat capacity of the container is negligible.)

(ii) (a) State the principle of calorimetry. [3]

(b) Why should the surface of the calorimeter be polished?

(c) Why should the calorimeter be made of a material of **low** specific heat capacity?

2024

(xi) During melting of ice at 0°C the:

(a) energy is released and temperature remains constant.

(b) energy is absorbed and temperature remains constant.

(c) energy is released and temperature decreases.

(d) energy is absorbed and temperature increases.

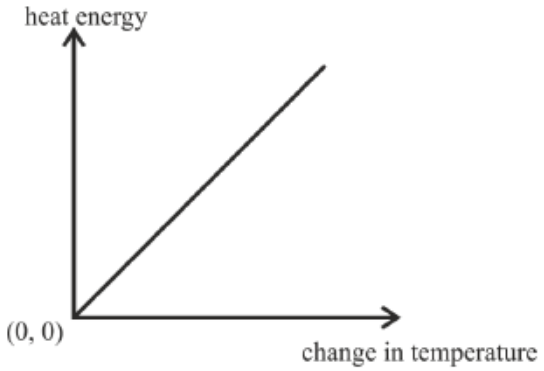
(xiv) The graph given below shows heat energy supplied against change in temperature when no energy is lost to the surrounding. The slope of this graph will give:

(a) Specific heat capacity

(b) Latent heat of fusion

(c) Latent heat of vaporization

(d) Heat capacity



(iv) How much heat is required to convert 500 g of ice at 0°C to water at 0°C? The latent heat of fusion of ice is 330 Jg^{-1}. [2]

Question 9

(i) 85 g of water at 30°C is cooled to 5°C by adding certain mass of ice. Find the mass of ice required. [3]

[Specific heat capacity of water = 4.2 $Jg^{-1}°C^{-1}$, Specific latent heat of fusion = 336 Jg^{-1}]

(ii) (a) Why does it become pleasantly warm when the lakes start freezing? [3]

(b) Water freezes to form ice. What change would you expect in the average kinetic energy of the molecules?

(c) Which will contain more heat energy 1 g of ice at 0°C or 1 g water at 0°C?

2023

(xii) **Specific** latent heat of a substance:

(a) is directly proportional to the mass

(b) is directly proportional to the change in the temperature

(c) depends on the material

(d) is inversely proportional to the mass

(xiii) Specific heat capacity of a substance X is 1900 $Jkg^{-1}\,{}^{o}C^{-1}$ means:

(a) Substance X absorbs 1900 J for 1°C rise in temperature

(b) 1 kg of substance X absorbs 1900 J heat for 1°C rise in temperature

(c) 1 kg of substance X absorbs 1900 J heat to increase the temperature

(d) 1 kg of substance X absorbs 1900 J heat to cool down by 1°C

Question 9

(i) Calculate the total amount of heat energy required to **melt** 200 g of ice at 0°C to water at 100°C. [3]

(Specific latent heat of ice = 336 J g^{-1}, specific heat capacity of water = 4.2 J g^{-1} °C^{-1})

(ii) (a) State the principle of calorimetry. [3]

(b) Name the material used for making a calorimeter.

(c) Write *one* characteristic property of the material chosen for making a calorimeter.

2021

(vii) If water absorbs 4000 joule heat to increase the temperature of 1 kg water through 1°C then the specific heat capacity of water is

(a) $4\ Jkg^{-1}\ °C^{-1}$

(b) $400\ Jg^{-1}\ °C^{-1}$

(c) $4\ Jg^{-1}\ °C^{-1}$

(d) $4.2\ Jg^{-1}\ °C^{-1}$

(viii) Water is used in car radiators because

(a) it is a good conductor of heat.

(b) it conducts heat faster as compared to the other substances and cools the engine quickly.

(c) its specific heat capacity is very low.

(d) its specific heat capacity is very high so it can cool the engine without a greater increase in its own temperature.

(ii) (a) Give an important reason for copper to be used as a material for a calorimeter. [3]

(b) Calculate the thermal capacity of 40 g of water.

