Unit 11: Thermal Expansion and Change of State

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

1. In solids, the particles can only
A. escape from the surface B. flow freely
C. move randomly in all directions **D. vibrate about their mean positions**

2. When a solid absorbs heat, the amplitude of vibration of its particles
A. increases B. remains the same
C. becomes zero D. decreases

3. Liquid particles
A. have the largest gaps
B. keep changing their positions and can flow
C. are fixed in position
D. have no attractive force

4. Gas particles exert pressure by
A. vibrating about fixed positions
B. sticking to the walls
C. colliding with the walls of the container
D. attracting each other

5. Melting is the change of a
A. gas into a solid **B. solid into a liquid**
C. liquid into a solid D. liquid into a gas

6. The boiling point of water at standard atmospheric pressure is
A. 100 °C B. 373 °C C. 0 °C D. 212 °C

7. Condensation is the change of a
A. liquid into a gas B. gas into a solid
C. solid into a gas **D. gas into a liquid**

8. Water droplets forming on the outside of a cold bottle are an example of
A. sublimation B. evaporation
C. condensation D. melting

9. Sublimation is the change of a
A. solid directly into a gas B. solid into a liquid
C. gas directly into a solid D. liquid into a solid

10. A common example of sublimation is
A. ice melting **B. dry ice changing into carbon dioxide gas**
C. water boiling D. dew formation

11. Deposition is the change of a
A. liquid into a gas B. solid into a liquid
C. gas directly into a solid D. solid directly into a gas

12. Formation of frost on leaves is an example of
A. melting B. evaporation
C. sublimation **D. deposition**

13. Which process involves a change from gas to solid without passing through the liquid phase?
A. Freezing **B. Deposition**
C. Sublimation D. Melting

14. Thermal expansion means
A. change in colour on heating B. increase in mass on heating
C. decrease in size on heating **D. increase in size of matter on heating**

15. For the same increase in temperature, the expansion is least in
A. solids B. liquids C. plasma D. gases

16. For the same increase in temperature, the expansion is most in
A. solids B. all equal **C. gases** D. liquids

17. The change in length of a solid on heating is called
A. linear thermal expansion B. real expansion
C. surface expansion only D. volumetric thermal expansion

18. The formula for linear thermal expansion is
A. $\Delta L = \alpha L_0 / \Delta T$ **B. $\Delta L = \alpha L_0 \Delta T$**
C. $\Delta L = L_0 \Delta T / \alpha$ D. $\Delta L = \alpha / (L_0 \Delta T)$

19. The coefficient of linear thermal expansion is the
A. fractional change in volume per kelvin
B. change in length per metre
C. fractional change in length per kelvin change in temperature
D. change in temperature per metre

20. The SI unit of the coefficient of linear expansion is
A. m K^{-1} B. K C. m **D. K^{-1}**

21. The change in volume of a solid on heating is called
A. apparent expansion **B. volumetric thermal expansion**
C. linear thermal expansion D. real expansion

22. The formula for volumetric thermal expansion is
A. $\Delta V = \beta V_0 \Delta T$ B. $\Delta V = \beta / (V_0 \Delta T)$
C. $\Delta V = V_0 \Delta T / \beta$ D. $\Delta V = \beta \Delta T / V_0$

23. The relation between the coefficients of linear and volume expansion of solids is
A. $\beta = \alpha^2$ B. $\beta = \alpha/3$ **C. $\beta = 3\alpha$** D. $\beta = 1.5\alpha$

24. A steel bridge 1500 m long ($\alpha = 1.2\times10^{-5}\ K^{-1}$) undergoes a temperature change of 15 °C. Its change in length is
A. 0.027 m B. 2.7 m C. 27 m **D. 0.27 m**

25. A steel bar of length 1.5 m is heated from 10 °C to 100 °C ($\alpha = 1.2\times10^{-5}\ K^{-1}$). The increase in length is
A. 16.2 mm **B. 1.62 mm** C. 0.162 mm D. 162 mm

26. A solid cube of side 10 cm with $\alpha = 9\times10^{-6}\ K^{-1}$ is heated by 100 °C. The increase in its volume is
A. 9 cm^3 B. 0.9 cm^3 C. 27 cm^3 **D. 2.7 cm^3**

27. A hot air balloon fabric of volume 500 m^3 with $\beta = 3.5\times10^{-5}\ K^{-1}$ is heated by 60 °C. The volume increases by
A. 1.05 m^3 B. 0.105 m^3 C. 105 m^3 D. 10.5 m^3

28. When heat is applied directly to a liquid, the increase in its volume is called
A. apparent volume expansion B. surface expansion
C. real volume expansion D. linear expansion

29. Expansion of a liquid observed without considering the expansion of its container is called
A. apparent expansion B. anomalous expansion
C. real expansion D. linear expansion

30. When a liquid in a flask is heated, its level first
A. only falls **B. falls and then rises**
C. rises and then falls D. only rises

31. Real expansion of a liquid equals
A. apparent expansion − expansion of container
B. apparent expansion only
C. apparent expansion + expansion of the container
D. apparent expansion × expansion of container

32. The relation between the coefficients of real and apparent expansion of a liquid is
A. $\gamma r = \gamma a\ \gamma g$ B. $\gamma r = \gamma a\ /\ \gamma g$
C. $\gamma r = \gamma a - \gamma g$ **D. $\gamma r = \gamma a + \gamma g$**

