

Heat

EXERCISE – 1

Multiple Choice Questions

DIRECTIONS: The following questions have four choices (a), (b), (c) and (d) out of which only one is correct. You have to choose the correct alternative.

1. The direction of flow of heat is
(a) always from hotter body to a cooler body
(b) always from cooler body to a hotter body.
(c) always from a body at a lower temperature to a body at higher temperature
(d) All of the above
2. Which of the following devices is used for measurement of temperature of human body?
(a) Stethoscope
(b) Clinical thermometer
(c) Laboratory thermometer
(d) None of these
3. The clinical thermometers presently in use in India are marked with a temperature scale. This scale corresponds to which of the following?
(a) Celsius (b) Fahrenheit
(c) Both (a) and (b) (d) None of these
4. The normal temperature of human body is
(a) 35-C (b) 37-C
(c) 39°C (d) None of these
5. The flow of heat by conduction is generally observed in case of
(a) solids (b) liquids
(c) gases (d) All of these
6. In which mode of heat transfer does the transfer of heat occur as a wave?
(a) Conduction (b) Convection
(c) Radiation (d) All of these
7. One feels sensation of heat when exposed to
(a) ultra violet rays (b) infra-red rays
(c) X-rays (d) gamma rays
8. Which of the following is a good conductor of heat?
(a) Wood (b) Plastic
(c) Aluminium (d) None of these
9. In sea breeze
(a) cold air moves from sea towards land during day time
(b) hot air moves from sea towards land during day time
(c) cold air moves from land towards sea during day time
(d) None of the above is correct
10. In land breeze
(a) cold air moves from sea towards land during night.
(b) hot air moves from sea towards land during night.
(c) cold air moves from land towards sea during night.
(d) None of the above is correct
11. Mercury is generally used in thermometer because it has a
(a) high fluidity (b) high density
(c) high conductivity (d) high specific heat
12. Nights are cooler in the deserts because
(a) sand radiates heat less quickly as compared to earth
(b) the sky is generally clear
(c) sand radiates heat more quickly as compared to earth
(d) the sky is generally cloudy.
13. Seema is in a hurry and wants her noodles to cool down faster. She should put it on a plate made of
(a) wood (b) paper
(c) plastic (d) metal
14. On a Fahrenheit scale
(a) Boiling point of water is 212°F
(b) The temperature will be equal to that on the Celsius scale at -40°C
(c) The difference between the upper fixed point and the lower fixed point is divided into 180 equal parts
(d) All of the above
15. Expansion of a substance on heating depends on
(a) nature of the substance
(b) rise in temperature
(c) both A and B
(d) color of the substance

- 16.** On a cold day, it is hard to open the lid of a tight container. But when you gently heat the neck you can easily open the lid. Why?
 (a) On heating glass expands and lid contracts
 (b) Lid expands more than the neck and thus slides easily
 (c) Neck becomes slippery on heating
 (d) Lids of the bottles cannot bear the heat
- 17.** Process of change of state from gaseous state to liquid state is called
 (a) freezing (b) sublimation
 (e) boiling (d) condensation
- 18.** When two bodies at different temperatures are placed in thermal contact with each other, heat flows from the body at higher temperature to the body at lower temperature until them both acquire the same temperature. Assuming that there is no loss of heat to the surroundings, the heat
 (a) gained by the hotter body will be equal to the heat lost by the colder body
 (b) the heat gained by the hotter body will be less than the heat lost by the colder body
 (c) the heat gained by the hotter body will be greater than the heat lost by the colder body
 (d) the heat lost by the hotter body will be equal to the heat gained by the colder body.
- 19.** We receive heat energy from the sun through _____ mode of transmission
 (a) conduction (b) convection
 (c) radiation (d) yet to be found
- 20.** Conduction is possible
 (a) when the bodies are apart from each other
 (b) when the bodies have same temperature and in thermal contact
 (c) when they have different temperatures maintaining distance between them
 (d) bodies should be in contact and should have different temperatures
- 21.** Cups are not made of metals. The reason is
 (a) metals are good conductors
 (b) metals are bad conductors
 (c) metals are expensive
 (d) None of the above
- 22.** Which of the following statement(s) is/are correct?
 (a) Temperature is a measure of total amount of heat contained in an object.
 (b) Temperature is a measure of degree of hotness or coldness of a body.
 (c) Both the above are correct
 (d) None of the above is correct
- 23.** It is a reliable measure of degree of hotness of an object. It is
 (a) heat (b) temperature
 (c) Both of these (d) None of these
- 24.** The movement of cold air from sea towards land during daytime is called
 (a) air breeze (b) sea breeze
 (c) land breeze (d) None of these
- 25.** Why stainless steel pans are generally provided with copper bottoms?
 (a) Copper bottom makes the pan more durable
 (b) Copper bottom makes the pan appear beautiful
 (c) Copper is a better conductor of heat than steel
 (d) Copper can be cleaned more easily as compared to steel
- 26.** In places of hot climate it is advised that the outer walls of houses be painted white.
 (a) White color is good reflector. So the heat falling on the wall gets reflected and wall is not heated
 (b) White makes the wall look beautiful
 (c) Other colors will be expensive
 (d) None of the above
- 27.** What do you mean by heat?
 (a) Heat is a measure of temperature.
 (b) Heat is a form of potential.
 (c) It is form of energy which gets transferred from a hot to a cold body.
 (d) None of the above.
- 28.** Which of the following pairs may give equal numerical values of the temperature of a body?
 (a) Fahrenheit and Celsius
 (b) Celsius and Kelvin
 (c) Kelvin and Platinum
 (d) None of these
- 29.** On which of the following scales of temperature, the temperature is never negative?
 (a) Celsius (b) Fahrenheit
 (c) Reamer (d) Kelvin
- 30.** The smallest and old unit of heat energy is :

