Unit 10: Heat Capacity and Modes of Heat Transfer

70 MCQs. Correct option in bold. 1 mark each.

1. The specific heat capacity of a material is the heat absorbed or lost to change the temperature of
A. 1 m^3 of the substance by 1 K | B. 1 kg of the substance by 100 K
C. any mass of the substance by 1 K | **D. 1 kg of the substance by 1 K**

2. The formula for specific heat capacity is
A. $c = Q / (m\Delta T)$ | B. $c = m\Delta T / Q$
C. $c = Q + m\Delta T$ | D. $c = Qm\Delta T$

3. The SI unit of specific heat capacity is
A. J kg K | B. $J\ K^{-1}$
C. $J\ kg^{-1}\ K^{-1}$ | D. $J\ kg^{-1}$

4. The SI unit of heat capacity of an object is
A. J kg | **B. $J\ K^{-1}$**
C. $J\ kg^{-1}\ K^{-1}$ | D. $J\ kg\ K^{-1}$

5. The specific heat of aluminium is 900 $J\ kg^{-1}\ K^{-1}$. In $J\ g^{-1}\ °C^{-1}$ this is
A. 0.9 | B. 90 | C. 0.09 | D. 9

6. The specific heat of water 4180 $J\ kg^{-1}\ K^{-1}$ expressed in $J\ g^{-1}\ °C^{-1}$ is
A. 4180 | B. 41.8 | **C. 4.18** | D. 0.418

7. Materials of low specific heat are used in heat sinks because they
A. absorb a large amount of heat for a small temperature change
B. heat up and cool down quickly
C. retain heat for a long time
D. never conduct heat

8. Water is used as a coolant in the radiators of automobiles because
A. it has oxygen | B. it has a low cost only
C. it is easily available only | **D. it has a large specific heat**

9. Coastal areas like Karachi have small temperature variation because
A. the Sun is weaker there
B. oceans have low specific heat
C. oceans store heat in summer and release it in winter
D. land has a high specific heat

10. If equal heat is supplied to equal masses of water and copper, the temperature of copper rises faster because
A. water is a poor conductor of heat
B. radiation from water is stronger
C. convection in water dissipates heat
D. copper has a lower specific heat capacity

11. Two common methods to measure specific heat of solids and liquids are
A. method of mixtures and electrical heating method
B. calorimetry and conduction methods only
C. electrical method and radiation method
D. method of mixtures and Leslie cube method

12. In the method of mixtures, heat lost by the hot body is
A. less than heat gained by the cold bodies
B. equal to heat gained by the cold bodies
C. greater than heat gained by the cold bodies
D. zero

13. In the electrical heating method, the heat energy supplied by the heater is calculated by
A. current / voltage × time | B. voltage / current × time
C. voltage × current × time | D. voltage + current + time

14. A 200 g metal is heated from 25 °C to 75 °C using 3500 J. Its specific heat is
A. 35 $J\ kg^{-1}\ K^{-1}$ | B. 700 $J\ kg^{-1}\ K^{-1}$
C. 3500 $J\ kg^{-1}\ K^{-1}$ | **D. 350 $J\ kg^{-1}\ K^{-1}$**

15. The heat absorbed by 0.5 kg of aluminium (c = 900 $J\ kg^{-1}\ K^{-1}$) heated from 25 °C to 100 °C is
A. 33.75 kJ | B. 3.375 kJ | C. 45 kJ | D. 337.5 kJ

16. The heat given to 25 kg of water to raise its temperature by 50 °C is (c = 4200 $J\ kg^{-1}\ K^{-1}$)
A. 52.5 MJ | **B. 5.25 MJ** | C. 0.525 MJ | D. 5.25 kJ

17. The temperature change of 5 litres of water absorbing 8.4 MJ of heat is (c = 4200 $J\ kg^{-1}\ K^{-1}$)
A. 400 °C | B. 4 °C | C. 1680 °C | D. 40 °C

18. A 0.5 kg metal block needs 19 kJ to be heated from 30 °C to 80 °C. Its specific heat is
A. 1520 $J\ kg^{-1}\ K^{-1}$ | B. 190 $J\ kg^{-1}\ K^{-1}$
C. 380 $J\ kg^{-1}\ K^{-1}$ | **D. 760 $J\ kg^{-1}\ K^{-1}$**

19. 100 g of water at 80 °C is mixed with 200 g of water at 20 °C. The final temperature is
A. 30 °C | B. 60 °C | **C. 40 °C** | D. 50 °C

20. A 3 kg steel rod (c = 460 $J\ kg^{-1}\ K^{-1}$) cools from 450 °C to 50 °C. The heat lost is
A. 62 kJ | **B. 552 kJ** | C. 620 kJ | D. 55.2 kJ

21. The three methods of heat transfer are
A. conduction, convection and radiation | B. conduction, convection and refraction
C. conduction, evaporation and radiation | D. convection, reflection and radiation

22. Thermal conduction takes place mainly in
A. gases only | B. liquids only
C. solids | D. vacuum

23. Metals are good conductors of heat because they have
A. large gaps between atoms | **B. a large number of free electrons**
C. no atoms | D. high density only

24. In a metal rod, heat is transferred quickly by
A. radiation only | B. convection currents
C. bulk movement of atoms | **D. free electrons**

25. Handles of cooking pans are made of plastic or wood because these are
A. heavy | B. good conductors of heat
C. poor conductors of heat | D. good radiators

26. The transfer of heat due to bulk movement of molecules in fluids is called
A. conduction | **B. convection**
C. radiation | D. insulation

27. The transfer of heat due to density difference in fluids is
A. radiation | B. conduction
C. insulation | **D. convection**

28. When water is heated from the bottom, the hot water rises because it becomes
A. less dense | B. heavier
C. more dense | D. more viscous

