SARDAR PATEL UNIVERSITY
Programme: MSC (Integrated Biotechnology)
Semester: I
Syllabus with effect from: June 2010

Paper Code: PS01CIGB06	**Total Credits: 3**
Title Of Paper: Biomathematics	

Unit	Description in detail	Weightage (%)
1	**SOME SPECIAL FUNCTIONS:** Set, union and intersection of two sets, Function, brief idea of one-to-one and onto function, definitions of domain, co-domain and range of function, examples of finding range and domain of given function, Cartesian product and its biological application, linear functions (definition and its general form $y = ax + b$), point-slope formula, Quadratic function(definition), derivation of coordinates of vertex of parabola represented by $y = ax^2 + bx + c$, visualization of vertex of parabola as a local extrema & local extremum of quadratic function (along with examples), power functions (definition and general form $y = ax^n$), graphical representation of power function for different cases ($a > 0,\ a < 0,\ n = 0,\ n = 1,\ n = 2,\ n < 0,\ 0 < n < 1,\ n > 1$), polynomials, periodic functions (definition), trigonometric functions , trigonometric equalities involving sin, cos, tan, cosec, sec, and cot (related examples), exponential function , definition and properties/rules of exponential function (related examples), logarithmic function, definition and properties/rules of logarithmic function (related examples).	
2	**LIMIT AND DIFFERENTIATION OF FUNCTION:** Limit of function, definition (informal), evaluation of algebraic limit by direct substitution, factorization and rationalization, evaluation of limits by standard result $\lim_{x \to a} \frac{x^n - a^n}{x - a} = na^{n-1}$, evaluation of limit when $x \to \infty$, evaluation of trigonometric limits (using results $\lim_{x \to 0} \frac{\sin x}{x} = 0$ and $\lim_{x \to 0} \frac{\tan x}{x} = 0$), evaluation of logarithmic and exponential limits (using result $\lim_{x \to 0} \frac{a^x - 1}{x} = \log_e a$), differentiation (definition and geometrical meaning), differentiation using standard derivatives, derivative of exponential, logarithmic, trigonometric and inverse trigonometric functions, product rule and quotient rule for differentiation, derivative of composite function using chain rule, local maxima and local minima for function of single variable, higher order derivatives.	
3	**PARTIAL DERIVATIVES, INTEGRATION & DIFFERENTIAL EQUATION:** Introduction of function of several variables, partial derivative of function of several variables (two and three variables), higher (second) order partial derivatives, Maxima and minima for functions of two and more variables, Integration (definition as antiderivative), integration using standard integrals, integration by substitution, integration by trigonometric substitution, integration by parts, integration by partial fraction, differential equation (definition), order and degree of a differential equation, solution of differential equation using	

	method of separable variable (i.e. solution of differential equations of the form $y' = ay + b$, $y' = ay^2 + by + c$ and $y' = ky/x$)	
4	**MATRIX THEORY:** Definition of matrix, Equality of matrices, Sum of two matrices, Scalar multiplication of a matrix, Transpose of a matrix, Introduction to a special types of matrices like row matrix, column matrix, square matrix, diagonal matrix, symmetric matrix, skew-symmetric matrix, identity matrix, Null (zero) matrix, Row – echelon form of a matrix, Rank of a matrix, Inverse of a square matrix, Eigenvalues and eigenvectors of a square matrix..	
	Practical:	
	• To apply the concept of function in biosciences. • To use the concept of exponential & logarithmic function in the field of biosciences. • To make use of log function in some complex calculation of mathematics. • To apply the concept of trigonometric functions to solve some practical problems. • To study the basic concept of vector space. • To use matrix algebra & vector space theory to solve the problems of genetics. • To apply the knowledge of matrix algebra in order to find the compactness of secondary RNA molecule. • To apply the concept of minima and maxima for the function of single variable.	

Basic Text & Reference Books:

- Introduction to Mathematics for Life-Sciences by P. Batschelet - Springer - Verlag
- Mathematics for Biological Science by Jagdish Arya and Ladner