- (a) calorie (b) Calorie
(c) Joule (d) none of the above

31. More is the difference in temperature of the bodies in contact:
(a) More is the rate of flow of heat from a body at a higher temperature to a body at lower temperature.
(b) More is the rate of flow of heat from a body at a lower temperature to a body at higher temperature.
(c) There is no change in the rate of flow of heat
(d) None of the above

32. Near coastal regions, the sea breeze blows :
(a) during day time only
(b) during night time only
(c) throughout the day and night
(d) none of the above

33. In a vacuum flask, which methods of heat transfer are prevented by the vacuum?
(a) Conduction only
(b) Convection only
(c) Conduction and convection only
(d) Conduction, convection and radiation

34. The device used to measure temperature of human body and is provided with a scale of temperature range 35°C to 42°C is called.....
(a) Thermometer
(b) Clinical thermometer
(c) Laboratory thermometer
(d) None of these

35. It is a mode of transfer of heat from one part of a substance to another part and in it there is no movement of the substance. This mode is
(a) Conduction (b) convection
(c) Radiation (d) all of these

36. Sea breeze refers to
(a) Cold air that moves from sea towards land during night time.
(b) Cold air that moves from sea towards land during day time.
(c) Both the above.
(d) None of the above.

37. The final temperature of a mixture of water obtained by mixing equal volumes of water at 2°C and 4°C will be
(a) 1°C (b) 2°C
(c) 3°C (d) 4°C

38. For a clinical thermometer we use a solid and a liquid. The liquid used in a clinical thermometer is
(a) a metal
(b) a non-metal
(c) neither a metal nor a non-metal
(d) none of the above is correct

39. Which of the following is an insulator?
(a) Wood (b) Plastic
(c) Both of these (d) None of these

Match the Column

DIRECTION: Match Column-I with Column-II and select the correct answer using the code given below the columns.

40.

| Column-I | Column-II |
|------------|---|
| (a) Summer | (p) Land breeze blows |
| (b) Winter | (q) Sea breeze blows |
| (c) Day | (r) Dark colored clothes are preferred |
| (d) Night | (s) Light colored clothes are preferred |

- (a) (a) \rightarrow (s), (b) \rightarrow (r), (c) \rightarrow (q), (d) \rightarrow (p)
(b) (a) \rightarrow (p), (b) \rightarrow (q), (c) \rightarrow (r), (d) \rightarrow (s)
(c) (a) \rightarrow (q), (b) \rightarrow (p), (c) \rightarrow (r), (d) \rightarrow (s)
(d) (a) \rightarrow (r), (b) \rightarrow (s), (c) \rightarrow (p), (d) \rightarrow (q)

41.

| Column-I (Transfer of heat) | Column-II (Medium) |
|--------------------------------|-----------------------|
| (a) Conduction | (p) Black surface |
| (b) Convection | (q) Vacuum |
| (c) Radiation | (r) Air |
| (d) Absorption | (s) A solid medium |

- (a) (a) \rightarrow (r), (b) \rightarrow (s), (c) \rightarrow (p), (d) \rightarrow (q)
(b) (a) \rightarrow (r), (b) \rightarrow (s), (c) \rightarrow (p), (d) \rightarrow (q)
(c) (a) \rightarrow (s), (b) \rightarrow (r), (c) \rightarrow (q), (d) \rightarrow (p)
(d) (a) \rightarrow (s), (b) \rightarrow (p), (c) \rightarrow (r), (d) \rightarrow (q)

42.

| Column-I | Column-II |
|----------------------------|--|
| (a) Clinical thermometer | (p) Kink |
| (b) Laboratory thermometer | (q) Scale marked in $^{\circ}\text{C}$ |
| (c) Steel | (r) Good conductor |
| (d) Plastic | (s) Bad conductor |

- (a) (a) \rightarrow (p), (b) \rightarrow (q), (c) \rightarrow (r), (d) \rightarrow (s)
(b) (a) \rightarrow (q), (b) \rightarrow (p), (c) \rightarrow (r), (d) \rightarrow (s)
(c) (a) \rightarrow (q), (b) \rightarrow (p), (c) \rightarrow (s), (d) \rightarrow (r)
(d) (a) \rightarrow (p), (b) \rightarrow (q), (c) \rightarrow (s), (d) \rightarrow (r)

Passage Based Question

DIRECTIONS: Read the passage given below and answer the questions that follow.

