Electron Diffraction and Imaging

Assignment No – 8 (solution)

1. **Electrons are scattered elastically by**
   a. Coulomb interaction when they penetrate the positively charged atomic core
   b. their interaction with the nuclear potential
   c. by the phonons
   d. by the plasmons

2. **Select the correct statement of atomic scattering factor for x-ray diffraction**
   a. Atomic scattering factor increases with increase of scattering angle
   b. Number of electrons in an atom only determines the atomic scattering factor
   c. The atom and its ion will have the same scattering factor
   d. Atomic Scattering factor for forward scattering is equal to Z

3. **The spatial coherence length of the electrons exiting from the electron source is measured**,
   a. Along the travelling direction of the electrons
   b. Perpendicular to the travelling direction of the electrons
   c. Along the scattering direction of the electrons
   d. None of these

4. **The spatial coherence increases with**
   a. Increase in width of the source
   b. Decrease in width of the source
   c. Increase in distance from source to aperture
   d. Decrease in distance from source to aperture

5. **FEG(Field Emission Gun) has excellent spatial and temporal coherence because of**
   a. Small cross-over and narrow energy spread
   b. Large cross-over and narrow energy spread
   c. Small cross-over and broad energy spread
   d. Large cross-over and broad energy spread

6. **Temporal coherence length in TEM increases with**
   a. Increasing accelerating voltage and increasing energy spread
   b. Increasing accelerating voltage and decreasing energy spread
   c. Using thin sample for examination and increasing energy spread
   d. Decreasing accelerating voltage and increasing energy spread

7. **Chromatic aberration arises due to**
   a. Different focal length for different scattering planes
   b. Energy spread in the electron beam
   c. fluctuation in beam voltage and lens current

d. the variation in magnetic field in a plane perpendicular to optic axis

8. **Due to spherical aberration,**
   a. Uniform Phase shift is introduced
   b. Zero phase shift is introduced
   c. Non-uniform Phase shift is introduced
   d. None of these

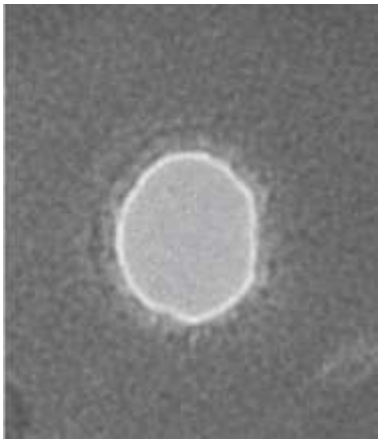
9. **Gun brightness increases with**
   a. Increasing current density in the beam and increasing semi-angle of beam convergence
   b. Increasing current density in the beam and decreasing semi-angle of beam convergence
   c. Decreasing current density in the beam and increasing semi-angle of beam convergence
   d. Decreasing current density in the beam and decreasing semi-angle of beam convergence

10. **The image in TEM is focused on the projector screen as well as the CCD camera at a different height from the screen due to**
    a. Large Depth of field
    b. Large Depth of focus
    c. Small Depth of field
    d. Small Depth of focus

11. **Which of the following effect in the image is caused by astigmatism?**

    a. Poor contrast
    b. Fringes around edge of a hole in the image
    c. An inability to bring the image into crisp focus
    d. Bright ring around the grain boundary in the image

12. **Choose the correct statement for the image shown below. Fringes are seen around the hole in the image shown below because of**



a. Underfocus
b. Exact focus
c. Astigmatism

d. Specimen being amorphous

13. Choose the correct statement

a. Atomic scattering factor for electrons is independent of scattering angle
b. Atomic scattering factor for x-ray is independent of scattering angle
c. Atomic scattering factor for neutron is independent of scattering angle
d. Atomic scattering factor for neutrons is different for atom and its ions

14. **Coherency can be defined as**

a. Beam current passing per unit area
b. Respective difference in Brightness of two different area of a sample
c. How well the electron waves are “in step” with one another
d. How well the image is in focus

15. **Choose the correct statements**,

a. Fine size beams are more spatially coherent and give better spatial resolution.
b. Fine size beams are more spatially coherent but give poor spatial resolution
c. Large size beams are more spatially coherent and give better spatial resolution.
d. Large size beams are more spatially coherent but give poor spatial resolution

NOTE: If you need any explanation for any of the question, you are welcome to write us on the forum. ---- NPTEL Team.