B.Sc. 6th Semester (Honours) Examination, 2020-21

PHYSICS

Course ID: 62427 **Course Code: SH/PHS/604/DSE-4**

Course Title: Nano Materials and Applications Lab (DSE T7/P7)

Time: 1 Hour **Full Marks: 15**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer any ***three*** questions: 5×3=15

1. Name the chemicals required to synthesize Au nanoparticles using chemical route. Explain the process using flow chart and write down the chemical reaction involved in this process. What precautions should be taken during this synthesis process? [1+3+1]

2. Name the chemicals required to synthesize ZnS nanoparticles using chemical route. Explain the process using flow chart and write down the chemical reaction involved in this process. What precautions should be taken during this synthesis process? [1+3+1]

3. What is Surface Plasmon Resonance (SPR)? The data for variation of SPR band of spherical Au nanoparticles with particle size (D) is given in the following table:

D (nm)	λ_{max} (nm)
1.9	No SPR
10.2	517
14.9	520
22.1	523
50.4	535
99.8	575

Draw D vs. λ_{max} graph using the given data. What inference can be drawn from this graph? [1+2+2]

4. What information can be obtained about a nanomaterial studying its X-ray diffraction data? Explain the principle of estimating particle size from X-ray diffraction data. [2+3]

5. Explain the principle of estimating size of spherical semiconductor nanoparticles by measuring its band gap. What is meant by strong and weak confinement regime of nanomaterials? [3+2]