Passage-1

A clinical thermometer is used to measure the body temperature of human beings. It consists of a long, narrow, uniform glass tube. It has a bulb at one end. The bulb contains mercury. This thermometer reads temperatures from 35°C to 42°C .

43. A clinical thermometer can be used to measure the body temperature of human beings. A person suffering with fever is likely to show which of the following readings on this thermometer?
- (a) 35°C (b) 36°C
(c) 37°C (d) 39°C
44. What for is a clinical thermometer provided with a kink?
- (a) To keep the mercury within the range of 35°C - 42°C
(b) To allow the temperature reading to remain unchanged after the use of temperature until a jerk is given.
(c) To make the thermometer size smaller.
(d) All of the above are correct.
45. Which of the following precautions should be used while using a clinical thermometer?
- (a) It should be washed before use.
(b) It should be washed after use.
(c) It should be washed preferably with some antiseptic.
(d) All the above.

Passage-2

Light a candle. Keep one hand above the candle flame and one hand on the side of the flame. Do you feel any difference in degree of hotness felt by two hands?

46. Which hand feels hot?
- (a) The hand that was kept above the flame.
(b) The hand that was kept on the side of the flame.
(c) Both hands feel equally hot.
(d) None of these is correct.
47. In this activity the mode of transference of heat is
- (a) Conduction (b) convection

(c) Radiation

(d) none of these

48. How does the heat travel in air?
- (a) The air near the heat source gets hot and rises.
(b) The air from sides comes to take its place.
(c) In this way air gets heated.
(d) All the above are correct.

Assertion/Reason Based Questions

DIRECTIONS: The questions in this segment consist of two statements, one labeled as "Assertion A" and the other labeled as "Reason R". You are to examine these two statements carefully and decide if the Assertion A and Reason R are individually true and if so whether the reason is a correct explanation of the assertion. Select your answers to these items using codes given below.

- (a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.
49. Assertion (A): Heat always flows from a larger object to a smaller object.
Reason (R): Various modes by which heat can flow are conduction, convection and radiation.
50. Assertion (A) : When a body A at temperature 50°C is brought in contact with a body B at temperature 30°C , heat flows from the body A to the body B.
Reason (R): Heat always flows from a body at a low temperature to a body at a high temperature.
51. Assertion (A): Sea breeze blows during daytime.
Reason (R): The air above the sea is hot and moves toward land.
52. Assertion (A): Two bodies at the same temperature may contain different amounts of heat.
Reason (R): Two bodies may require different amounts of heat to maintain or acquire same temperature.
53. Assertion (A): The flow of heat energy from one body to the other depends upon the amount of heat energy in them.

Reason (R): Heat flows from lower temperature of the body to higher temperature of the body.

54. Assertion (A): Temperature is a measure of degree of hotness of our body.
Reason (R): We use a clinical thermometer to measure the degree of hotness of our body.
55. Assertion (A): A clinical thermometer has a scale in the range of 37°C to 45°C .
Reason (R): The normal temperature of human body is 37°C .

Statement Based Questions

DIRECTIONS: Read the following two statements carefully and choose the correct options.

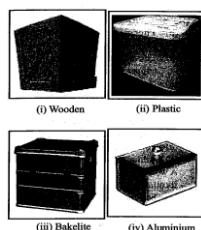
- (a) Statement (1) is correct while statement (2) is incorrect.
(b) Statement (2) is correct while statement (1) is incorrect.
(c) Both statements are correct
(d) Both statements are incorrect. _____

56. **Statement 1:** In a room containing air, heat can go from one place to another by radiation only.
Statement 2: In conduction & convection, heat is transferred from one place to other by actual motion of heated material.
57. **Statement 1:** Radiation is a method of transfer of heat.
Statement 2: The process of heat transfer that does not require any medium is called convection.

Figure Based Questions

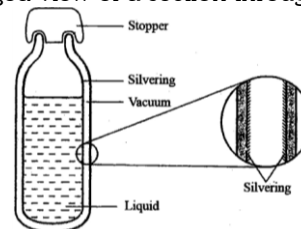
DIRECTIONS: On the basis of following diagram/picture answer the questions given below:

58. In the pictures shown below boxes are made of different materials. These boxes are left in the open under the sun for an hour. After one hour which of these boxes will be hottest?



