University and PG College MSc Teachers' Training Program *In* Chemistry

16th June 2019 to 6th July 2019 (21 days)

Center of Excellence in Science and Mathematics Education

Indian Institute of Science

at its

***Challakere Campus*, Chitradurga-577536**

Under

Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT), MHRD, Govt. of India.

IISc at Challakere Campus offers a great opportunity for University and PG college teachers **teaching MSc Chemistry**. This is a three weeks residential training program equivalent to UGC refresher courses approved by MHRD, Govt. of India.

Course Specialization: (1) **Quantum Chemistry, (2) Spectroscopy and (3) Solid state Chemistry.**

The 21 day course is divided into three main subjects which cover most part of MSc general chemistry.

To orient the teachers, we cover Electronics for Chemists; Essential Mathematics for Chemists; Computer Education (LAPTOP), origin maths program, Unix Operating system to run DFT calculations, plotting mathematical functions, s, p, d, f and hybrid orbitals; Energy levels - atomic spectra and molecular spectra; Not to lose sight on chemistry, you will do over 50 chemical reactions (4 days).

(1) Quantum Chemistry: Quantum mechanics has remained one of the difficult topics in MSc because, what is taught is not sufficient/helpful to calculate atomic/molecular energy levels. Today, **Density Functional Theory** has emerged to obtain electronic states of atoms, ions, molecules and solids: Open source Quantum Espresso programs is implemented in our LAPTOP. With two days of learning computer language, you can get electronic states of atoms, molecules and solid with DFT. The teacher will be equipped to teach what to expect from QUANTUM MECHANICS at MSc Chemistry level. We cover Basics of Quantum Mechanics, exact solution of hydrogen atom; Density Functional Theory to obtain electronic energy levels in atoms, ions, molecules, transition metal complexes; Determination of crystal structure and electronic structure of metals and semiconductors, bands in metals and semiconductors by DFT (7 days; 80% time for computation and 20% theory classes).

(2) Spectroscopy: Absorption and emission properties of atoms, ions, molecules and solids (IR, UV, NMR, XPS). More than 25 experiments and extensive analysis of spectra (4 days).

(3) Solid State/Materials Chemistry: Solid state study has remained at 2d sin ɵ = nλ level. Students need to know more to clear NET. We cover determination of structure in solids by powder x-ray diffraction pattern, Miller Indices, indexing powder XRD patterns, Packing in solids, structure of metals, ionic solids; Rietveld analysis to fit the structure – to pursue research in solid state chemistry, preparation of solids and study of their structure, electrical, magnetic and optical properties (5 days).

Each day, teachers will be doing 3 to 5 experiments, which include Resistance vs Temperature for metals and semiconductors, measurement of band gap, temperature measurements from 77 to 1000 K; PXRD analysis, determination of lattice parameters and Rietveld refinement of XRD profile, TGA, Langmuir adsorption, vacuum techniques, gas-solid reaction.

Applications are invited from Indian Citizens who teach Chemistry to MSc students from any part of India. Those who have attended two UGC refresher courses earlier can also apply. **Contract Lecturers and guest faculty members can also apply.**

There will be over **80 hours of lecture and 100 hours of experiments on the above topics.** No holiday/break in 21 days. Only one Sunday afternoon will be left free.

Send your application in the prescribed format available in the TDC website

tdc.iisc.ac.in

Last date to receive application: May 15, 2019.

Send your application to:

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