29. Upward movement of sea water is called
A. evaporation | B. tide
C. downwelling | **D. upwelling**

30. Upwelling brings to the surface water that is
A. warmer and poor in nutrients | B. warmer and rich in nutrients
C. colder and rich in nutrients | D. colder and poor in nutrients

31. A sea breeze blows during the
A. day | B. winter nights only
C. night | D. early morning only

32. A land breeze blows during the
A. noon | **B. night**
C. afternoon | D. summer day only

33. During the day, the land becomes hotter than the sea because the land has
A. high density only | B. no heat absorption
C. low specific heat | D. high specific heat

34. Birds like eagles, hawks and vultures glide without flapping by riding on
A. sea breezes | **B. thermals (rising warm air)**
C. cold air currents | D. land breezes

35. Hurricanes form over
A. cold land | B. deserts
C. polar ice | **D. warm ocean waters**

36. The transfer of heat by electromagnetic waves is called
A. radiation | B. conduction
C. insulation | D. convection

37. Radiation does not require
A. a hot body | **B. a material medium**
C. heat energy | D. infrared waves

38. Radiation is the fastest method of heat transfer because it moves at the
A. speed of free electrons B. speed of sound
C. speed of air currents **D. speed of light**

39. Which combination of heat transfer is dominant when your hand is near, but not touching, a fire?
A. Conduction and radiation B. Convection and conduction
C. Radiation and convection D. Conduction and insulation

40. The best absorber of radiation is a
A. dull black surface B. shiny silver surface
C. white surface D. smooth mirror

41. A good absorber of heat radiation is also a good
A. conductor **B. emitter** C. reflector D. insulator

42. Laptop chargers are made with black surfaces because black surfaces are good
A. reflectors B. conductors
C. emitters D. insulators

43. Before painting house walls they are made smooth and painted white so that they become
A. good absorbers B. good emitters
C. poor reflectors **D. good reflectors and poor absorbers**

44. At the same temperature, a hot body with a larger surface area emits
A. more radiation B. the same radiation as a smaller body
C. no radiation D. less radiation

45. An object remains at the same temperature when it absorbs and radiates heat at
A. an increasing rate B. zero rate
C. equal rates D. different rates

46. The Leslie cube is used to demonstrate how
A. specific heat is measured
B. conduction occurs in metals
C. convection currents form
D. surface textures affect emission of thermal radiation

47. In a thermos flask, the vacuum between the walls prevents heat transfer by
A. radiation only **B. conduction and convection**
C. emission only D. evaporation only

48. The inner walls of a thermos flask are silvered to reduce heat loss by
A. radiation B. convection
C. diffusion D. conduction

49. An infrared thermometer detects
A. sound waves B. X-rays
C. ultraviolet radiation **D. infrared radiation emitted by objects**

50. The greenhouse effect is the process in which heat is trapped near the Earth's surface by
A. ozone only B. clouds only
C. greenhouse gases D. oxygen

51. Without the atmosphere, the Earth's night temperature would fall to about
A. -180 °C B. -50 °C C. -20 °C D. 0 °C

52. Which of the following is a greenhouse gas?
A. Argon **B. Methane** C. Helium D. Neon

53. The enhanced greenhouse effect contributes to global warming by
A. trapping more heat in the atmosphere B. increasing reflection of solar radiation
C. increasing Earth's rotation speed D. blocking ultraviolet rays

54. The gradual increase in temperature of the Earth's atmosphere and oceans is called
A. convection **B. global warming**
C. greenhouse effect D. thermal equilibrium

55. Burning of fossil fuels increases
A. oxygen B. ozone
C. nitrogen only **D. greenhouse gases in the atmosphere**

56. Deforestation increases carbon dioxide because trees
A. absorb oxygen B. absorb methane only
C. absorb carbon dioxide D. produce carbon dioxide

57. Rising sea levels increase the risk of
A. freezing B. earthquakes only
C. droughts only **D. flooding of coastal areas**

58. Increased evaporation due to global warming leads to
A. droughts in dry areas and heavier rainfall in wet areas
B. more rain everywhere
C. no change in rainfall
D. less rain everywhere

59. A heat wave is a period of abnormally hot weather lasting generally more than
A. one hour B. one year **C. two days** D. one month

60. A prolonged dry period with deficiency of precipitation is called
A. flood **B. drought** C. hurricane D. cyclone

61. The temperature of the Earth's core is about
A. 60000 °C B. 600 °C C. 60 °C **D. 6000 °C**

62. The Earth's core is mainly composed of
A. aluminium and copper **B. iron and nickel**
C. carbon and hydrogen D. silicon and oxygen

63. The layer between the core and the crust is the
A. mantle B. troposphere
C. lithosphere D. outer core

64. Molten or partially molten rock beneath the Earth's crust is called
A. lava B. lithosphere
C. magma D. ash

65. The layer of the Earth composed of partially molten rock that can flow slowly is the
A. outer core B. lithosphere
C. mesosphere **D. asthenosphere**

66. In the mantle, heat is transferred mainly by
A. radiation **B. convection**
C. conduction D. diffusion

67. The primary driving force behind the movement of tectonic plates is
A. the Moon's gravity B. solar radiation
C. mantle convection currents D. the Earth's magnetic field

68. Tectonic plates move at a rate of
A. a few centimetres per year B. a few metres per day
C. a few kilometres per hour D. a few metres per second

69. A factor that keeps the Earth's core hot is
A. ocean currents
B. the Sun's heat
C. radioactive decay of uranium, thorium and potassium
D. the Moon

70. Gravitational compression keeps the core hot because it
A. increases pressure and temperature B. decreases pressure
C. cools the core D. removes radioactive elements