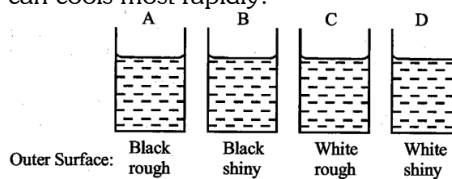
- (a) (i) (b) (ii)
(c) (iii) (d) (iv)

59. The diagram shows a vacuum flask and an enlarged view of a section through the flask wall.



The main reason for the silvering is to reduce heat transfer by

- (a) conduction only
(b) conduction and convection
(c) radiation only
(d) radiation and convection
60. Four metal cans are identical except for the color and texture of their outer surfaces. 100 cm^3 of water at 70°C is poured into each can. Which can cools most rapidly?



- (a) A
(b) B
(c) C
(d) D

Exercise – 2

Multiple Choice Questions

DIRECTIONS: The following questions has four choices (a), (b), (c) and (d) out of which only one is correct. You have to choose the correct alternative.

1. One litre of water at 30°C is mixed with one litre of water at 50°C . The temperature of the mixture will be
 - (a) 80°C
 - (b) more than 50°C but less than 80°C
 - (c) 20°C
 - (d) between 30°C and 50°C
2. Black objects are
 - (a) good absorbers and bad emitters of heat
 - (b) good absorbers and good emitters of heat
 - (c) bad absorbers and good emitters of heat
 - (d) bad absorbers and bad emitters of heat
3. Four identical kettles, having the same amount of water, have bases made of different metals of same thickness. If these kettles are placed on identical flames, water will boil first in the kettle the base of which is made of
 - (a) Stainless steel
 - (b) brass
 - (c) Aluminum
 - (d) copper
4. The glass tube used for construction of a thermometer should be
 - (a) long
 - (b) narrow
 - (c) uniform
 - (d) All of these
5. When a liquid in a beaker is heated on a gas burner
 - (a) Heated molecules become less dense and rise
 - (b) Colder molecules from above move down and get heated
 - (c) The heat is transferred by convection
 - (d) All of these are correct
6. Two laboratory thermometers are marked as 'A' and 'B'. The bulb of thermometer 'A' is wrapped in a white cloth and that of thermometer 'B' in black cloth. Both the thermometers are placed in sunlight for an hour. After one hour:
 - (a) Both the thermometers will read the same temperature
 - (b) Thermometer 'A' will show higher temperature than 'B'
 - (c) Thermometer 'B' will show higher temperature than 'A'
 - (d) None of the above is correct.
7. Which one of the following will not help to cool down a cup of hot tea?
 - (a) Stirring the contents of cup continuously
 - (b) Adding a piece of ice to the cup of hot tea
 - (c) Pouring the hot tea in a saucer
 - (d) Adding more sugar to the cup of tea.
8. A wooden spoon is dipped in a cup of ice cream. Its other end
 - (a) becomes cold by the process of conduction;
 - (b) becomes cold by the process of convection;
 - (c) becomes cold by the process of radiation;
 - (d) does not become cold.
9. In a car, radiator and fan are used to cool the engine. The heat transfer modes involved are
 - (a) conduction and convection
 - (b) convection and radiation
 - (c) conduction and radiation
 - (d) conduction, convection and radiation
10. The minimum possible temperature beyond which water cannot be cooled is
 - (a) -98.5°C
 - (b) 100°C
 - (c) -273.15°C
 - (d) -469.5°C
11. Why are two blankets warmer than one?
 - (a) Two blankets have more wool and hence provide greater warmth.
 - (b) Two blankets enclose air which does not allow the cold to penetrate.
 - (c) Two blankets compress the air in between the body and the blankets and this compression produces heat.
 - (d) Two blankets compress the air in between the body and the blankets and this compression produces heat.
 - (e) None of these.
12. The freezer in a refrigerator is fitted near the top
 - (a) To keep it away from the hot compressor which is near the bottom?
 - (b) so that it can cool the whole interior by setting up convection currents
 - (c) for the sake of convenience
 - (d) None of these
13. We cannot use mercury thermometer at low temperatures because:
 - (a) glass might break down at low temperature
 - (b) heat does not flow from the body whose measurement we are taking with the thermometer

