## Multiple Choice: Identify the letter of the choice that best completes the statement

**1.** If it is given that 546 K equals 273°C, then it follows that 400 K equals:
A 1 200°C. B 127°C. C 150°C. D 473°C.

**2.** What is the temperature of a system in thermal equilibrium with another system made up of ice and water at one atmosphere of pressure?
A 100°C B 0°F C 273 K D 0 K

**3.** Which best describes a system made up of ice, water and steam existing together?
A steam point B absolute zero C triple point D ice point

**4.** At what temperature is the same numerical value obtained in Celsius and Fahrenheit?
A –40° B 0° C 40° D –72°

**5.** Normal body temperature for humans is 37°C. What is this temperature in kelvins?
A 296 B 310 C 393 D 273

**6.** Carbon dioxide forms into a solid (dry ice) at approximately –157°F. What temperature in degrees Celsius does this correspond to?
A –157°C B –93°C C –121°C D –105°C

**7.** An interval of one Celsius degree is equivalent to an interval of:
A 5/9 Fahrenheit degree.
B one Fahrenheit degree.
C 5/9 kelvin.
D one kelvin.

**8.** A temperature of 233 K equals which of the following?
A 506°C B 40°C C -40°F D 40°F

**9.** The pressure in a constant-volume gas thermometer extrapolates to zero at what temperature?
A 0°C B 0 K C 0°F D 0 Pa

**10.** A steel wire, 150 m long at 10°C, has a coefficient of linear expansion of $11 \times 10^{-6}$/C°. Give its change in length as the temperature changes from 10°C to 45°C.
A 0.65 cm B 1.8 cm C 5.8 cm D 12 cm

**11.** A rectangular steel plate with dimensions of 30 cm × 25 cm is heated from 20°C to 220°C. What is its change in area? (Coefficient of linear expansion for steel is $11 \times 10^{-6}$/C°.)
A 0.82 $cm^2$ B 1.65 $cm^2$ C 3.3 $cm^2$ D 6.6 $cm^2$

**12.** Which best expresses the value for the coefficient of volume expansion, $\beta$, for given material as a function of its corresponding coefficient of linear expansion, $\alpha$?
A $\beta = \alpha^3$ B $\beta = 3\alpha$ C $\beta = \alpha^2$ D $\beta = 2\alpha$

**13.** A steel plate has a hole drilled through it. The plate is put into a furnace and heated. What happens to the size of the inside diameter of a hole as its temperature increases?
A increases B decreases C remains constant D becomes elliptical

**14.** What happens to a volume of water when its temperature is reduced from 8°C to 4°C?
A density increases
B density decreases
C density remains constant
D vaporizes

**15.** A steel sphere sits on top of an aluminum ring. The steel sphere ($\alpha = 1.10 \times 10^{-5}$/C°) has a diameter of 4.000 0 cm at 0°C. The aluminum ring ($\alpha = 2.40 \times 10^{-5}$/C°) has an inside diameter of 3.994 0 cm at 0°C. Closest to which temperature given will the sphere just fall through the ring?
A 462°C B 208°C C 116°C D 57.7°C

**16.** A long steel beam has a length of twenty-five meters on a cold day when the temperature is 0°C. What is the length of the beam on a hot day when $T$ = 40°C? ($\alpha_{steel} = 1.1 \times 10^{-5}$/C°)
A 25.000 44 m B 25.004 4 m C 25.011 m D 25.044 m

**17.** As a copper wire is heated, its length increases by 0.100%. What is the change of the temperature of the wire? ($\alpha_{Cu} = 16.6 \times 10^{-6}/C°$)

6.0°C **D** 30.1°C **C** 60.2°C **B** 120.4°C **A**

**18.** A pipe of length 10.0 m increases in length by 1.5 cm when its temperature is increased by 90°F. What is its coefficient of linear expansion?

$23 \times 10^{-6}$/°C **D** $13 \times 10^{-6}$/°C **C** $17 \times 10^{-6}$/°C **B** $30 \times 10^{-6}$/°C **A**

**19.** A material has a coefficient of volume expansion of $60 \times 10^{-6}$/°C. What is its area coefficient of expansion?

$180 \times 10^{-6}$/°C **D** $20 \times 10^{-6}$/°C **C** $40 \times 10^{-6}$/°C **B** $120 \times 10^{-6}$/°C **A**

**20.** Boltzmann's constant, $k_B$, may be derived as a function of $R$, the universal gas constant, and $N_A$, Avogadro's number. Which expresses the value of $k_B$?

$N_A/R$ **D** $R/N_A$ **C** $N_AR$ **B** $N_AR^2$ **A**

**21.** An aluminum tube is 3m long at 20°C. The length at 100 °C and 0.0 °C becames. ($\alpha = 24 \times 10^{-6}$ (°C)$^{-1}$)

5.00576m and 9.29856 m **C** 3.00576 m and 2.99856 m **A**

2.00576m and 3.99856 m **D** 9.00576m and 5.99856 m **B**

**22.** The temperature coefficient of resistance of the material of a wire is 0.00125°C$^{-1}$. Its resistance at 300 K is 1Ω. The temperature will the resistance of the wire be 2 Ω is

854ºC **D** 584ºC **C** 485ºC **B** 458ºC **A**

**23.** Two hundred thousand joules of heat is removed from a 25kg block of ice initially at -5°C. What is its final temperature? ($c_{ice}$ = 2110J/kg °C)

2.8°C **D** 8.8°C **C** 8.0°C **B** 0.8°C **A**

**24.** Two black concentric spheres are temperatures of 200k and 300k. The space in between the two spheres is evacuated. The net rate of energy transfer between the two spheres is ($\sigma = 5.67 \times 10^{-8}$ M.K.S. units)

38.7 Watts/m$^2$ **D** 3.87 Watts/m$^2$ **C** 0.387 KWatts/m$^2$ **B** 0.387Watts/m$^2$ **A**

**25.** Charles' Law is define the relation between volume of a gas varies directly with the absolute temperature at

constant pressure **C** varies pressure **A**

constant number of moles **D** varies number of moles **B**

**MULTIPLE CHOICE**

**1.** ANS: A
**2.** ANS: B
**3.** ANS: B
**4.** ANS: A
**5.** ANS: B
**6.** ANS: D
**7.** ANS: B
**8.** ANS: C
**9.** ANS: B
**10.** ANS: C
**11.** ANS: C
**12.** ANS: B
**13.** ANS: A
**14.** ANS: A
**15.** ANS: C
**16.** ANS: C
**17.** ANS: B
**18.** ANS: A
**19.** ANS: B
**20.** ANS: C
**21.** ANS: A
**22.** ANS: D
**23.** ANS: C
**24.** ANS: B
**25.** ANS: C