A. Choose the correct alternative : 1 Mark

1. If specific heat of a substance is infinite, it means—
   (a) heat is given out
   (b) heat is taken in
   (c) no change in temperature takes place whether heat is taken in or, given out
   (d) all of the above
2. Which of the following has the highest specific heat?
   (a) copper (b) water
   (c) hydrogen (d) silver
3. Water is used as a coolant because of its—
   (a) lower density
   (b) easy availability
   (c) high specific heat
   (d) low specific heat
4. Boiling water is changing into steam. The specific heat of boiling water is—
   (a) zero (b) one
   (c) infinity (d) less than one
5. One mole of a gas enclosed in a vessel is heated at constant pressure through 1 K. Work done by the gas is—
   (a) 1 joule (b) $\frac{1}{R}$ joule
   (c) R joule (d) none of these
6. Temperature determines the direction of net change of—
   (a) gross K.E.
   (b) gross P.E.
   (c) intermolecular P.E.
   (d) intermolecular K.E.
7. Work required to generate 1 kcal of heat is—
   (a) 4.2 J (b) 4.2×10^7 J
   (c) 4.2×10^3 J (d) none of these
8. Co-efficient of cubical expansion of water is minimum at—
   (a) 0°C (b) 4°C
   (c) 15.5°C (d) 100°C
9. In a pressure cooker, cooking is faster because the increase of vapour pressure—
   (a) increases sp. heat
   (b) decreases sp. heat
   (c) decreases the boiling point
   (d) increases the boiling point
10. Gaps are left in railway tracks to compensate thermal expansion during—
    (a) rainy season (b) winter
    (c) summer (d) wind
11. A solid Iron ball is heated, which one of the following will have minimum percentage increase—
    (a) radius (b) surface area
    (c) volume (d) density
12. The relationship between the co-efficient of linear and volumetric expansion is—
    (a) $\gamma = \alpha^{-3}$ (b) $\gamma = \alpha^3$
    (c) $\gamma = 3\alpha$ (d) $\gamma = \alpha$
13. The co-efficient of linear expansion of any material depends on—
    (a) temperature difference
    (b) length of material
    (c) shape of material
    (d) none of the above
14. When Iron ball is heated, percentage increase will be largest in—
    (a) diameter (b) surface area
    (c) volume (d) density

15. The α(co-efficient of linear expansion) is –

(a) $\frac{L}{\Delta T \times \Delta L}$ (b) $\frac{\Delta L}{T \times L}$

(c) $\frac{L}{T \times \Delta L}$ (d) $\frac{\Delta L}{\Delta T \times L}$

B. Choose the correct alternatives : 2 Marks

1. For nitrogen $C_p - C_v = x$ and for argon. $C_p - C_v = y$. The relation between x and y is given by –

(a) $x = y$ (b) $x = 7y$

(c) $x = 7x$ (d) $x = \frac{1}{2}y$

2. The increase in internal energy of a gas per unit mass per unit rise in temp. is equal to –

(a) C_v (b) C_p

(c) $C_p - C_v$ (d) $C_p + C_v$

3. One gram of ice at 0°C is added to 5 gram of water at 10°C. Final temperature of the mixture is –

(a) -5°C (b) 5°C

(c) 0°C (d) none of these

4. 336 g of ice at 0°C is mixed with 336 g of water at 80°C. The final temp. of the mixture is –

(a) 80°C (b) 40°C

(c) 60°C (d) 0°C

5. A bimetallic strip is made of two strips A and B having coeffs. of linear expansion α_A and β_B. If $\alpha_A < \alpha_B$, then on heating, the strip will –

(a) bend with A on outer side

(b) bend with B on outer side

(c) not bend at all

(d) none of these

6. Two liquids are at temps [illegible] 40°C. When same mass of both of them is mixed, the temp. of the mixture is 32°C. What is the ratio of their specific heats?

(a) 1/3 (b) 2/5

(c) 3/2 (d) 2/3

7. Two bars of copper having same length but unequal cross sections are heated to the same temperature. The change in length will be –

(a) equal in both bars

(b) more in thicker bar

(c) more in thinner bar

(d) cannot say

8. Two blocks of ice when pressed together join to form one block. This happens because –

(a) m.p. falls with pressure

(b) m.p. rises with pressure

(c) heat is rejected to outside

(d) heat is absorbed from outside

9. A bottle of water at 0°C is opened on the surface of moon. What happens?

(a) water freezses

(b) water will boil

(c) water decomposes into H_2 and O_2

(d) None of these happens

10. The coefficient of linear expansion of a crystal in one directions is α_1 and that in every direction it is α_2. The coeff. of cubical expansion is –

(a) $3\alpha_1$ (b) $3\alpha_2$

(c) $\alpha_1 + 2\alpha_2$ (d) $2\alpha_1 + \alpha_2$

Multiple Choice Questions

A. Choose the correct alternative : 1 Mark

1. With rise in temperature, the Young's modulus of electicity –
   (a) decreases (b) changes erratically
   (c) increases (d) remains unchanged

2. The Young's modulus of a perfectly rigid body is –
   (a) unity
   (b) zero
   (c) infinity
   (d) some finite non-zero constant

3. The shear modulus of elasticity of a liquid is –
   (a) infinity
   (b) unity
   (c) some finite, non-zero constant
   (d) zero