- (c) at low temperatures mercury becomes transparent and it becomes difficult to take the readings
(d) Mercury freezes at low temperatures
- 14.** Iron glows in red color when it is heated to very high temperature because:
(a) Heat we supply assumes red color at high temperature
(b) Mechanical energy is being converted into heat energy
(c) All metals glow in red color when heated
(d) Heat energy is being converted into light energy
- 15.** Gaps are left between railway tracks because:
(a) gaps give the space to the tracks to expand in summer heat
(b) gaps hold the tracks firmly
(c) to produce gentle rhythmic sound when the train moves on the track
(d) it is customary to leave the gaps
- 16.** The temperature of the substance remains constant when it is melting and boiling though some quantity of heat is supplied. What happens to this energy?
(a) It is dissipated as sound energy
(b) It is consumed to increase the energy of the molecules
(c) It is used to change the state of the substance
(d) It is still an unsolved problem in science
- 17.** A coin is dipped in the molten wax in a glass tube. When we heat the upper part of the glass tube, the wax around the coin will not melt because:
(a) wax has a very high melting point
(b) wax is a good conductor of heat
(c) glass is a good conductor of heat
(d) wax and glass are bad conductors
- 18.** Rooms are fitted with ventilators to let the air move around. The phenomenon involved is:
(a) conduction (b) convection
(c) radiation (d) condensation
- 19.** Reflecting solar films are used on the top of the cars to:
(a) produce electricity
(b) to absorb more light
(c) to prevent heating by radiation
(d) to make to strong
- 20.** Which of the following is correct?
(a) We can easily find the degree of hotness of a body by using the sense of touch.
(b) We prefer to wear white clothes made of cotton during winter because cotton is a bad conductor of heat.
(c) The thermometer that we use to measure body temperature is called clinical thermometer.
(d) All the above are correct
- 21.** Which of the following is correct?
(a) The range of clinical thermometer is 35°C - 45°C
(b) The normal body temperature of human body is 39°C .
(c) Heat flows from a body containing larger amount of heat to a body containing lesser amount of heat.
(d) All the above are correct.
- 22.** Why does a clinical thermometer have a range of 35°C - 42°C ?
(a) To keep its size compact
(b) The temperature of human body can normally fluctuate between these two extreme ranges of lower and higher temperatures.
(c) Both the above.
(d) None of these.
- 23.** In which case rate of flow of heat from P to Q is least:
(a) P- 100°C , Q- 40°C (b) P- 90°C , Q- 10°C
(c) P- 50°C , Q- 10°C (d) P- 60°C , Q- 50°C
- 24.** A body P at a higher temperature is placed in contact with another body Q at lower temperature, till an equilibrium stage is reached. At this stage:
(a) the heat will stop flowing from P to Q
(b) the heat will stop flowing from Q to P
(c) the heat continue flowing from P to Q and vice versa
(d) None of the above
- 25.** Two bodies P and Q are in contact with each other, such that P is at a higher temperature than Q. When equilibrium temperature is reached "X" units of heat energy is given by the body P. The heat energy received by the body Q is :
(a) More than X (b) less than X
(c) Equal to X (d) None of the above\

26. The land breeze blows from land to sea in coastal regions, because, the land:
 (a) cools slowly as compared to seawater
 (b) cools rapidly as compared to seawater
 (c) cools at the same rate as seawater
 (d) None of the above
27. A fan produces a feeling of comfort because
 (a) a fan supplies cool air
 (b) the evaporation of sweat
 (c) fan increases the humidity in air
 (d) fan decreases the humidity in air
28. Which of the following statement is true?
 (a) Metal are bad conductors
 (b) In gases, heat is transferred by conduction
 (c) In conduction, molecules move from hotter to colder parts transmitting energy.
 (d) Metals conduct heat better than the gases
29. Good absorbers of heat are
 (a) Poor emitters (b) non-emitters
 (c) Good emitters (d) highly polished
30. The temperature of the sun is measured with
 (a) Platinum thermometer
 (b) Gas thermometer
 (c) Pyrometer
 (d) Vapor pressure thermometer
31. Temperature is a
 (a) microscopic concept
 (b) macroscopic concept
 (c) space-time concept
 (d) none of the above
32. How is heat transferred through the base of a metal saucepan?
 (a) by conduction only
 (b) by radiation only
 (c) by conduction and convection
 (d) by convection and radiation
33. Why do we wear woolen clothes in winter?
 (a) Wool is a poor conductor of heat
 (b) Wool is a good conductor of heat
 (c) Both the above are correct
 (d) None of the above is correct
34. Why stainless steel pans are generally provided with copper bottoms?
 (a) Copper bottom makes the pan more durable

- (b) Copper bottom makes the pan appear beautiful
 (c) Copper is a better conductor of heat than steel
 (d) Copper can be learned more easily as compared to steel

35. In the process of flow of heat by conduction
 (a) There is no movement of the substance
 (b) The heat transfer takes place from higher temperature part of body to lower temperature part of body
 (c) Occurs when one end of an iron rod is heated on a burner
 (d) All the above are correct
36. Suppose we take two identical size rods (one wooden rod and another iron rod) and wrap each one of them in a piece of paper, and heat, these rods with a candle flame. On being heated, the paper around the iron rod does not burn but the one around wooden rod catches fire. Which of the following is the possible reason for this?
 (a) Iron being a good conductor, conducts away heat given to paper.
 (b) Wood being an insulator, takes away all the heat.
 (c) In case of iron rod, the candle is near the paper.
 (d) Paper around iron rod is thicker.

Match the column

DIRECTION: Match column-I with Column-II and select the correct answer using the code given below the columns.

