

Nanotechnology/PGQP 38

- The average of the function $f(x) = \sin x$ in the interval $(0, \pi)$ is
 - 1/2
 - $2/\pi$
 - $1/\pi$
 - $4/\pi$
- In a p-type semiconductor, the Fermi Level lies 0.4 eV above the valence band. If the conduction of the acceptor atom is tripled. Find the new position of the Fermi level
 - 0.367 eV
 - 0.734 eV
 - 0.183 eV
 - 0.052 eV
- Approximately how large must be the magnetic induction for the orientation energy to be comparable to the thermal energy at room temperature for $\mu_m = 5 \mu_B$
 - 89.32 W/m²
 - 10.32 W/m²
 - 52.45 W/m²
 - 78.27 W/m²
- To produce single electron tunneling, the thermal energy of the particle must be
 - much smaller than Coulomb energy
 - much higher than Coulomb energy
 - equal to the Coulomb energy
 - not related to Coulomb energy
- In case of homogeneous nucleation, the critical radius and the free energy barrier for nucleation
 - decrease as the undercooling increases
 - increases as the undercooling increases
 - decrease as the undercooling decreases
 - increase as the undercooling decreases
- An elementary crystal with a facet centered cubic structure (FCC), each surface atom in the {100} facet will have broken bonds.
 - two
 - three
 - four
 - five
- In a cyclic process, heat transfers are + 14.7 kJ, - 25.2 kJ, - 3.56 kJ and +31.5 kJ. Calculate the net work for this cyclic process.
 - 12.45 kJ
 - 17.44 kJ
 - 19.24 kJ
 - 2.4 kJ
- For a steel alloy, a carburizing heat treatment of 10 h duration will raise the carbon concentration to 0.45 wt% at a point 2.5 mm from the surface. Estimate the time to achieve the same concentration at a 5.0 mm position for an identical steel and at the same carburizing temperature.
 - 10 h
 - 5 h
 - 40 h
 - 35 h
- The number-average molecular weight of a polypropylene is 1,000,000 g/mol. Compute the number-average degree of polymerization.
 - 20,700
 - 40,000
 - 23,700
 - 55,000
- Pi (π)-bond is formed by the overlapping of
 - p-p orbitals along their axis

- (b) $s-p$ orbitals along the axis of p -orbitals
- (c) $p-p$ orbitals along the perpendicular to their axis
- (d) $s-s$ orbitals

11. Optical Fibers are based on the phenomenon of

- (a) Total Internal reflection
- (b) Stefan's Law of radiation
- (c) Photoelectric effect
- (d) Refraction

12. The criterion for the spontaneity of a process is

- (a) $\Delta S_{\text{sys}} > 0$
- (b) $\Delta S_{\text{surr}} > 0$
- (c) $\Delta S_{\text{sys}} + \Delta S_{\text{surr}} > 0$
- (d) $\Delta S_{\text{sys}} - \Delta S_{\text{surr}} > 0$

13. Creep curve is a plot of

- (a) Strain versus time
- (b) Strain versus temperature
- (c) Stress versus strain
- (d) Elastic modulus versus temperature

14. Time dependent deformation in which the material does not recover its original dimension is called

- (a) Elasticity
- (b) Plasticity
- (c) Viscoelasticity
- (d) Anelasticity

15. Polymers are in nature.

- (a) Organic
- (b) Inorganic
- (c) Both (a) and (b)
- (d) Ceramic
