

1. When an electron 'jumps' from an energy level to a lower one, the energy released is usually
 - A) absorbed by the nucleus
 - B) emitted as heat
 - C) emitted as light
 - D) emitted as a continuous electromagnetic wave
 - E) emitted as a photon.
2. Which of the following are close-packed structures?
 - A) hexagonal
 - B) tetragonal
 - C) b.c.c.
 - D) f.c.c.
 - E) diamond.
3. The [110] direction in a cubic unit cell is parallel to
 - A) the diagonal of one face of the cell
 - B) the body diagonal of the cell
 - C) one edge of the cube.
4. A phase change *usually* occurs
 - A) at a specific temperature and pressure
 - B) with the evolution or absorption of heat
 - C) over a range of temperature at a given pressure
 - D) spontaneously, without the absorption or evolution of heat
 - E) without passing through stable intermediate states.
5. The elastic strain obtained on applying a stress to a material is
 - A) time-dependent
 - B) instantaneous
 - C) partially permanent
 - D) reversible
 - E) directly proportional to the stress
 - F) inversely proportional to the stress.
6. Work-hardening is a useful strengthening mechanism but it has the following disadvantages.
 - A) only useful for two-phase materials
 - B) decreases the ductility of the material
 - C) not suitable if the material is to be used at an elevated temperature
 - D) only applicable to single crystals.
7. For complete solid miscibility the two components must have
 - A) similar melting points
 - B) the same crystal structure
 - C) similar size atoms
 - D) identical free energies at room temperature
 - E) similar hardness
 - F) the same valency.
8. A martensitic transformation
 - A) involves the precipitation of an equilibrium precipitate
 - B) is extremely rapid
 - C) can only lead to a change in the crystal structure of the phases
 - D) can lead to a change in composition of the phases
 - E) does not involve diffusion.
9. During the initial stage in the deformation of a composite with a metal matrix
 - A) there is a hyperbolic relationship between stress and strain
 - B) both the matrix and the fibres deform elastically
 - C) the Young's Modulus of the composite is given by a simple law of mixtures
 - D) the Young's Modulus of the composite is determined primarily by the yield stress of the metal matrix
10. The molecules in a polymer are held together by
 - A) primary bonds
 - B) secondary bonds
 - C) strong bonds
 - D) weak bonds
 - E) covalent bonds
 - F) van der Waal's or hydrogen bonds.
11. The resistivity of a metal is a function of temperature because
 - A) the electron velocity varies with temperature
 - B) the electron gas density varies with temperature
 - C) the number of phonons varies with temperature.
12. If the atomic magnetic moments are randomly oriented in a solid its magnetic behaviour is termed
 - A) polycrystalline
 - B) paramagnetic
 - C) antiferromagnetic
 - D) polymagnetic.

自以上12題中可以選擇的答案共有25個,每個答案4分,共計100分。