37.

| Column-I | Column-II |
|-------------------------------------|--|
| (a) Range of clinical thermometer | (p) 35°C to 42°C |
| (b) Range of Laboratory thermometer | (q) -10°C to 110°C |
| (c) Normal body temperature | (r) 37°C |
| (d) A liquid metal | (s) Mercury |

- (a) (a) \rightarrow (p), (b) \rightarrow (q), (c) \rightarrow (r), (d) \rightarrow (s)
 (b) (a) \rightarrow (q), (b) \rightarrow (r), (c) \rightarrow (s), (d) \rightarrow (p)
 (c) (a) \rightarrow (r), (b) \rightarrow (s), (c) \rightarrow (p), (d) \rightarrow (q)
 (d) (a) \rightarrow (s), (b) \rightarrow (p), (c) \rightarrow (q), (d) \rightarrow (r)

38.

| Column-I | Column-II |
|-----------------|---------------------|
| (a) Melting | (p) Solid to gas |
| (b) Sublimation | (q) Solid to liquid |

| | |
|------------------|-------------------|
| (c) Condensation | (r) Gas to liquid |
| (d) Vaporization | (s) Liquid to gas |

- (a) (a) → (q), (b) → (p), (c) → (r), (d) → (s)
 (b) (a) → (p), (b) → (q), (c) → (r), (d) → (s)
 (c) (a) → (s), (b) → (p), (c) → (q), (d) → (r)
 (d) (a) → (r), (b) → (s), (c) → (p), (d) → (q)

Passage Based Question

DIRECTIONS: Read the passage given below and answer the questions that follow.

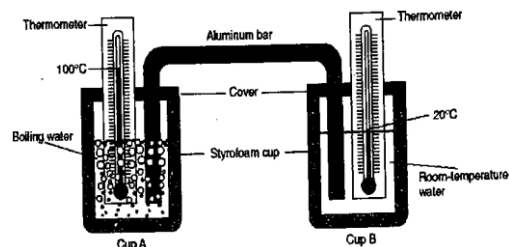
Passage – 1

Substances that conduct heat very well are called good conductors of heat or thermal conductors. All the metals such as silver, copper, aluminum, iron, mercury and metal alloys such as brass, steel and stainless steel are good conductors of heat. Though all the metals are good conductors of heat, some metals are better conductors of heat than the others. Among metals, silver metal is the best conductor of heat, next is copper and lowest is lead. Substances that do not conduct heat very well are called bad conductors or poor conductors or insulators of heat. Some of the examples of heat or thermal insulators are plastic, wood, paper, cloth, thermocol, rubber, etc. Liquids like water are poor conductors and gases are very poor conductors of heat. Thus, air is a very good insulator of heat.

- 39.** It is observed that when glass is heated, it cracks while metal does not. Which of the following statements explain this phenomenon?
 (a) Metal is a poor conductor of heat.
 (b) The expansion of the glass after heating is uniform and therefore it cracks.
 (c) In case of glass the heat is transmitted quickly when heated.
 (d) Glass is a poor conductor of heat.
- 40.** Which of the following is the best insulator of heat?
 (a) air (b) silver
 (c) iron (d) water
- 41.** When we touch a steel rod and a paper simultaneously, we feel that the rod is colder because:
 (a) Iron being a good conductor conducts more heat from our body
 (b) Paper being a good conductor conducts more heat from our body
 (c) More heat flows from the iron to our body
 (d) more heat flows from the paper to our body

Passage – 2

The thermometers showed the temperature of the water in cup A and cup B at the beginning of a heat-flow experiment.



- 42.** Over the next 15 minutes, which changes would most likely occur?
 (a) The temperature in cup A will decrease and the temperature in cup B will increase.
 (b) The temperature in cup A will decrease and the temperature in cup B will decrease.
 (c) The temperature in cup A will increase and the temperature in cup B will increase.
 (d) The temperature in cup A will increase and the temperature in cup B will decrease.
- 43.** Which process is most responsible for the temperature changes that will take place?
 (a) Radiation of heat from the water in the cups to the thermometers
 (b) Conduction of heat through the aluminum bar
 (c) Radiation of heat from the water in the cups into the air
 (d) Conduction of heat through the air to the Water in the cups

Assertion/ Reason Based Questions

DIRECTIONS: The questions in this segment consists of two statements, one labelled as "Assertion A" and the other labelled as "Reason R". You are to examine these two statements carefully and decide if the Assertion A and Reason R are individually true and if so, whether the reason is a correct explanation of the assertion. Select your answers to these items using codes given below.

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true but R is not the correct explanation of A.
 (c) A is true but R is false.
 (d) A is false but R is true.
- 44.** **Assertion (A):** Glass tumbler breaks in winter when hot water is poured to it.
Reason (R): When hot water is poured, the outer surface of glass expands.