[Specific heat capacity of water = 4200 JKg^{-1} $°C^{-1}$]

(ii) (a) Why does it become colder after a hailstorm than during or before the hailstorm? [3]

(b) 'If two bodies have the same specific heat capacities, then they will always absorb the same amount of heat if their temperature increases by the same amount.' State whether the given statement is true or false.

(iii) A metal piece of mass 420 g present at 80°C is dropped in 80g of water present at 20°C in a calorimeter of mass 84g. If the final temperature of the mixture is 30°C, then calculate the specific heat capacity of the metal piece. [4]

[Specific heat capacity of water = 4.2 Jkg^{-1} $°C^{-1}$, Specific heat capacity of the calorimeter = 200 Jkg^{-1} $°C^{-1}$]

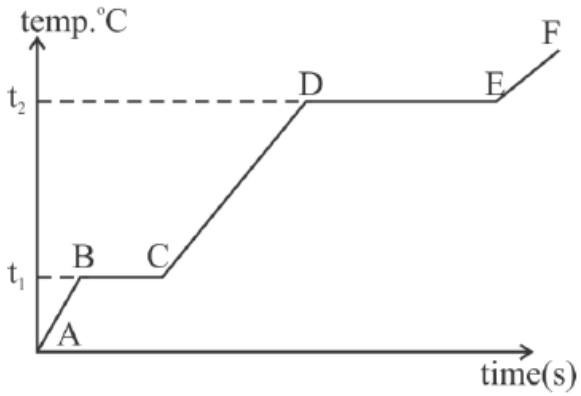
Question 9

(a) (i) Define heat capacity of a substance. [3]

(ii) Write the SI unit of heat capacity.

(iii) What is the relationship between heat capacity and specific heat capacity of a substance?

(b) The diagram below shows the change of phases of a substance on a temperature vs time graph on heating the substance at a constant rate. [3]



(i) Why is the slope of CD less than slope of AB?

(ii) What is the boiling and melting point of the substance?

(c) A piece of ice of mass 60 g is dropped into 140 g of water at 50°C. [4]

Calculate the final temperature of water when all the ice has melted.

(Assume no heat is lost to the surrounding)

Specific heat capacity of water = 4.2 $Jg^{-1}k^{-1}$

Specific latent heat of fusion of ice = 336 Jg^{-1}

(c) The specific heat capacity of a substance A is 3,800 $Jkg^{-1}K^{-1}$ and that of a substance B is 400 $Jkg^{-1}K^{-1}$. Which of the two substances is a good conductor of heat? Give a reason for your answer. [2]

(b) (i) State whether the specific heat capacity of a substance remains the same when its state changes from solid to liquid. [2]

(ii) Give one example to support your answer.

2019

Question 9

(a) (i) Define Calorimetry. [3]

(ii) Name the material used for making a Calorimeter.

(iii) Why is a Calorimeter made up of thin sheets of the above material answered in (ii)?

(b) The melting point of naphthalene is 80°C and the room temperature is 30°C. A sample of liquid naphthalene at 100°C is cooled down to the room temperature. Draw a temperature time graph to represent this cooling. In the graph, mark the region which corresponds to the freezing process. [3]

(c) 104 g of water at 30°C is taken in a calorimeter made of copper of mass 42 g. When a certain mass of ice at 0°C is added to it, the final steady temperature of the mixture after the ice has melted, was found to be 10°C. Find the mass of ice added. [Specific heat capacity of water = 4.2 $Jg^{-1}°C^{-1}$; Specific latent heat of fusion of ice = 336 Jg^{-1}; Specific heat capacity of copper = 0.4 $Jg^{-1}°C^{-1}$] [4]

2018

Question 4

(a) (i) How can a temperature in degree Celsius be converted into S.I. unit of temperature? [2]

(ii) A liquid **X** has the maximum specific heat capacity and is used as a coolant in Car radiators. Name the liquid **X**.

(b) A solid metal weighing 150 g melts at its melting point of 800 °C by providing heat at the rate of 100 W. The time taken for it to completely melt at the same temperature is 4 min. What is the specific latent heat of fusion of the metal? [2]

(c) An electric iron is rated 220V, 2kW. [4]

(i) If the iron is used for 2h daily find the cost of running it for one week if it costs ₹ 4.25 per kWh.