33. A flask contains 250 ml of glycerine at 20 °C ($\gamma = 500\times10^{-6}\ K^{-1}$). When heated to 70 °C, the volume increases by
A. 12.5 ml B. 0.625 ml **C. 6.25 ml** D. 62.5 ml

34. All liquids expand on heating except water, which between 4 °C and 0 °C
A. evaporates **B. expands on cooling**
C. does not change D. contracts on cooling

35. Water has its highest density at
A. 4 °C B. 100 °C C. -4 °C D. 0 °C

36. The anomalous expansion of water allows ice to
A. sink in water B. become denser than water
C. melt faster **D. float on water**

37. A bimetallic strip consists of
A. two thin strips of different metals joined together
B. two glass strips
C. two strips of the same metal
D. a metal and a plastic strip

38. A bimetallic strip bends on heating because
A. it becomes magnetic B. both metals contract
C. one metal expands more than the other D. both metals expand equally

39. In an electric iron, a bimetallic thermostat controls the temperature of the
A. handle **B. heating coil**
C. fuse D. cord

40. Expansion joints are used in bridges to
A. reduce weight B. reduce cost only
C. increase strength only **D. accommodate expansion and contraction**

41. Evaporation is the change of a liquid into vapours at
A. only the freezing point **B. any temperature**
C. only 100 °C D. only the boiling point

42. Evaporation causes cooling because the molecules left behind have
A. lower average kinetic energy B. lower mass
C. higher average kinetic energy D. higher mass

43. Sweating cools the body because of
A. condensation of sweat B. freezing of sweat
C. radiation of sweat **D. evaporation of sweat**

44. Which factor decreases the rate of evaporation?
A. Increase in surface area B. Increase in wind speed
C. Increase in humidity D. Increase in temperature

45. Which factor increases the rate of evaporation?
A. Decrease in temperature B. Increase in humidity
C. Decrease in surface area **D. Increase in wind speed**

46. Boiling occurs
A. only at the surface at any temperature
B. without any heat
C. throughout the liquid at the boiling point
D. only below the boiling point

47. In a refrigerator, cooling is produced by the evaporation of
A. air **B. the refrigerant**
C. water D. oil

48. CFCs were banned as refrigerants because they
A. deplete the ozone layer B. freeze easily
C. are expensive D. are heavy

49. Latent heat is the heat absorbed or released during a change of state without a change in
A. mass B. volume
C. temperature D. pressure

50. The heat required to change a solid into a liquid at its melting point is called latent heat of
A. vaporisation B. condensation
C. sublimation **D. fusion**

51. The heat required to change a liquid into a gas at its boiling point is called latent heat of
A. freezing **B. vaporisation**
C. melting D. fusion

52. The formula for heat required for a change of state (melting) is
A. $\Delta Q = mLf$ B. $\Delta Q = Lf/m$ C. $\Delta Q = mc\Delta T$ D. $\Delta Q = m/Lf$

53. The latent heat of fusion of ice is
A. 3.33×10^{3} J kg^{-1} B. 4200 J kg^{-1}
C. 3.33×10^{5} J kg^{-1} D. 2.26×10^{6} J kg^{-1}

54. The latent heat of vaporisation of water is
A. 2.26×10^{6} J kg^{-1} B. 4200 J kg^{-1}
C. 2.26×10^{4} J kg^{-1} D. 3.33×10^{5} J kg^{-1}

55. During melting of ice at 0 °C, the heat absorbed is used to
A. increase the kinetic energy of particles
B. increase the temperature
C. increase the mass
D. weaken the attractive forces between particles

56. On the temperature-heat graph of ice, the flat portion at 0 °C represents
A. latent heat of vaporisation **B. latent heat of fusion**
C. heating of steam D. specific heat of water

57. On the temperature-heat graph of water, the flat portion at 100 °C represents
A. latent heat of fusion B. specific heat of ice
C. latent heat of vaporisation D. heating of ice

58. How much heat is required to change 15 kg of ice into water at its melting point (Lf = 3.3×10^{5} J kg^{-1})?
A. 4.95×10^{6} J B. 4.95×10^{5} J
C. 4.95×10^{7} J D. 4.95×10^{4} J

59. How much heat is required to change 7 kg of water into steam at its boiling point (Lv = 2.26×10^{6} J kg^{-1})?
A. 1.58×10^{8} J B. 1.58×10^{5} J
C. 1.58×10^{6} J **D. 1.58×10^{7} J**

60. If the latent heat of fusion of a material is 336 J/g, the heat required to melt 10 g of it at its melting point is
A. 336 J **B. 3360 J**
C. 33600 J D. 3.36×10^{5} J

61. When the temperature of a gas in a fixed volume increases, its pressure
A. decreases B. becomes zero
C. remains the same **D. increases**

62. When the volume of a gas is decreased at constant temperature, its pressure
A. increases B. decreases
C. becomes zero D. stays the same

63. The pressure of a gas is inversely proportional to its volume at constant temperature according to
A. Snell's law **B. Boyle's law**
C. Ohm's law D. Newton's law

64. Superconductors are materials through which current flows
A. only at high temperature B. with very high resistance
C. without resistance D. only in one direction

65. The temperature at and below which resistivity becomes zero is called the
A. melting point B. boiling point
C. room temperature **D. critical temperature**

66. Superconductivity was discovered in 1911 by
A. Isaac Newton **B. Heike Kamerlingh Onnes**
C. Michael Faraday D. Albert Einstein

67. The critical temperature of aluminium is
A. 4.2 K B. 7.2 K **C. 1.18 K** D. 108 K