45. **Assertion (A):** Temperature decreases with increasing height above sea level.
Reason (R): Atmosphere is mainly heated by conduction from the earth.
46. **Assertion (A):** The temperature of a body is 10°C . Its temperature in Fahrenheit scale is 50°F .
Reason (R): Celsius (C) and Fahrenheit (F) are related as $F = \frac{9}{5}C + 32$
47. **Assertion (A):** Land and sea breezes are caused in coastal regions.
Reason (R): The specific heat of land is about 4 times less than sea water.
48. **Assertion (A):** Two bodies at different temperatures, if brought in thermal contact do not necessary settle to the mean temperature.
Reason (R): The two bodies may have different thermal capacities.
49. **Assertion (A):** A brass tumbler feels much colder than a wooden tray on a chilly day.
Reason (R): The ability to conduct heat of brass is less than that of wood.
50. **Assertion (A):** Snow is better insulator than ice.
Reason (R): Snow contain air packet and air is good insulator of heat.
51. **Assertion (A):** Sea breeze refers to the movement of cold air from sea towards land during day time.
Reason (R): Land breeze refers to the movement of cold air from land towards sea during night time.

Statement Based Questions

DIRECTIONS: Read the following three statements carefully and choose the correct option.

- (a) Statement (1) and (3) are incorrect while statement (2) is correct.
 (b) Statement (1) and (2) are incorrect while (3) is correct.
 (c) All the statements are correct.
 (d) All the statements are incorrect.
52. **Statement-1:** Room heaters and refrigerators lose most of their heat by convection.

Statement-2: A hot surface heat the air next to it. The hot air rises, to be replaced by cooler air which then heat, and so on.

Statement-3: Radiation is a method of transfer of heat.

53. **Statement-1:** The bulb of one thermometer is spherical while that of the other is cylindrical. Both have equal amount of mercury. The response of the cylindrical bulb thermometer will be quicker.

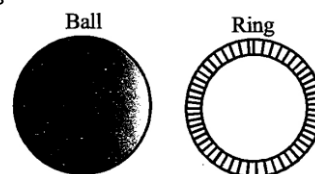
Statement-2: Heat conduction in a body is directly proportional to cross-sectional area.

Statement-3: The range of clinical thermometer is 35°C to 42°C

Figure Based Questions

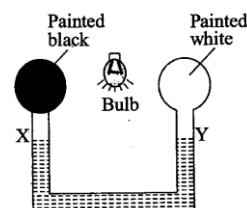
DIRECTIONS: On the basis of following diagram/ picture answer the questions given below:

54. Consider the figures of a metal ball and a metal ring given below:



The metal ball can just pass through the hole of a metal ring formed out of a strip. When the ball is heated it gets stuck. But when the metal ring is heated.

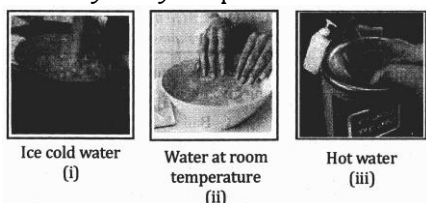
- (a) The ball will not pass through because there is no change in the ring.
 (b) The ball can now pass through it because the ring diameter expands on heating.
 (c) The ball gets stuck because the diameter of the hole decreases on expansion. (d) None of the above
55. The figure shows air-filled bulbs connected by a U-tube partly filled with alcohol. What happens to the levels of alcohol in the limbs X and Y when an electric bulb is placed midway between the painted air filled bulbs and electric bulb is lighted?



- (a) The level of alcohol falls in both limbs.

- (b) The level of alcohol in the limb X rises while that in limb Y falls.
- (c) The level of alcohol in limb X falls while that in limb Y rises.
- (d) There is no change in the levels of alcohol in the two limbs.

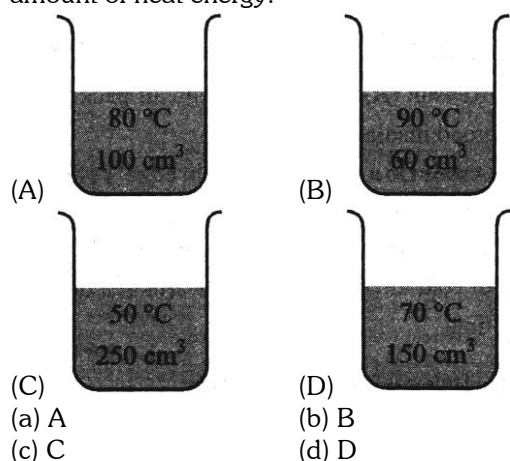
56. Carefully study the pictures shown below



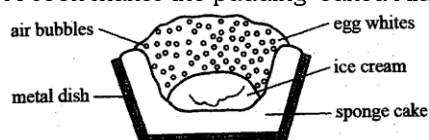
In picture (i) it is shown a hand dipping in ice cold water and in picture (iii) it is shown another hand dipping in hot water. In picture (ii) shown two hands being taken out from ice cold water and hot water and then dipped simultaneously in water at room temperature. Which of the following statement(s) is/are correct?