4. The property of metals which allows them to be drawn readily into thin wires beyond their elastic limit without rupture is known as –
   (a) malleability (b) ductility
   (c) hardness (d) elasticity

5. Solids which break or rupture above the elastic limit are classified as –
   (a) brittle (b) elastic
   (c) ductile (d) malleable

6. The reciprocal of bulk modulus of a substance is called its –
   (a) compressibiity
   (b) rigidity
   (c) viscosity
   (d) modulus of elasticity

7. When a wire undergoes a linear tensile strain, it experiences a lateral contraction also. The ratio of lateral contraction of longitudinal strain is known as –
   (a) Young's modulus
   (b) bulk modulus
   (c) poission ratio
   (d) none of the above

8. The relation between Young's modulus (Y) bulk modulus (K) and modulus of elasticity (η) is –
   (a) $\frac{3}{Y} = \frac{1}{K} + \frac{3}{7}$ (b) $\frac{3}{Y} = \frac{1}{\eta} + \frac{1}{3K}$
   (c) $\frac{1}{Y} = \frac{3}{\eta} + \frac{1}{3K}$ (d) $\frac{1}{\eta} = \frac{3}{Y} + \frac{1}{3K}$

9. A cube is subjected to a uniform volume compression. If the side of the cube decreases by 2%, the bulk strain is –
   (a) 0.02 (b) 0.03
   (c) 0.04 (d) 0.06

10. A rubber ball is taken to a 100 m deep lake and its volume changes by 0.1%. The bulk modulus of rubber is nearly –
   (a) 1×10^6 N/m^2
   (b) 1×10^7 N/m^2
   (c) 1×10^8 N/m^2
   (d) 1×10^9 N/m^2

11. The length of a metal is l_1 when the tension in it is T_1 and is l_2 when the tension is T_2. The original length of the wire is—

(a) $\frac{l_1 + l_2}{2}$ (b) $\frac{l_1 T_2 + l_2 T_1}{T_1 + T_2}$

(c) $\frac{l_1 T_2 - l_2 T_1}{T_2 - T_1}$ (d) $\sqrt{T_1 T_2 l_1 l_2}$

12. The relation between Young's modulus (Y), modulus of rigidity (η) and poisson's ratio (σ) is—

(a) $Y = 2\eta(1 - \alpha)$

(b) $Y = 2\eta(1 + \alpha)$

(c) $Y = \eta(1 - 2\alpha)$

(d) $Y = 2\eta(1 + 2\alpha)$

13. When a spiral spring is stretched by a force, the resultant strain is—

(a) volume (b) shear

(c) tensile (d) all of these

14. In case of rubber band the workdone by it in returning to its original shape

(a) is less than the work required to deform it

(b) is greater than the work required to deform it

(c) is equal to the work required to deform it

(d) all of the above

15. A spiral spring is stretched by a weight attached to it. The modulus of elasticity involved is—

(a) Young's modulus

(b) Bulk modulus

(c) Modulus of rigidity

(d) Isothermal elasticity

16. The force required to stretch a steel wire of 1 cm^2 cross-section to 1.1 times its length would be ($Y = 2 \times 10^{11}$ N/m^2)

(a) 2×10^6 N (b) 2×10^3 N

(c) 2×10^{-3} N (d) 2×10^{-6} N

17. The normal density of gold is ρ and its bulk modulus is K. The increase in density of a piace of gold when a pressure P is applied uniformly from all sides is—

(a) $\frac{K\rho}{2P}$ (b) $\frac{P\rho}{2K}$

(c) $\frac{P\rho}{K - \rho}$ (d) $\frac{P\rho}{K - P}$

18. A boy is carrying a bucket of water in one hand and a piece of plaster in the other. After transferring the plaster piece to the bucket (In which it floats) the boy will carry—

(a) same load as before

(b) more load than before

(c) less load than before

(d) either less or, more load, depending on the density of the plaster.

19. A body is just floating in a liquid (their densities are equal). If the body is slightly pressed down and released it will—

(a) start oscillating

(b) sink to the bottom

(c) come back to the same position immediately

(d) come back to the same position slowly

20. 1 kg of cotton and iron are weighed in vacuum, then—

(a) cotton and iron will weigh same

(b) iron will weigh more than cotton

(c) cotton will weigh more than iron

(d) both have zero weight

21. An ice block floats in a liquid whose density is less than water. A part of block is outside the liquid. When whole of ice has melted, the liquid level will –
(a) rise
(b) go down
(c) remain same
(d) first rise than go down

22. A block of ice is floating in liquid of specific gravity 1.2 contained in a beaker. When the ice melts completely, how will the liquid level in the beaker change?
(a) It will increase
(b) It will decrease
(c) It will remain constant
(d) None of the above

23. A boat floating in a tank is carrying a number of large stones. If the stones are unloaded into water, what will happen to the water level?
(a) It will increase
(b) It wil decrease
(c) It will remain constant
(d) It will depend upon the nature of stones

24. The volume elasticity is possessed by –
(a) Solids only
(b) Liquids only
(c) Gases only
(d) All the three states of matter

25. If a metal wire is stretched a little beyond its elastic limit (or, yield point), and released, it will –
(a) not contract
(b) lose its elastic property completely.
(c) contract only upto its length at the elastic limit
(d) contract, but its final length will be greater than initial length