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CA1 CSE G1

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PSG College of Technology
Department of Physics
BE CSE G1
19Z202 Materials Science
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Heisenberg uncertainty principle is the consequence of *

- ☐ Bohr hypothesis
- ☒ de Broglie hypothesis
- ☐ diffraction
- ☐ interference

Which one of the following combination will increase the likelihood of particle tunneling a) increase the height of the barrier, b) decrease the height of the barrier, c) increase the mass of the particle, d) decrease the mass of the particle, e) decrease the width of the barrier

- ☒ b, d and e
- ☐ a, d and e
- ☐ a, c and e
- ☐ a, b and c

The energy of the particle after quantum tunneling is

- ☐ less than the initial energy
- ☐ greater than the initial energy
- ☒ equal to the initial energy
- ☐ unpredictable

The lowest energy level of a certain quantum harmonic oscillator is 5.00 eV. The energy of the next higher level is closest to

- ☐ 7.5 eV
- ☐ 10 eV
- ☒ 20 eV
- ☐ 40 eV

Which of the wave function is not acceptable

- ☐ $\exp(x)$
- ☐ $\exp(-x)$

☐ $\sin(x)/x$

☒ $\sin^{-1} x$

The kinetic energy of a particle in a box is proportional to the

☐ quantum number

☒ square of the quantum number

☐ Length of the box

☐ square of the length of the box

An Eigen function has physical significance if it is

☒ finite value

☐ discontinuous

☐ multi valued

☐ zero

Time dependent Schrodinger equation in shorter form is given by $H\psi$ equal to *

☐ $E\psi^2$

☐ E

☐ ψ

☒ $E\psi$

Tunnel effect can be explained on the basis of _____ *

☐ Schrodinger's Equation

☐ Particle in a Box

- ☒ Heisenberg's uncertainty principle
- ☐ De-Broglie Wavelength

Electronic polarization

- ☐ increases linearly with temperature
- ☐ increases exponentially with temperature
- ☒ is independent of temperature
- ☐ decreases with temperature

The electric dipole moment per unit volume is known as

- ☐ dielectric constant
- ☒ dielectric polarization
- ☐ relative permittivity
- ☐ dielectric polarizability

The dielectric constant of metal is observed when it is subjected to

- ☐ thermal energy
- ☒ low frequency electric field
- ☐ high frequency electric field
- ☐ magnetic field

At $T = 0$ K, the energy levels located above Fermi energy level are

- ☐ partially filled
- ☒ vacant

- ☐ completely filled
- ☐ absent

The ratio of thermal to electrical conductivity is directly proportional to

- ☒ Temperature
- ☐ Specific heat capacity
- ☐ mobility of an electron
- ☐ electrical resistivity

If E_1 and E_2 are the energies of a particle in a potential box corresponding to $n=1$ and $n=2$, respectively, then the relation between E_1 and E_2 is given as

- ☐ $E_1 = E_2$
- ☐ $E_1 = 2E_2$
- ☐ $E_1 = 3E_2$
- ☒ $E_1 = 4E_2$

An electron with a total energy of $E = 6$ eV approaches a potential barrier with a height of $V = 12$ eV. If the width of the barrier is $L = 0.18$ nm, what is the probability that the electron will tunnel through the barrier?

- ☐ ~1%
- ☐ 0%
- ☒ ~4%
- ☐ ~10%

An electron is in 1D box of 1nm length. What is the probability of locating the electron between $x=0$ and $x=0.2$ nm in its lowest energy state?

- ☐ 0
- ☒ 0.05
- ☐ 0.5
- ☐ 1

An electron which has mass 9.11×10^{-31} kg traveling at 40 m/s. Suppose the momentum is measured to an accuracy of 1 percent then the uncertainty in position is

- ☒ $\sim 10^{-4}$ m
- ☐ $\sim 10^{-10}$ m
- ☐ $\sim 10^{-34}$ m
- ☐ $\sim 10^6$ m

Fermi level for Silver is 5.5 eV, Find out the energy for which the probability of occupancy at 300 K is 0.9.

- ☒ ~ 5.4 eV
- ☐ ~ 1.2 eV
- ☐ ~ 1.0 eV
- ☐ ~ 10.2 eV

Find out the average radius of the atom of an air molecule if the polarizability of atoms in the air molecules is 9×10^{-41} Fm²

- ☒ ~ 1 Å
- ☐ ~ 0.5 Å
- ☐ ~ 2 Å
- ☐



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