

## NSE Fusion Oral Exam Mandatory Question. Feb 2016

1. When a solid is in contact with a plasma, a characteristic structure is induced at the boundary of the plasma; it is called the sheath.

(a) Show from first principles what is the approximate thickness of the sheath in an unmagnetized plasma.

(b) In a proposed steady fusion reactor, where will sheaths form? Why are they important? What phenomena important to the operation of a reactor do they govern?

2. In a tokamak there are two classes of particles: “passing” and “trapped”.

(a) What is the distinction between them and why?

(b) If a tokamak of high aspect ratio has circular cross-section, show how to calculate the gyrocenter orbit of a passing particle of small perpendicular energy.