(ii) Why is the fuse absolutely necessary in a power circuit?

Question 9

(a) (i) Heat supplied to a solid changes it into liquid. What is this change in phase called? [3]

(ii) During the phase change does the average kinetic energy of the molecules of the substance increase?

(iii) What is the energy absorbed during the phase change called?

(b) (i) State two differences between "Heat Capacity" and "Specific Heat Capacity". [3]

(ii) Give a mathematical relation between Heat Capacity and Specific Heat Capacity.

(c) The temperature of 170g of water at 50°C is lowered to 5°C by adding certain amount of ice to it. Find the mass of ice added. [4]

Given: Specific heat capacity of water = 4200 J kg^{-1} $^{o}C^{-1}$ and Specific latent heat of ice = 336000 J kg^{-1}

2017

Question 2

(a) Define heat capacity and state its SI unit. [2]

(b) Why is the base of a cooking pan generally made thick? [2]

(c) A solid of mass 50 g at 150°C is placed in 100 g of water at 11°C, when the final temperature recorded is 20°C. Find the specific heat capacity of the solid. [2]

(Specific heat capacity of water = 4.2 J/g°C)

Question 6

(a) (i) How is the transference of heat energy by radiation prevented in a calorimeter? [3]

(ii) You have a choice of three metals A, B and C, of specific heat capacities 900 $Jkg^{-1}{}^{o}C^{-1}$, 380 $Jkg^{-1}{}^{o}C^{-1}$ and 460 $Jkg^{-1}{}^{o}C^{-1}$ respectively, to make a calorimeter. Which material will you select? Justify your answer.

(b) Calculate the mass of ice needed to cool 150g of water contained in a calorimeter of mass 50g at 32°C such that the final temperature is 5°C. [3]

Specific heat capacity of calorimeter = 0.4 J/g°C

Specific heat capacity of water = 4.2 J/g°C

Latent heat capacity of ice = 330 J/g

(c) (i) Name the radiations which are absorbed by greenhouse gases in the earth's atmosphere. [4]

(ii) A radiation X is focused by a particular device on the bulb of a thermometer and mercury in the thermometer shows a rapid increase. Name the radiation X.

(iii) Name two factors on which the heat energy liberated by a body depends.

(iii) For burning of coal in a thermoelectric station, the energy conversion taking place is:

(a) chemical to heat to mechanical

(b) chemical to heat to mechanical to electrical

(c) chemical to heat to light

(d) heat to chemical to mechanical

(xiii) Heat capacity of a body is the:

(a) energy needed to melt a body without change in its temperature.

(b) energy needed to raise the temperature of a body by 1°C

(c) increase in volume of the body when its temperature increases by 1°C

(d) total amount of internal energy that is constant.

(xiv) The amount of heat energy required to melt a given mass of a substance at its melting point without any rise in its temperature is called as the:

(a) specific heat capacity

(b) specific latent heat of fusion

(c) latent heat of fusion

(d) specific latent heat of freezing

(iv) A solid of mass 60 g at 100°C is placed in 150 g of water at 20°C. The final steady temperature is 25°C. Calculate the heat capacity of solid.

[sp. heat capacity of water = 4.2 J g^{-1} K^{-1}]

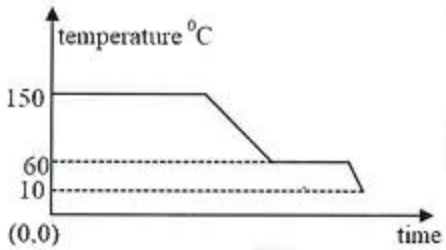
Question 9

(i) What mass of ice at 0°C added to 2.1 kg water, will cool it down from 75°C to 25°C? Given Specific heat capacity of water = 4.2 Jg^{-1} $°C^{-1}$, Specific latent heat of ice = 336 Jg^{-1}.

(ii) The diagram below shows a cooling curve for a substance:

(a) State the temperatures at which the substance condenses.

(b) The temperature range in which the substance is in liquid state.



(c) Why do we prefer ice to ice-cold water for cooling a drink?