

Major Exam
PYL729: Nano Probe Techniques

May 9, 2018

Part B Marks: 30

- ✓Q1. Do evanescent waves transport energy? Explain. [2]
- Q2. How does the feedback system in an AFM keep the probe-sample force constant? How does tapping mode in AFM differ from non-contact mode? What is hysteresis and creep in scanning probe microscopy? [3]
- ✓Q3. What is the typical resolution of a near field scanning optical microscope (NSOM)? How it differs from conventional optical microscope? [3]
- ✓Q4. What is Raman spectroscopy? What is the significance of virtual states in Raman spectroscopy? [3]
- Q5. How does SPR differ from LSPR? Ag is preferred over Au as plasmonic materials, why? Write down two applications of SERS. [3]
- ✓Q6. Does Raman spectroscopy spectra depend on the excitation wavelength? Explain, why or why not. What is the mechanism for bulk plasmons generation? Bulk plasmons are observed by p-type, s-type or un-polarized light, explain? [4]
- ✓Q7. What is set point in STM imaging? Name the metal from which tip of the STM is made. What are the forces other than vander Wall in cantilever surface interaction in AFM? [3]
- ✓Q8. What is local density of states measured by scanning tunneling spectroscopy (STS). Sketch a diagram showing tunneling of electrons between a metal tip and Au sample surface with a positive bias of 0.5 V applied to the sample surface. [4]
- ✓Q9. What is the typical resolution in magnetic force microscopy (MFM)? Compare it with AFM. [2]
- Q10. What is atom probe tomography? How does it differ from Field Ion Microscopy (FIM)? [3]

END
