



RAJARATA UNIVERSITY OF SRI LANKA  
FACULTY OF APPLIED SCIENCES

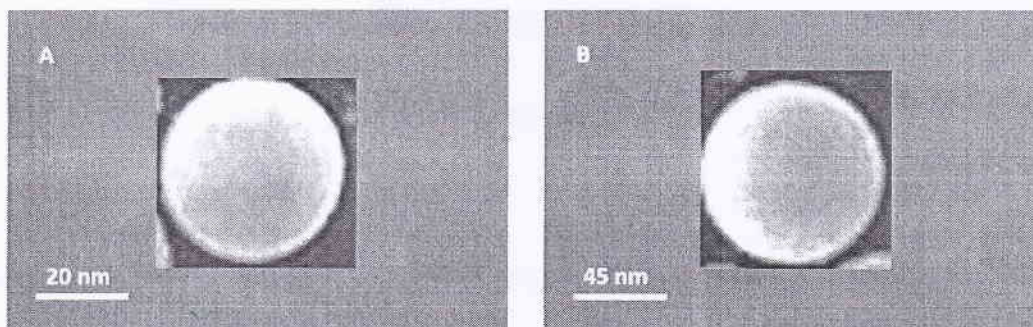
B.Sc. (Special) Degree in Chemistry  
Fourth Year – Semester I Examination – September / October 2019

CHE 4206 – NANOCHEMISTRY

Time: 2 hours

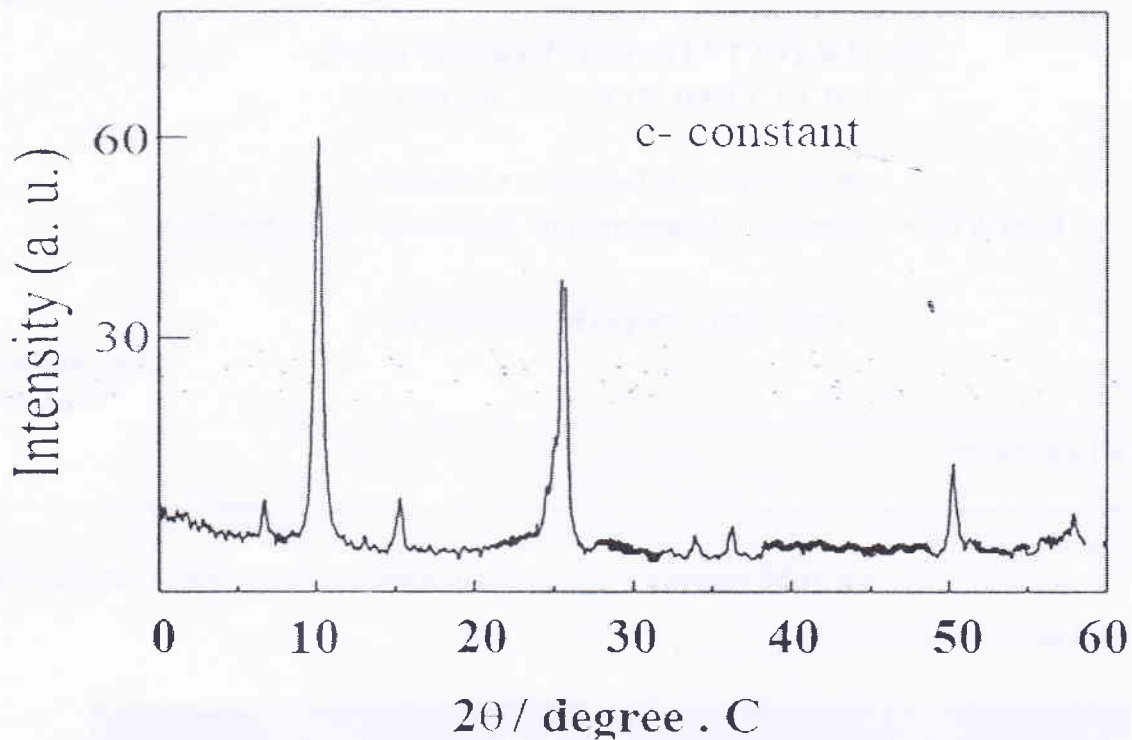
Answer all questions

1. You are provided with two SEM images of two gold nanoparticles in two different sizes and the XRD pattern of sample A.



- Calculate the particle sizes of the gold nanoparticles, separately using above SEM images
- The XRD pattern given below is related to the sample A. calculate the position (in  $2\theta$ ) of the highest intense peak of the gold nanoparticles by extracting important data from the given XRD pattern. (**Important: consider the single-particle of each of these samples developed by two spherical crystallite units. Shape factor – 0.9**)
- Calculate the full width at half maximum intensity (FWHM) of the XRD pattern of sample B.
- Colors of above two gold colloidal samples are blue and red. Identify these two colloidal solutions separately and explain the reason for the change in color of spherical gold nanoparticles with their size.

(100 Marks)



XRD Pattern of sample A

2. Briefly explain the major steps of the development of P-N junction on the silicon wafer using UV light source.  
(100 Marks)
3. With appropriate examples, explain how the optical, physical and electrical properties are changed at the nanoscale  
(100 Marks)
4. In electron microscopic systems, different types of signals are generated when electron beam interacts with the sample. What are the signals coming out from the sample surface? Explain the mechanism of generation of these signals  
(100 Marks)

END