- (a) Both hands give the same feeling about hotness of water to both the hands.
- (b) The hand taken out from ice cold water will tell that the water in (ii) is hot while the other hand will tell the water in (ii) is cold.
- (c) The hand taken out from ice cold water will tell that the water in (ii) is cold while the other hand will tell that water in (ii) is hot.
- (d) None of the above is correct.

57. Four beakers given below contain same liquid. Which of the following beakers contain the more amount of heat energy?



58. A cook makes the pudding 'baked Alaska'.



The pudding is placed in a very hot oven until the top of the egg whites turns brown. It is then removed from the oven. Why does the ice-cream stay cold?

- (a) Air is a good conductor of heat and conducts the heat away from the ice cream.
- (b) Air is a poor conductor of heat and stops the heat from reaching the ice cream.
- (c) The metal dish is a good conductor of heat and conducts the heat away from the ice cream.
- (d) The metal dish is a poor conductor of heat and stops the heat from reaching the ice cream.

Hints & Solutions

EXERCISE – 1

Multiple Choice Questions

- (a)
- (b) To X measure temperature of human body we use clinical thermometer or doctor's thermometer.
- (a) The scale presently used in India for clinical thermometer is Celsius scale.
- (b) Normal temperature of human body is 37°C.
- (a) In solids heat flows from one part of the solid to an other part by conduction.
- (c) In radiation heat is transferred as a wave.
- (b)
- (c) Aluminum is a good conductor of heat.
- (a)
- (c)
- (c)
- (c)
- (d)
- (d)
- (c)
- (b)

17. (d)
18. (d)
19. (c) Since there is no medium between sun and earth heat can travel only through radiation.
20. (d)
21. (a)
22. (b)
23. (b)
24. (b)
25. (c)
26. (a)
27. (c)
28. (a)
29. (d)
30. (a)
31. (a)
32. (a)
33. (c) Conduction and convection cannot happen in a vacuum and only radiation can pass through a vacuum.
34. (b)
35. (a)
36. (b)
37. (c)
38. (a)
39. (c)
40. (a)

41. (c)

42. (a)

Passage Based Questions

43. (d) Normal body temperature is 37°C . A person having fever will show higher temperature.
44. (b)
45. (d)
46. (a) Towards top the air gets heated by convection but there is no convection on sides.
47. (b)
48. (d)

Assertion/Reason Based Questions

49. (d) Assertion A is incorrect; Reason R is correct.
50. (c)
51. (c)
52. (d)
53. (c)
54. (b) Both correct. Reason R is not the correct explanation of Assertion A.
55. (d)

Statement Based Questions

56. (b)
57. (a)

Figure Based Questions:

59. (d) Aluminum is a good conductor of heat.
60. (c) The silvering reduces heat transfer by radiation as shiny (silvered) surfaces are poor emitters and poor absorbers of radiation.

61. (a) Black, rough surfaces are good emitters of radiation, thus more heat will be lost by radiation, and will cool the fastest.

EXERCISE - 2

Multiple Choice Questions

1. (d)
 2. (b)
 3. (d)
 4. (d)
 5. (d)
 6. (c)
 7. (d)
 8. (d) Wood is a bad conductor of heat.
 9. (b)
 10. (c)
 11. (b)
 12. (b)
 13. (d)
 14. (d) Heat being a form of energy can be transformed into other forms of energy.
 15. (a)
 16. (c)
 17. (d)
 18. (b)
 19. (c)
 20. (c)
 21. (c)
 22. (b)
 23. (c)
 24. (c)
 25. (c)
 26. (b)
 27. (b)
 28. (d) Metals are good conductors of heat.
 29. (c)
 30. (c)
 31. (b)
 32. (a) The base of the saucepan is a solid (metal), which is a good conductor of heat. Therefore the main form of thermal energy transfer is conduction.
 33. (a)
 34. (c)
 35. (d)
 36. (a)
- ### Match the column
37. (a)
 38. (a)
- ### Passage Based Question
39. (d)
 40. (a)
 41. (a) Heat always flows from a hotter region to a colder one. Since iron is a good conductor of heat, more heat will flow from our body into it and we will feel it as cold. As paper is a bad conductor less heat will flow from our body.
 42. (a) As heat flows from body at higher temperature to body at lower temperature

43. (b)

Assertion/Reason Based Questions

44. (c)

45. (a)

46. (a)

47. (a)

48. (a)

49. (c)

50. (a)

51. (b)

Statement Based Questions

52. (c)

53. (c)

Figure Based Question

54. (b)

55. (c) Black color being a better absorber of heat, bulb X gets more heated due to heat radiated by the electric bulb resulting in the expansion of air inside it. The expanded air requires more space and thus pushes the alcohol towards limb Y.

56. (b)

57. (c)

58. (b) The air bubbles trapped in the egg whites is a poor conductor of heat, and stops the heat from being conducted to the ice cream.