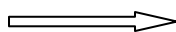# M.A/M.Sc Mathematics Semester 3ʳᵈ

**Effective from academic session 2011**  ⟶  **Repetition for 2012 with minor change**

## MATHEMATICAL BIOLOGY

**Course No. MM-OP-306**

**Unit-I**

Two species Population Models, Types of Interactions between two Species, Prey-Predator Model, Lotka-Voltera Systems and its Geometrical Interpretation, Competition Models, Mutualism and Symbiosis, Stability Analysis of Prey-Predator Model.

**Unit-II**

Epidemic Models and Dynamics of Infectious Diseases: Simple Epidemic Models; SIS, SIR and SRS Epidemic Models. Modelling Venereal Diseases, Modelling Transmission Dynamics of HIV.

**Unit-III**

Cell Growth, Exponential Growth or Decay, Determination of Growth or Decay Rates, The method of Least Squares, Nutrient Uptake by a Cell, Growth of Microbial Colony and Growth of Chemostat.

Enzyme kinetics, The Michaelis-Menten Theory, Early time behaviour of Enzymatic reactions, Cooperative properties of Enzymes, Allosteric Enzymes, Haemoglobin,

**Unit-IV**

Introduction to compartment models, Discrete and Continuous transfers, Introduction to tracer method in Physiology, Bath-tub models, Continuous Infusion into a Compartment, Elementary pharmacokinetics, Parameter estimation in two Compartment models.

*Recommended Books:*

1. Mathematical Biology (An Introduction, Vol. I and II), J.D. Murray, Springer Verlag.
2. Mathematical Model in Biology and Medicines, J.N. Kapur.
3. S. I. Rubinow, Introduction to Mathematical Biology, John Wiley and Sons, 1975.
4. M. R. Cullen, Linear Models in Biology, Ellis Horwood Ltd.