7th Semester	RML7D002	**Modelling and Simulation of Mineral Processing Operations**	**L-T-P 3-0-0**	**3 Credits**

Module I: **(10 Hours)**

Introduction to mathematical modelling, Stochastics and deterministic models, modelling of size reduction, Matrix and Kinetic models for crushers and grinding mills.

Module II: **(10 Hours)**

Application for the computation of size distribution of the products of crushers and grinding mills from the size distribution of the feeds to the units. Review of computer techniques for handling multidimensional arrays. Computation and representation of assay factor matrices by arrays of variables. Writing computer programmes incorporating the algorithms, Extension of the algorithms to incorporate assay values and mineralogical compositions. Evaluation of the performance of the comminution circuits.

Module III: **(10 Hours)**

Introduction to computation of partition value equations. Use of partition value curves and equations for the modelling of screening, classification and density separation processes. Modelling of electrical and magnetic separation processes using distribution factors.

Module IV: **(10 Hours)**

Recycle calculation by iterative methods using direct substitution and Wegestein's techniques. Writing of computer programs incorporating the use of partition values, use of computer programs and packages for the modelling of separation processes and iterative recycle calculations. Simulation of stochastic and deterministic phenomena, Monte Carlo Simulation. Matrix form representation of beneficiation plant flow sheets. Mineral characterization files, feed composition files and other data bases required for the plant flow sheet, computations. Software for the development of the flow sheet matrices; simulation of unit operations and recycle calculations. Graphic display and error traps for computer program to simulate beneficiation plant flow sheets.

Books:
[1]   King R.P.: Modelling and Simulations of Mineral Processing Systems, Butterworth-Heinemann
[2]   Ford, M.A.: Simulation of Ore dressing Plants. Ph.D Thesis, University of the Witwatersrand, Johannesburg.